

# Package ‘sparklyr’

December 1, 2020

**Type** Package

**Title** R Interface to Apache Spark

**Version** 1.5.1

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**Description** R interface to Apache Spark, a fast and general engine for big data processing, see <<http://spark.apache.org>>. This package supports connecting to local and remote Apache Spark clusters, provides a 'dplyr' compatible back-end, and provides an interface to Spark's built-in machine learning algorithms.

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**SystemRequirements** Spark: 1.6.x, 2.x, or 3.x

**URL** <https://spark.rstudio.com/>

**BugReports** <https://github.com/sparklyr/sparklyr/issues>

**LazyData** TRUE

**RoxygenNote** 7.1.1

**Depends** R (>= 3.2)

**Imports** assertthat, base64enc, config (>= 0.2), DBI (>= 0.6-1), dplyr (>= 0.7.2), dbplyr (>= 1.1.0), digest, forge, generics, globals, glue, httr (>= 1.2.1), jsonlite (>= 1.4), lifecycle, methods, openssl (>= 0.8), purrr, r2d3, rappdirs, rlang (>= 0.1.4), rprojroot, rstudioapi (>= 0.10), stringr, tibble, tidy, tidyselect, vctrs, uuid, withr, xml2, ellipsis (>= 0.1.0)

**Suggests** arrow (>= 0.14.0), broom, diffobj, foreach, ggplot2, iterators, janeaustenr, Lahman, mlbench, nnet, nycflights13, R6, RCurl, reshape2, shiny (>= 1.0.1), testthat

**Collate** 'spark\_data\_build\_types.R' 'arrow\_data.R' 'spark\_invoke.R' 'browse\_url.R' 'spark\_connection.R' 'avro\_utils.R' 'config\_settings.R' 'config\_spark.R' 'connection\_instances.R' 'connection\_progress.R' 'connection\_shinyapp.R' 'spark\_version.R' 'connection\_spark.R' 'connection\_viewer.R' 'core\_arrow.R' 'core\_config.R' 'core\_connection.R'

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 'zzz.R'

**NeedsCompilation** no

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---

checkpoint\_directory    *Set/Get Spark checkpoint directory*

---

**Description**

Set/Get Spark checkpoint directory

**Usage**

spark\_set\_checkpoint\_dir(sc, dir)

spark\_get\_checkpoint\_dir(sc)

**Arguments**

sc	A spark_connection.
dir	checkpoint directory, must be HDFS path of running on cluster

---

compile\_package\_jars    *Compile Scala sources into a Java Archive (jar)*

---

**Description**

Compile the scala source files contained within an R package into a Java Archive (jar) file that can be loaded and used within a Spark environment.

**Usage**

compile\_package\_jars(..., spec = NULL)

**Arguments**

...	Optional compilation specifications, as generated by spark_compilation_spec. When no arguments are passed, spark_default_compilation_spec is used instead.
spec	An optional list of compilation specifications. When set, this option takes precedence over arguments passed to ...

---

connection_config	<i>Read configuration values for a connection</i>
-------------------	---------------------------------------------------

---

**Description**

Read configuration values for a connection

**Usage**

```
connection_config(sc, prefix, not_prefix = list())
```

**Arguments**

sc	spark_connection
prefix	Prefix to read parameters for (e.g. spark.context., spark.sql., etc.)
not_prefix	Prefix to not include.

**Value**

Named list of config parameters (note that if a prefix was specified then the names will not include the prefix)

---

copy_to.spark_connection	<i>Copy an R Data Frame to Spark</i>
--------------------------	--------------------------------------

---

**Description**

Copy an R data.frame to Spark, and return a reference to the generated Spark DataFrame as a tbl\_spark. The returned object will act as a dplyr-compatible interface to the underlying Spark table.

**Usage**

```
## S3 method for class 'spark_connection'
copy_to(
  dest,
  df,
  name = spark_table_name(substitute(df)),
  overwrite = FALSE,
  memory = TRUE,
  repartition = 0L,
  ...
)
```

**Arguments**

dest	A spark_connection.
df	An R data.frame.
name	The name to assign to the copied table in Spark.
overwrite	Boolean; overwrite a pre-existing table with the name name if one already exists?
memory	Boolean; should the table be cached into memory?
repartition	The number of partitions to use when distributing the table across the Spark cluster. The default (0) can be used to avoid partitioning.
...	Optional arguments; currently unused.

**Value**

A tbl\_spark, representing a dplyr-compatible interface to a Spark DataFrame.

---

distinct	<i>Distinct</i>
----------	-----------------

---

**Description**

See [distinct](#) for more details.

---

download_scalac	<i>Downloads default Scala Compilers</i>
-----------------	------------------------------------------

---

**Description**

compile\_package\_jars requires several versions of the scala compiler to work, this is to match Spark scala versions. To help setup your environment, this function will download the required compilers under the default search path.

**Usage**

```
download_scalac(dest_path = NULL)
```

**Arguments**

dest_path	The destination path where scalac will be downloaded to.
-----------	----------------------------------------------------------

**Details**

See find\_scalac for a list of paths searched and used by this function to install the required compilers.

---

dplyr_hof	<i>dplyr wrappers for Apache Spark higher order functions</i>
-----------	---------------------------------------------------------------

---

**Description**

These methods implement dplyr grammars for Apache Spark higher order functions

---

ensure	<i>Enforce Specific Structure for R Objects</i>
--------	-------------------------------------------------

---

**Description**

These routines are useful when preparing to pass objects to a Spark routine, as it is often necessary to ensure certain parameters are scalar integers, or scalar doubles, and so on.

**Arguments**

object	An R object.
allow.na	Are NA values permitted for this object?
allow.null	Are NULL values permitted for this object?
default	If object is NULL, what value should be used in its place? If default is specified, allow.null is ignored (and assumed to be TRUE).

---

fill	<i>Fill</i>
------	-------------

---

**Description**

See [fill](#) for more details.

---

find_scalac	<i>Discover the Scala Compiler</i>
-------------	------------------------------------

---

### Description

Find the scalac compiler for a particular version of scala, by scanning some common directories containing scala installations.

### Usage

```
find_scalac(version, locations = NULL)
```

### Arguments

version	The scala version to search for. Versions of the form major.minor will be matched against the scalac installation with version major.minor.patch; if multiple compilers are discovered the most recent one will be used.
locations	Additional locations to scan. By default, the directories /opt/scala and /usr/local/scala will be scanned.

---

ft_binarizer	<i>Feature Transformation – Binarizer (Transformer)</i>
--------------	---------------------------------------------------------

---

### Description

Apply thresholding to a column, such that values less than or equal to the threshold are assigned the value 0.0, and values greater than the threshold are assigned the value 1.0. Column output is numeric for compatibility with other modeling functions.

### Usage

```
ft_binarizer(  
  x,  
  input_col,  
  output_col,  
  threshold = 0,  
  uid = random_string("binarizer_"),  
  ...  
)
```

**Arguments**

x	A spark_connection, ml_pipeline, or a tbl_spark.
input_col	The name of the input column.
output_col	The name of the output column.
threshold	Threshold used to binarize continuous features.
uid	A character string used to uniquely identify the feature transformer.
...	Optional arguments; currently unused.

**Value**

The object returned depends on the class of x.

- spark\_connection: When x is a spark\_connection, the function returns a ml\_transformer, a ml\_estimator, or one of their subclasses. The object contains a pointer to a Spark Transformer or Estimator object and can be used to compose Pipeline objects.
- ml\_pipeline: When x is a ml\_pipeline, the function returns a ml\_pipeline with the transformer or estimator appended to the pipeline.
- tbl\_spark: When x is a tbl\_spark, a transformer is constructed then immediately applied to the input tbl\_spark, returning a tbl\_spark

**See Also**

See <http://spark.apache.org/docs/latest/ml-features.html> for more information on the set of transformations available for DataFrame columns in Spark.

Other feature transformers: `ft_bucketizer()`, `ft_chisq_selector()`, `ft_count_vectorizer()`, `ft_dct()`, `ft_elementwise_product()`, `ft_feature_hasher()`, `ft_hashing_tf()`, `ft_idf()`, `ft_imputer()`, `ft_index_to_string()`, `ft_interaction()`, `ft_lsh`, `ft_max_abs_scaler()`, `ft_min_max_scaler()`, `ft_ngram()`, `ft_normalizer()`, `ft_one_hot_encoder_estimator()`, `ft_one_hot_encoder()`, `ft_pca()`, `ft_polynomial_expansion()`, `ft_quantile_discretizer()`, `ft_r_formula()`, `ft_regex_tokenizer()`, `ft_robust_scaler()`, `ft_sql_transformer()`, `ft_standard_scaler()`, `ft_stop_words_remover()`, `ft_string_indexer()`, `ft_tokenizer()`, `ft_vector_assembler()`, `ft_vector_indexer()`, `ft_vector_slicer()`, `ft_word2vec()`

**Examples**

```
## Not run:
library(dplyr)

sc <- spark_connect(master = "local")
iris_tbl <- sdf_copy_to(sc, iris, name = "iris_tbl", overwrite = TRUE)

iris_tbl %>%
  ft_binarizer(
    input_col = "Sepal_Length",
    output_col = "Sepal_Length_bin",
    threshold = 5
  ) %>%
```

```

select(Sepal_Length, Sepal_Length_bin, Species)

## End(Not run)

```

---

ft\_bucketizer

*Feature Transformation – Bucketizer (Transformer)*


---

## Description

Similar to R's `cut` function, this transforms a numeric column into a discretized column, with breaks specified through the `splits` parameter.

## Usage

```

ft_bucketizer(
  x,
  input_col = NULL,
  output_col = NULL,
  splits = NULL,
  input_cols = NULL,
  output_cols = NULL,
  splits_array = NULL,
  handle_invalid = "error",
  uid = random_string("bucketizer_"),
  ...
)

```

## Arguments

<code>x</code>	A <code>spark_connection</code> , <code>ml_pipeline</code> , or a <code>tbl_spark</code> .
<code>input_col</code>	The name of the input column.
<code>output_col</code>	The name of the output column.
<code>splits</code>	A numeric vector of cutpoints, indicating the bucket boundaries.
<code>input_cols</code>	Names of input columns.
<code>output_cols</code>	Names of output columns.
<code>splits_array</code>	Parameter for specifying multiple splits parameters. Each element in this array can be used to map continuous features into buckets.
<code>handle_invalid</code>	(Spark 2.1.0+) Param for how to handle invalid entries. Options are 'skip' (filter out rows with invalid values), 'error' (throw an error), or 'keep' (keep invalid values in a special additional bucket). Default: "error"
<code>uid</code>	A character string used to uniquely identify the feature transformer.
<code>...</code>	Optional arguments; currently unused.



## Value

The object returned depends on the class of x.

- `spark_connection`: When x is a `spark_connection`, the function returns a `ml_transformer`, a `ml_estimator`, or one of their subclasses. The object contains a pointer to a Spark Transformer or Estimator object and can be used to compose Pipeline objects.
- `ml_pipeline`: When x is a `ml_pipeline`, the function returns a `ml_pipeline` with the transformer or estimator appended to the pipeline.
- `tbl_spark`: When x is a `tbl_spark`, a transformer is constructed then immediately applied to the input `tbl_spark`, returning a `tbl_spark`

## See Also

See <http://spark.apache.org/docs/latest/ml-features.html> for more information on the set of transformations available for DataFrame columns in Spark.

Other feature transformers: `ft_binarizer()`, `ft_chisq_selector()`, `ft_count_vectorizer()`, `ft_dct()`, `ft_elementwise_product()`, `ft_feature_hasher()`, `ft_hashing_tf()`, `ft_idf()`, `ft_imputer()`, `ft_index_to_string()`, `ft_interaction()`, `ft_lsh`, `ft_max_abs_scaler()`, `ft_min_max_scaler()`, `ft_ngram()`, `ft_normalizer()`, `ft_one_hot_encoder_estimator()`, `ft_one_hot_encoder()`, `ft_pca()`, `ft_polynomial_expansion()`, `ft_quantile_discretizer()`, `ft_r_formula()`, `ft_regex_tokenizer()`, `ft_robust_scaler()`, `ft_sql_transformer()`, `ft_standard_scaler()`, `ft_stop_words_remover()`, `ft_string_indexer()`, `ft_tokenizer()`, `ft_vector_assembler()`, `ft_vector_indexer()`, `ft_vector_slicer()`, `ft_word2vec()`

## Examples

```
## Not run:
library(dplyr)

sc <- spark_connect(master = "local")
iris_tbl <- sdf_copy_to(sc, iris, name = "iris_tbl", overwrite = TRUE)

iris_tbl %>%
  ft_bucketizer(
    input_col = "Sepal_Length",
    output_col = "Sepal_Length_bucket",
    splits = c(0, 4.5, 5, 8)
  ) %>%
  select(Sepal_Length, Sepal_Length_bucket, Species)

## End(Not run)
```

---

 ft\_chisq\_selector      *Feature Transformation – ChiSqSelector (Estimator)*


---

## Description

Chi-Squared feature selection, which selects categorical features to use for predicting a categorical label

## Usage

```
ft_chisq_selector(
  x,
  features_col = "features",
  output_col = NULL,
  label_col = "label",
  selector_type = "numTopFeatures",
  fdr = 0.05,
  fpr = 0.05,
  fwe = 0.05,
  num_top_features = 50,
  percentile = 0.1,
  uid = random_string("chisq_selector_"),
  ...
)
```

## Arguments

x	A spark_connection, ml_pipeline, or a tbl_spark.
features_col	Features column name, as a length-one character vector. The column should be single vector column of numeric values. Usually this column is output by <a href="#">ft_r_formula</a> .
output_col	The name of the output column.
label_col	Label column name. The column should be a numeric column. Usually this column is output by <a href="#">ft_r_formula</a> .
selector_type	(Spark 2.1.0+) The selector type of the ChiSqSelector. Supported options: "num-TopFeatures" (default), "percentile", "fpr", "fdr", "fwe".
fdr	(Spark 2.2.0+) The upper bound of the expected false discovery rate. Only applicable when selector_type = "fdr". Default value is 0.05.
fpr	(Spark 2.1.0+) The highest p-value for features to be kept. Only applicable when selector_type = "fpr". Default value is 0.05.
fwe	(Spark 2.2.0+) The upper bound of the expected family-wise error rate. Only applicable when selector_type = "fwe". Default value is 0.05.

num_top_features	Number of features that selector will select, ordered by ascending p-value. If the number of features is less than num_top_features, then this will select all features. Only applicable when selector_type = "numTopFeatures". The default value of num_top_features is 50.
percentile	(Spark 2.1.0+) Percentile of features that selector will select, ordered by statistics value descending. Only applicable when selector_type = "percentile". Default value is 0.1.
uid	A character string used to uniquely identify the feature transformer.
...	Optional arguments; currently unused.

### Details

In the case where `x` is a `tbl_spark`, the estimator fits against `x` to obtain a transformer, which is then immediately used to transform `x`, returning a `tbl_spark`.

### Value

The object returned depends on the class of `x`.

- `spark_connection`: When `x` is a `spark_connection`, the function returns a `ml_transformer`, a `ml_estimator`, or one of their subclasses. The object contains a pointer to a Spark Transformer or Estimator object and can be used to compose Pipeline objects.
- `ml_pipeline`: When `x` is a `ml_pipeline`, the function returns a `ml_pipeline` with the transformer or estimator appended to the pipeline.
- `tbl_spark`: When `x` is a `tbl_spark`, a transformer is constructed then immediately applied to the input `tbl_spark`, returning a `tbl_spark`

### See Also

See <http://spark.apache.org/docs/latest/ml-features.html> for more information on the set of transformations available for DataFrame columns in Spark.

Other feature transformers: `ft_binarizer()`, `ft_bucketizer()`, `ft_count_vectorizer()`, `ft_dct()`, `ft_elementwise_product()`, `ft_feature_hasher()`, `ft_hashing_tf()`, `ft_idf()`, `ft_imputer()`, `ft_index_to_string()`, `ft_interaction()`, `ft_lsh`, `ft_max_abs_scaler()`, `ft_min_max_scaler()`, `ft_ngram()`, `ft_normalizer()`, `ft_one_hot_encoder_estimator()`, `ft_one_hot_encoder()`, `ft_pca()`, `ft_polynomial_expansion()`, `ft_quantile_discretizer()`, `ft_r_formula()`, `ft_regex_tokenizer()`, `ft_robust_scaler()`, `ft_sql_transformer()`, `ft_standard_scaler()`, `ft_stop_words_remover()`, `ft_string_indexer()`, `ft_tokenizer()`, `ft_vector_assembler()`, `ft_vector_indexer()`, `ft_vector_slicer()`, `ft_word2vec()`

---

 ft\_count\_vectorizer    *Feature Transformation – CountVectorizer (Estimator)*


---

## Description

Extracts a vocabulary from document collections.

## Usage

```
ft_count_vectorizer(
    x,
    input_col = NULL,
    output_col = NULL,
    binary = FALSE,
    min_df = 1,
    min_tf = 1,
    vocab_size = 2^18,
    uid = random_string("count_vectorizer_"),
    ...
)

ml_vocabulary(model)
```

## Arguments

x	A spark_connection, ml_pipeline, or a tbl_spark.
input_col	The name of the input column.
output_col	The name of the output column.
binary	Binary toggle to control the output vector values. If TRUE, all nonzero counts (after min_tf filter applied) are set to 1. This is useful for discrete probabilistic models that model binary events rather than integer counts. Default: FALSE
min_df	Specifies the minimum number of different documents a term must appear in to be included in the vocabulary. If this is an integer greater than or equal to 1, this specifies the number of documents the term must appear in; if this is a double in [0,1), then this specifies the fraction of documents. Default: 1.
min_tf	Filter to ignore rare words in a document. For each document, terms with frequency/count less than the given threshold are ignored. If this is an integer greater than or equal to 1, then this specifies a count (of times the term must appear in the document); if this is a double in [0,1), then this specifies a fraction (out of the document's token count). Default: 1.
vocab_size	Build a vocabulary that only considers the top vocab_size terms ordered by term frequency across the corpus. Default: 2^18.
uid	A character string used to uniquely identify the feature transformer.
...	Optional arguments; currently unused.
model	A ml_count_vectorizer_model.

**Details**

In the case where `x` is a `tbl_spark`, the estimator fits against `x` to obtain a transformer, which is then immediately used to transform `x`, returning a `tbl_spark`.

**Value**

The object returned depends on the class of `x`.

- `spark_connection`: When `x` is a `spark_connection`, the function returns a `ml_transformer`, a `ml_estimator`, or one of their subclasses. The object contains a pointer to a Spark Transformer or Estimator object and can be used to compose Pipeline objects.
- `ml_pipeline`: When `x` is a `ml_pipeline`, the function returns a `ml_pipeline` with the transformer or estimator appended to the pipeline.
- `tbl_spark`: When `x` is a `tbl_spark`, a transformer is constructed then immediately applied to the input `tbl_spark`, returning a `tbl_spark`

`ml_vocabulary()` returns a vector of vocabulary built.

**See Also**

See <http://spark.apache.org/docs/latest/ml-features.html> for more information on the set of transformations available for DataFrame columns in Spark.

Other feature transformers: `ft_binarizer()`, `ft_bucketizer()`, `ft_chisq_selector()`, `ft_dct()`, `ft_elementwise_product()`, `ft_feature_hasher()`, `ft_hashing_tf()`, `ft_idf()`, `ft_imputer()`, `ft_index_to_string()`, `ft_interaction()`, `ft_lsh`, `ft_max_abs_scaler()`, `ft_min_max_scaler()`, `ft_ngram()`, `ft_normalizer()`, `ft_one_hot_encoder_estimator()`, `ft_one_hot_encoder()`, `ft_pca()`, `ft_polynomial_expansion()`, `ft_quantile_discretizer()`, `ft_r_formula()`, `ft_regex_tokenizer()`, `ft_robust_scaler()`, `ft_sql_transformer()`, `ft_standard_scaler()`, `ft_stop_words_remover()`, `ft_string_indexer()`, `ft_tokenizer()`, `ft_vector_assembler()`, `ft_vector_indexer()`, `ft_vector_slicer()`, `ft_word2vec()`

---

ft_dct	<i>Feature Transformation – Discrete Cosine Transform (DCT) (Transformer)</i>
--------	-------------------------------------------------------------------------------

---

**Description**

A feature transformer that takes the 1D discrete cosine transform of a real vector. No zero padding is performed on the input vector. It returns a real vector of the same length representing the DCT. The return vector is scaled such that the transform matrix is unitary (aka scaled DCT-II).

**Usage**

```

ft_dct(
  x,
  input_col = NULL,
  output_col = NULL,
  inverse = FALSE,
  uid = random_string("dct_"),
  ...
)

ft_discrete_cosine_transform(
  x,
  input_col,
  output_col,
  inverse = FALSE,
  uid = random_string("dct_"),
  ...
)

```

**Arguments**

x	A spark_connection, ml_pipeline, or a tbl_spark.
input_col	The name of the input column.
output_col	The name of the output column.
inverse	Indicates whether to perform the inverse DCT (TRUE) or forward DCT (FALSE).
uid	A character string used to uniquely identify the feature transformer.
...	Optional arguments; currently unused.

**Details**

ft\_discrete\_cosine\_transform() is an alias for ft\_dct for backwards compatibility.

**Value**

The object returned depends on the class of x.

- **spark\_connection**: When x is a spark\_connection, the function returns a ml\_transformer, a ml\_estimator, or one of their subclasses. The object contains a pointer to a Spark Transformer or Estimator object and can be used to compose Pipeline objects.
- **ml\_pipeline**: When x is a ml\_pipeline, the function returns a ml\_pipeline with the transformer or estimator appended to the pipeline.
- **tbl\_spark**: When x is a tbl\_spark, a transformer is constructed then immediately applied to the input tbl\_spark, returning a tbl\_spark

**See Also**

See <http://spark.apache.org/docs/latest/ml-features.html> for more information on the set of transformations available for DataFrame columns in Spark.

Other feature transformers: `ft_binarizer()`, `ft_bucketizer()`, `ft_chisq_selector()`, `ft_count_vectorizer()`, `ft_elementwise_product()`, `ft_feature_hasher()`, `ft_hashing_tf()`, `ft_idf()`, `ft_imputer()`, `ft_index_to_string()`, `ft_interaction()`, `ft_lsh`, `ft_max_abs_scaler()`, `ft_min_max_scaler()`, `ft_ngram()`, `ft_normalizer()`, `ft_one_hot_encoder_estimator()`, `ft_one_hot_encoder()`, `ft_pca()`, `ft_polynomial_expansion()`, `ft_quantile_discretizer()`, `ft_r_formula()`, `ft_regex_tokenizer()`, `ft_robust_scaler()`, `ft_sql_transformer()`, `ft_standard_scaler()`, `ft_stop_words_remover()`, `ft_string_indexer()`, `ft_tokenizer()`, `ft_vector_assembler()`, `ft_vector_indexer()`, `ft_vector_slicer()`, `ft_word2vec()`

---

ft\_elementwise\_product

*Feature Transformation – ElementwiseProduct (Transformer)*

---

**Description**

Outputs the Hadamard product (i.e., the element-wise product) of each input vector with a provided "weight" vector. In other words, it scales each column of the dataset by a scalar multiplier.

**Usage**

```
ft_elementwise_product(
  x,
  input_col = NULL,
  output_col = NULL,
  scaling_vec = NULL,
  uid = random_string("elementwise_product_"),
  ...
)
```

**Arguments**

x	A spark_connection, ml_pipeline, or a tbl_spark.
input_col	The name of the input column.
output_col	The name of the output column.
scaling_vec	the vector to multiply with input vectors
uid	A character string used to uniquely identify the feature transformer.
...	Optional arguments; currently unused.

**Value**

The object returned depends on the class of `x`.

- `spark_connection`: When `x` is a `spark_connection`, the function returns a `ml_transformer`, a `ml_estimator`, or one of their subclasses. The object contains a pointer to a Spark Transformer or Estimator object and can be used to compose Pipeline objects.
- `ml_pipeline`: When `x` is a `ml_pipeline`, the function returns a `ml_pipeline` with the transformer or estimator appended to the pipeline.
- `tbl_spark`: When `x` is a `tbl_spark`, a transformer is constructed then immediately applied to the input `tbl_spark`, returning a `tbl_spark`

**See Also**

See <http://spark.apache.org/docs/latest/ml-features.html> for more information on the set of transformations available for DataFrame columns in Spark.

Other feature transformers: `ft_binarizer()`, `ft_bucketizer()`, `ft_chisq_selector()`, `ft_count_vectorizer()`, `ft_dct()`, `ft_feature_hasher()`, `ft_hashing_tf()`, `ft_idf()`, `ft_imputer()`, `ft_index_to_string()`, `ft_interaction()`, `ft_lsh`, `ft_max_abs_scaler()`, `ft_min_max_scaler()`, `ft_ngram()`, `ft_normalizer()`, `ft_one_hot_encoder_estimator()`, `ft_one_hot_encoder()`, `ft_pca()`, `ft_polynomial_expansion()`, `ft_quantile_discretizer()`, `ft_r_formula()`, `ft_regex_tokenizer()`, `ft_robust_scaler()`, `ft_sql_transformer()`, `ft_standard_scaler()`, `ft_stop_words_remover()`, `ft_string_indexer()`, `ft_tokenizer()`, `ft_vector_assembler()`, `ft_vector_indexer()`, `ft_vector_slicer()`, `ft_word2vec()`

---

ft\_feature\_hasher      *Feature Transformation – FeatureHasher (Transformer)*

---

**Description**

Feature Transformation – FeatureHasher (Transformer)

**Usage**

```
ft_feature_hasher(
  x,
  input_cols = NULL,
  output_col = NULL,
  num_features = 2^18,
  categorical_cols = NULL,
  uid = random_string("feature_hasher_"),
  ...
)
```



**Arguments**

x	A spark_connection, ml_pipeline, or a tbl_spark.
input_cols	Names of input columns.
output_col	Name of output column.
num_features	Number of features. Defaults to 2 <sup>18</sup> .
categorical_cols	Numeric columns to treat as categorical features. By default only string and boolean columns are treated as categorical, so this param can be used to explicitly specify the numerical columns to treat as categorical.
uid	A character string used to uniquely identify the feature transformer.
...	Optional arguments; currently unused.

**Details**

Feature hashing projects a set of categorical or numerical features into a feature vector of specified dimension (typically substantially smaller than that of the original feature space). This is done using the hashing trick [https://en.wikipedia.org/wiki/Feature\\_hashing](https://en.wikipedia.org/wiki/Feature_hashing) to map features to indices in the feature vector.

The FeatureHasher transformer operates on multiple columns. Each column may contain either numeric or categorical features. Behavior and handling of column data types is as follows: -Numeric columns: For numeric features, the hash value of the column name is used to map the feature value to its index in the feature vector. By default, numeric features are not treated as categorical (even when they are integers). To treat them as categorical, specify the relevant columns in categorical\_Cols. -String columns: For categorical features, the hash value of the string "column\_name=value" is used to map to the vector index, with an indicator value of 1.0. Thus, categorical features are "one-hot" encoded (similarly to using OneHotEncoder with drop\_last=FALSE). -Boolean columns: Boolean values are treated in the same way as string columns. That is, boolean features are represented as "column\_name=true" or "column\_name=false", with an indicator value of 1.0.

Null (missing) values are ignored (implicitly zero in the resulting feature vector).

The hash function used here is also the MurmurHash 3 used in HashingTF. Since a simple modulo on the hashed value is used to determine the vector index, it is advisable to use a power of two as the num\_features parameter; otherwise the features will not be mapped evenly to the vector indices.

**Value**

The object returned depends on the class of x.

- spark\_connection: When x is a spark\_connection, the function returns a ml\_transformer, a ml\_estimator, or one of their subclasses. The object contains a pointer to a Spark Transformer or Estimator object and can be used to compose Pipeline objects.
- ml\_pipeline: When x is a ml\_pipeline, the function returns a ml\_pipeline with the transformer or estimator appended to the pipeline.
- tbl\_spark: When x is a tbl\_spark, a transformer is constructed then immediately applied to the input tbl\_spark, returning a tbl\_spark

**See Also**

See <http://spark.apache.org/docs/latest/ml-features.html> for more information on the set of transformations available for DataFrame columns in Spark.

Other feature transformers: `ft_binarizer()`, `ft_bucketizer()`, `ft_chisq_selector()`, `ft_count_vectorizer()`, `ft_dct()`, `ft_elementwise_product()`, `ft_hashing_tf()`, `ft_idf()`, `ft_imputer()`, `ft_index_to_string()`, `ft_interaction()`, `ft_lsh`, `ft_max_abs_scaler()`, `ft_min_max_scaler()`, `ft_ngram()`, `ft_normalizer()`, `ft_one_hot_encoder_estimator()`, `ft_one_hot_encoder()`, `ft_pca()`, `ft_polynomial_expansion()`, `ft_quantile_discretizer()`, `ft_r_formula()`, `ft_regex_tokenizer()`, `ft_robust_scaler()`, `ft_sql_transformer()`, `ft_standard_scaler()`, `ft_stop_words_remover()`, `ft_string_indexer()`, `ft_tokenizer()`, `ft_vector_assembler()`, `ft_vector_indexer()`, `ft_vector_slicer()`, `ft_word2vec()`

ft\_hashing\_tf

*Feature Transformation – HashingTF (Transformer)***Description**

Maps a sequence of terms to their term frequencies using the hashing trick.

**Usage**

```
ft_hashing_tf(
  x,
  input_col = NULL,
  output_col = NULL,
  binary = FALSE,
  num_features = 2^18,
  uid = random_string("hashing_tf_"),
  ...
)
```

**Arguments**

x	A spark_connection, ml_pipeline, or a tbl_spark.
input_col	The name of the input column.
output_col	The name of the output column.
binary	Binary toggle to control term frequency counts. If true, all non-zero counts are set to 1. This is useful for discrete probabilistic models that model binary events rather than integer counts. (default = FALSE)
num_features	Number of features. Should be greater than 0. (default = 2^18)
uid	A character string used to uniquely identify the feature transformer.
...	Optional arguments; currently unused.

**Value**

The object returned depends on the class of x.

- `spark_connection`: When x is a `spark_connection`, the function returns a `ml_transformer`, a `ml_estimator`, or one of their subclasses. The object contains a pointer to a Spark Transformer or Estimator object and can be used to compose Pipeline objects.
- `ml_pipeline`: When x is a `ml_pipeline`, the function returns a `ml_pipeline` with the transformer or estimator appended to the pipeline.
- `tbl_spark`: When x is a `tbl_spark`, a transformer is constructed then immediately applied to the input `tbl_spark`, returning a `tbl_spark`

**See Also**

See <http://spark.apache.org/docs/latest/ml-features.html> for more information on the set of transformations available for DataFrame columns in Spark.

Other feature transformers: `ft_binarizer()`, `ft_bucketizer()`, `ft_chisq_selector()`, `ft_count_vectorizer()`, `ft_dct()`, `ft_elementwise_product()`, `ft_feature_hasher()`, `ft_idf()`, `ft_imputer()`, `ft_index_to_string()`, `ft_interaction()`, `ft_lsh`, `ft_max_abs_scaler()`, `ft_min_max_scaler()`, `ft_ngram()`, `ft_normalizer()`, `ft_one_hot_encoder_estimator()`, `ft_one_hot_encoder()`, `ft_pca()`, `ft_polynomial_expansion()`, `ft_quantile_discretizer()`, `ft_r_formula()`, `ft_regex_tokenizer()`, `ft_robust_scaler()`, `ft_sql_transformer()`, `ft_standard_scaler()`, `ft_stop_words_remover()`, `ft_string_indexer()`, `ft_tokenizer()`, `ft_vector_assembler()`, `ft_vector_indexer()`, `ft_vector_slicer()`, `ft_word2vec()`

---

 ft\_idf

*Feature Transformation – IDF (Estimator)*


---

**Description**

Compute the Inverse Document Frequency (IDF) given a collection of documents.

**Usage**

```
ft_idf(
  x,
  input_col = NULL,
  output_col = NULL,
  min_doc_freq = 0,
  uid = random_string("idf_"),
  ...
)
```

**Arguments**

x	A spark_connection, ml_pipeline, or a tbl_spark.
input_col	The name of the input column.
output_col	The name of the output column.
min_doc_freq	The minimum number of documents in which a term should appear. Default: 0
uid	A character string used to uniquely identify the feature transformer.
...	Optional arguments; currently unused.

**Details**

In the case where x is a tbl\_spark, the estimator fits against x to obtain a transformer, which is then immediately used to transform x, returning a tbl\_spark.

**Value**

The object returned depends on the class of x.

- spark\_connection: When x is a spark\_connection, the function returns a ml\_transformer, a ml\_estimator, or one of their subclasses. The object contains a pointer to a Spark Transformer or Estimator object and can be used to compose Pipeline objects.
- ml\_pipeline: When x is a ml\_pipeline, the function returns a ml\_pipeline with the transformer or estimator appended to the pipeline.
- tbl\_spark: When x is a tbl\_spark, a transformer is constructed then immediately applied to the input tbl\_spark, returning a tbl\_spark

**See Also**

See <http://spark.apache.org/docs/latest/ml-features.html> for more information on the set of transformations available for DataFrame columns in Spark.

Other feature transformers: `ft_binarizer()`, `ft_bucketizer()`, `ft_chisq_selector()`, `ft_count_vectorizer()`, `ft_dct()`, `ft_elementwise_product()`, `ft_feature_hasher()`, `ft_hashing_tf()`, `ft_imputer()`, `ft_index_to_string()`, `ft_interaction()`, `ft_lsh`, `ft_max_abs_scaler()`, `ft_min_max_scaler()`, `ft_ngram()`, `ft_normalizer()`, `ft_one_hot_encoder_estimator()`, `ft_one_hot_encoder()`, `ft_pca()`, `ft_polynomial_expansion()`, `ft_quantile_discretizer()`, `ft_r_formula()`, `ft_regex_tokenizer()`, `ft_robust_scaler()`, `ft_sql_transformer()`, `ft_standard_scaler()`, `ft_stop_words_remover()`, `ft_string_indexer()`, `ft_tokenizer()`, `ft_vector_assembler()`, `ft_vector_indexer()`, `ft_vector_slicer()`, `ft_word2vec()`

ft\_imputer

*Feature Transformation – Imputer (Estimator)***Description**

Imputation estimator for completing missing values, either using the mean or the median of the columns in which the missing values are located. The input columns should be of numeric type. This function requires Spark 2.2.0+.

**Usage**

```
ft_imputer(
  x,
  input_cols = NULL,
  output_cols = NULL,
  missing_value = NULL,
  strategy = "mean",
  uid = random_string("imputer_"),
  ...
)
```

**Arguments**

x	A spark_connection, ml_pipeline, or a tbl_spark.
input_cols	The names of the input columns
output_cols	The names of the output columns.
missing_value	The placeholder for the missing values. All occurrences of missing_value will be imputed. Note that null values are always treated as missing.
strategy	The imputation strategy. Currently only "mean" and "median" are supported. If "mean", then replace missing values using the mean value of the feature. If "median", then replace missing values using the approximate median value of the feature. Default: mean
uid	A character string used to uniquely identify the feature transformer.
...	Optional arguments; currently unused.

**Details**

In the case where x is a tbl\_spark, the estimator fits against x to obtain a transformer, which is then immediately used to transform x, returning a tbl\_spark.

**Value**

The object returned depends on the class of x.

- spark\_connection: When x is a spark\_connection, the function returns a ml\_transformer, a ml\_estimator, or one of their subclasses. The object contains a pointer to a Spark Transformer or Estimator object and can be used to compose Pipeline objects.

- `ml_pipeline`: When `x` is a `ml_pipeline`, the function returns a `ml_pipeline` with the transformer or estimator appended to the pipeline.
- `tbl_spark`: When `x` is a `tbl_spark`, a transformer is constructed then immediately applied to the input `tbl_spark`, returning a `tbl_spark`

### See Also

See <http://spark.apache.org/docs/latest/ml-features.html> for more information on the set of transformations available for DataFrame columns in Spark.

Other feature transformers: `ft_binarizer()`, `ft_bucketizer()`, `ft_chisq_selector()`, `ft_count_vectorizer()`, `ft_dct()`, `ft_elementwise_product()`, `ft_feature_hasher()`, `ft_hashing_tf()`, `ft_idf()`, `ft_index_to_string()`, `ft_interaction()`, `ft_lsh`, `ft_max_abs_scaler()`, `ft_min_max_scaler()`, `ft_ngram()`, `ft_normalizer()`, `ft_one_hot_encoder_estimator()`, `ft_one_hot_encoder()`, `ft_pca()`, `ft_polynomial_expansion()`, `ft_quantile_discretizer()`, `ft_r_formula()`, `ft_regex_tokenizer()`, `ft_robust_scaler()`, `ft_sql_transformer()`, `ft_standard_scaler()`, `ft_stop_words_remover()`, `ft_string_indexer()`, `ft_tokenizer()`, `ft_vector_assembler()`, `ft_vector_indexer()`, `ft_vector_slicer()`, `ft_word2vec()`

---

ft\_index\_to\_string      *Feature Transformation – IndexToString (Transformer)*

---

### Description

A Transformer that maps a column of indices back to a new column of corresponding string values. The index-string mapping is either from the ML attributes of the input column, or from user-supplied labels (which take precedence over ML attributes). This function is the inverse of `ft_string_indexer`.

### Usage

```
ft_index_to_string(
  x,
  input_col = NULL,
  output_col = NULL,
  labels = NULL,
  uid = random_string("index_to_string_"),
  ...
)
```

### Arguments

<code>x</code>	A <code>spark_connection</code> , <code>ml_pipeline</code> , or a <code>tbl_spark</code> .
<code>input_col</code>	The name of the input column.
<code>output_col</code>	The name of the output column.
<code>labels</code>	Optional param for array of labels specifying index-string mapping.
<code>uid</code>	A character string used to uniquely identify the feature transformer.
<code>...</code>	Optional arguments; currently unused.

**Value**

The object returned depends on the class of `x`.

- `spark_connection`: When `x` is a `spark_connection`, the function returns a `ml_transformer`, a `ml_estimator`, or one of their subclasses. The object contains a pointer to a Spark Transformer or Estimator object and can be used to compose Pipeline objects.
- `ml_pipeline`: When `x` is a `ml_pipeline`, the function returns a `ml_pipeline` with the transformer or estimator appended to the pipeline.
- `tbl_spark`: When `x` is a `tbl_spark`, a transformer is constructed then immediately applied to the input `tbl_spark`, returning a `tbl_spark`

**See Also**

See <http://spark.apache.org/docs/latest/ml-features.html> for more information on the set of transformations available for DataFrame columns in Spark.

`ft_string_indexer`

Other feature transformers: `ft_binarizer()`, `ft_bucketizer()`, `ft_chisq_selector()`, `ft_count_vectorizer()`, `ft_dct()`, `ft_elementwise_product()`, `ft_feature_hasher()`, `ft_hashing_tf()`, `ft_idf()`, `ft_imputer()`, `ft_interaction()`, `ft_lsh`, `ft_max_abs_scaler()`, `ft_min_max_scaler()`, `ft_ngram()`, `ft_normalizer()`, `ft_one_hot_encoder_estimator()`, `ft_one_hot_encoder()`, `ft_pca()`, `ft_polynomial_expansion()`, `ft_quantile_discretizer()`, `ft_r_formula()`, `ft_regex_tokenizer()`, `ft_robust_scaler()`, `ft_sql_transformer()`, `ft_standard_scaler()`, `ft_stop_words_remover()`, `ft_string_indexer()`, `ft_tokenizer()`, `ft_vector_assembler()`, `ft_vector_indexer()`, `ft_vector_slicer()`, `ft_word2vec()`

---

ft\_interaction

*Feature Transformation – Interaction (Transformer)*

---

**Description**

Implements the feature interaction transform. This transformer takes in Double and Vector type columns and outputs a flattened vector of their feature interactions. To handle interaction, we first one-hot encode any nominal features. Then, a vector of the feature cross-products is produced.

**Usage**

```
ft_interaction(
  x,
  input_cols = NULL,
  output_col = NULL,
  uid = random_string("interaction_"),
  ...
)
```

**Arguments**

x	A spark_connection, ml_pipeline, or a tbl_spark.
input_cols	The names of the input columns
output_col	The name of the output column.
uid	A character string used to uniquely identify the feature transformer.
...	Optional arguments; currently unused.

**Value**

The object returned depends on the class of x.

- spark\_connection: When x is a spark\_connection, the function returns a ml\_transformer, a ml\_estimator, or one of their subclasses. The object contains a pointer to a Spark Transformer or Estimator object and can be used to compose Pipeline objects.
- ml\_pipeline: When x is a ml\_pipeline, the function returns a ml\_pipeline with the transformer or estimator appended to the pipeline.
- tbl\_spark: When x is a tbl\_spark, a transformer is constructed then immediately applied to the input tbl\_spark, returning a tbl\_spark

**See Also**

See <http://spark.apache.org/docs/latest/ml-features.html> for more information on the set of transformations available for DataFrame columns in Spark.

Other feature transformers: `ft_binarizer()`, `ft_bucketizer()`, `ft_chisq_selector()`, `ft_count_vectorizer()`, `ft_dct()`, `ft_elementwise_product()`, `ft_feature_hasher()`, `ft_hashing_tf()`, `ft_idf()`, `ft_imputer()`, `ft_index_to_string()`, `ft_lsh`, `ft_max_abs_scaler()`, `ft_min_max_scaler()`, `ft_ngram()`, `ft_normalizer()`, `ft_one_hot_encoder_estimator()`, `ft_one_hot_encoder()`, `ft_pca()`, `ft_polynomial_expansion()`, `ft_quantile_discretizer()`, `ft_r_formula()`, `ft_regex_tokenizer()`, `ft_robust_scaler()`, `ft_sql_transformer()`, `ft_standard_scaler()`, `ft_stop_words_remover()`, `ft_string_indexer()`, `ft_tokenizer()`, `ft_vector_assembler()`, `ft_vector_indexer()`, `ft_vector_slicer()`, `ft_word2vec()`

---

ft\_lsh

*Feature Transformation – LSH (Estimator)*


---

**Description**

Locality Sensitive Hashing functions for Euclidean distance (Bucketed Random Projection) and Jaccard distance (MinHash).



**Usage**

```

ft_bucketed_random_projection_lsh(
  x,
  input_col = NULL,
  output_col = NULL,
  bucket_length = NULL,
  num_hash_tables = 1,
  seed = NULL,
  uid = random_string("bucketed_random_projection_lsh_"),
  ...
)

ft_minhash_lsh(
  x,
  input_col = NULL,
  output_col = NULL,
  num_hash_tables = 1L,
  seed = NULL,
  uid = random_string("minhash_lsh_"),
  ...
)

```

**Arguments**

x	A spark_connection, ml_pipeline, or a tbl_spark.
input_col	The name of the input column.
output_col	The name of the output column.
bucket_length	The length of each hash bucket, a larger bucket lowers the false negative rate. The number of buckets will be (max L2 norm of input vectors) / bucketLength.
num_hash_tables	Number of hash tables used in LSH OR-amplification. LSH OR-amplification can be used to reduce the false negative rate. Higher values for this param lead to a reduced false negative rate, at the expense of added computational complexity.
seed	A random seed. Set this value if you need your results to be reproducible across repeated calls.
uid	A character string used to uniquely identify the feature transformer.
...	Optional arguments; currently unused.

**Details**

In the case where x is a tbl\_spark, the estimator fits against x to obtain a transformer, which is then immediately used to transform x, returning a tbl\_spark.

**Value**

The object returned depends on the class of x.

- `spark_connection`: When `x` is a `spark_connection`, the function returns a `ml_transformer`, a `ml_estimator`, or one of their subclasses. The object contains a pointer to a Spark Transformer or Estimator object and can be used to compose Pipeline objects.
- `ml_pipeline`: When `x` is a `ml_pipeline`, the function returns a `ml_pipeline` with the transformer or estimator appended to the pipeline.
- `tbl_spark`: When `x` is a `tbl_spark`, a transformer is constructed then immediately applied to the input `tbl_spark`, returning a `tbl_spark`

### See Also

See <http://spark.apache.org/docs/latest/ml-features.html> for more information on the set of transformations available for DataFrame columns in Spark.

`ft_lsh_utils`

Other feature transformers: `ft_binarizer()`, `ft_bucketizer()`, `ft_chisq_selector()`, `ft_count_vectorizer()`, `ft_dct()`, `ft_elementwise_product()`, `ft_feature_hasher()`, `ft_hashing_tf()`, `ft_idf()`, `ft_imputer()`, `ft_index_to_string()`, `ft_interaction()`, `ft_max_abs_scaler()`, `ft_min_max_scaler()`, `ft_ngram()`, `ft_normalizer()`, `ft_one_hot_encoder_estimator()`, `ft_one_hot_encoder()`, `ft_pca()`, `ft_polynomial_expansion()`, `ft_quantile_discretizer()`, `ft_r_formula()`, `ft_regex_tokenizer()`, `ft_robust_scaler()`, `ft_sql_transformer()`, `ft_standard_scaler()`, `ft_stop_words_removal()`, `ft_string_indexer()`, `ft_tokenizer()`, `ft_vector_assembler()`, `ft_vector_indexer()`, `ft_vector_slicer()`, `ft_word2vec()`

---

`ft_lsh_utils`

*Utility functions for LSH models*

---

### Description

Utility functions for LSH models

### Usage

```
ml_approx_nearest_neighbors(
  model,
  dataset,
  key,
  num_nearest_neighbors,
  dist_col = "distCol"
)
```

```
ml_approx_similarity_join(
  model,
  dataset_a,
  dataset_b,
  threshold,
  dist_col = "distCol"
)
```

**Arguments**

model	A fitted LSH model, returned by either <code>ft_minhash_lsh()</code> or <code>ft_bucketed_random_projection_lsh()</code> .
dataset	The dataset to search for nearest neighbors of the key.
key	Feature vector representing the item to search for.
num_nearest_neighbors	The maximum number of nearest neighbors.
dist_col	Output column for storing the distance between each result row and the key.
dataset_a	One of the datasets to join.
dataset_b	Another dataset to join.
threshold	The threshold for the distance of row pairs.

---

ft_max_abs_scaler	<i>Feature Transformation – MaxAbsScaler (Estimator)</i>
-------------------	----------------------------------------------------------

---

**Description**

Rescale each feature individually to range  $[-1, 1]$  by dividing through the largest maximum absolute value in each feature. It does not shift/center the data, and thus does not destroy any sparsity.

**Usage**

```
ft_max_abs_scaler(
  x,
  input_col = NULL,
  output_col = NULL,
  uid = random_string("max_abs_scaler_"),
  ...
)
```

**Arguments**

x	A <code>spark_connection</code> , <code>ml_pipeline</code> , or a <code>tbl_spark</code> .
input_col	The name of the input column.
output_col	The name of the output column.
uid	A character string used to uniquely identify the feature transformer.
...	Optional arguments; currently unused.

**Details**

In the case where `x` is a `tbl_spark`, the estimator fits against `x` to obtain a transformer, which is then immediately used to transform `x`, returning a `tbl_spark`.

**Value**

The object returned depends on the class of `x`.

- `spark_connection`: When `x` is a `spark_connection`, the function returns a `ml_transformer`, a `ml_estimator`, or one of their subclasses. The object contains a pointer to a Spark Transformer or Estimator object and can be used to compose Pipeline objects.
- `ml_pipeline`: When `x` is a `ml_pipeline`, the function returns a `ml_pipeline` with the transformer or estimator appended to the pipeline.
- `tbl_spark`: When `x` is a `tbl_spark`, a transformer is constructed then immediately applied to the input `tbl_spark`, returning a `tbl_spark`

**See Also**

See <http://spark.apache.org/docs/latest/ml-features.html> for more information on the set of transformations available for DataFrame columns in Spark.

Other feature transformers: `ft_binarizer()`, `ft_bucketizer()`, `ft_chisq_selector()`, `ft_count_vectorizer()`, `ft_dct()`, `ft_elementwise_product()`, `ft_feature_hasher()`, `ft_hashing_tf()`, `ft_idf()`, `ft_imputer()`, `ft_index_to_string()`, `ft_interaction()`, `ft_lsh`, `ft_min_max_scaler()`, `ft_ngram()`, `ft_normalizer()`, `ft_one_hot_encoder_estimator()`, `ft_one_hot_encoder()`, `ft_pca()`, `ft_polynomial_expansion()`, `ft_quantile_discretizer()`, `ft_r_formula()`, `ft_regex_tokenizer()`, `ft_robust_scaler()`, `ft_sql_transformer()`, `ft_standard_scaler()`, `ft_stop_words_remover()`, `ft_string_indexer()`, `ft_tokenizer()`, `ft_vector_assembler()`, `ft_vector_indexer()`, `ft_vector_slicer()`, `ft_word2vec()`

**Examples**

```
## Not run:
sc <- spark_connect(master = "local")
iris_tbl <- sdf_copy_to(sc, iris, name = "iris_tbl", overwrite = TRUE)

features <- c("Sepal_Length", "Sepal_Width", "Petal_Length", "Petal_Width")

iris_tbl %>%
  ft_vector_assembler(
    input_col = features,
    output_col = "features_temp"
  ) %>%
  ft_max_abs_scaler(
    input_col = "features_temp",
    output_col = "features"
  )

## End(Not run)
```

---

 ft\_min\_max\_scaler      *Feature Transformation – MinMaxScaler (Estimator)*


---

## Description

Rescale each feature individually to a common range [min, max] linearly using column summary statistics, which is also known as min-max normalization or Rescaling

## Usage

```
ft_min_max_scaler(
  x,
  input_col = NULL,
  output_col = NULL,
  min = 0,
  max = 1,
  uid = random_string("min_max_scaler_"),
  ...
)
```

## Arguments

x	A spark_connection, ml_pipeline, or a tbl_spark.
input_col	The name of the input column.
output_col	The name of the output column.
min	Lower bound after transformation, shared by all features Default: 0.0
max	Upper bound after transformation, shared by all features Default: 1.0
uid	A character string used to uniquely identify the feature transformer.
...	Optional arguments; currently unused.

## Details

In the case where x is a tbl\_spark, the estimator fits against x to obtain a transformer, which is then immediately used to transform x, returning a tbl\_spark.

## Value

The object returned depends on the class of x.

- spark\_connection: When x is a spark\_connection, the function returns a ml\_transformer, a ml\_estimator, or one of their subclasses. The object contains a pointer to a Spark Transformer or Estimator object and can be used to compose Pipeline objects.
- ml\_pipeline: When x is a ml\_pipeline, the function returns a ml\_pipeline with the transformer or estimator appended to the pipeline.
- tbl\_spark: When x is a tbl\_spark, a transformer is constructed then immediately applied to the input tbl\_spark, returning a tbl\_spark

**See Also**

See <http://spark.apache.org/docs/latest/ml-features.html> for more information on the set of transformations available for DataFrame columns in Spark.

Other feature transformers: `ft_binarizer()`, `ft_bucketizer()`, `ft_chisq_selector()`, `ft_count_vectorizer()`, `ft_dct()`, `ft_elementwise_product()`, `ft_feature_hasher()`, `ft_hashing_tf()`, `ft_idf()`, `ft_imputer()`, `ft_index_to_string()`, `ft_interaction()`, `ft_lsh`, `ft_max_abs_scaler()`, `ft_ngram()`, `ft_normalizer()`, `ft_one_hot_encoder_estimator()`, `ft_one_hot_encoder()`, `ft_pca()`, `ft_polynomial_expansion()`, `ft_quantile_discretizer()`, `ft_r_formula()`, `ft_regex_tokenizer()`, `ft_robust_scaler()`, `ft_sql_transformer()`, `ft_standard_scaler()`, `ft_stop_words_remover()`, `ft_string_indexer()`, `ft_tokenizer()`, `ft_vector_assembler()`, `ft_vector_indexer()`, `ft_vector_slicer()`, `ft_word2vec()`

**Examples**

```
## Not run:
sc <- spark_connect(master = "local")
iris_tbl <- sdf_copy_to(sc, iris, name = "iris_tbl", overwrite = TRUE)

features <- c("Sepal_Length", "Sepal_Width", "Petal_Length", "Petal_Width")

iris_tbl %>%
  ft_vector_assembler(
    input_col = features,
    output_col = "features_temp"
  ) %>%
  ft_min_max_scaler(
    input_col = "features_temp",
    output_col = "features"
  )

## End(Not run)
```

ft\_ngram

*Feature Transformation – NGram (Transformer)***Description**

A feature transformer that converts the input array of strings into an array of n-grams. Null values in the input array are ignored. It returns an array of n-grams where each n-gram is represented by a space-separated string of words.

**Usage**

```
ft_ngram(
  x,
  input_col = NULL,
  output_col = NULL,
```

```

    n = 2,
    uid = random_string("ngram_"),
    ...
)

```

### Arguments

x	A spark_connection, ml_pipeline, or a tbl_spark.
input_col	The name of the input column.
output_col	The name of the output column.
n	Minimum n-gram length, greater than or equal to 1. Default: 2, bigram features
uid	A character string used to uniquely identify the feature transformer.
...	Optional arguments; currently unused.

### Details

When the input is empty, an empty array is returned. When the input array length is less than n (number of elements per n-gram), no n-grams are returned.

### Value

The object returned depends on the class of x.

- spark\_connection: When x is a spark\_connection, the function returns a ml\_transformer, a ml\_estimator, or one of their subclasses. The object contains a pointer to a Spark Transformer or Estimator object and can be used to compose Pipeline objects.
- ml\_pipeline: When x is a ml\_pipeline, the function returns a ml\_pipeline with the transformer or estimator appended to the pipeline.
- tbl\_spark: When x is a tbl\_spark, a transformer is constructed then immediately applied to the input tbl\_spark, returning a tbl\_spark

### See Also

See <http://spark.apache.org/docs/latest/ml-features.html> for more information on the set of transformations available for DataFrame columns in Spark.

Other feature transformers: `ft_binarizer()`, `ft_bucketizer()`, `ft_chisq_selector()`, `ft_count_vectorizer()`, `ft_dct()`, `ft_elementwise_product()`, `ft_feature_hasher()`, `ft_hashing_tf()`, `ft_idf()`, `ft_imputer()`, `ft_index_to_string()`, `ft_interaction()`, `ft_lsh`, `ft_max_abs_scaler()`, `ft_min_max_scaler()`, `ft_normalizer()`, `ft_one_hot_encoder_estimator()`, `ft_one_hot_encoder()`, `ft_pca()`, `ft_polynomial_expansion()`, `ft_quantile_discretizer()`, `ft_r_formula()`, `ft_regex_tokenizer()`, `ft_robust_scaler()`, `ft_sql_transformer()`, `ft_standard_scaler()`, `ft_stop_words_remover()`, `ft_string_indexer()`, `ft_tokenizer()`, `ft_vector_assembler()`, `ft_vector_indexer()`, `ft_vector_slicer()`, `ft_word2vec()`

ft\_normalizer

*Feature Transformation – Normalizer (Transformer)***Description**

Normalize a vector to have unit norm using the given p-norm.

**Usage**

```
ft_normalizer(
  x,
  input_col = NULL,
  output_col = NULL,
  p = 2,
  uid = random_string("normalizer_"),
  ...
)
```

**Arguments**

x	A spark_connection, ml_pipeline, or a tbl_spark.
input_col	The name of the input column.
output_col	The name of the output column.
p	Normalization in $L^p$ space. Must be $\geq 1$ . Defaults to 2.
uid	A character string used to uniquely identify the feature transformer.
...	Optional arguments; currently unused.

**Value**

The object returned depends on the class of x.

- spark\_connection: When x is a spark\_connection, the function returns a ml\_transformer, a ml\_estimator, or one of their subclasses. The object contains a pointer to a Spark Transformer or Estimator object and can be used to compose Pipeline objects.
- ml\_pipeline: When x is a ml\_pipeline, the function returns a ml\_pipeline with the transformer or estimator appended to the pipeline.
- tbl\_spark: When x is a tbl\_spark, a transformer is constructed then immediately applied to the input tbl\_spark, returning a tbl\_spark

**See Also**

See <http://spark.apache.org/docs/latest/ml-features.html> for more information on the set of transformations available for DataFrame columns in Spark.

Other feature transformers: [ft\\_binarizer\(\)](#), [ft\\_bucketizer\(\)](#), [ft\\_chisq\\_selector\(\)](#), [ft\\_count\\_vectorizer\(\)](#), [ft\\_dct\(\)](#), [ft\\_elementwise\\_product\(\)](#), [ft\\_feature\\_hasher\(\)](#), [ft\\_hashing\\_tf\(\)](#), [ft\\_idf\(\)](#),



```
ft_imputer(), ft_index_to_string(), ft_interaction(), ft_lsh, ft_max_abs_scaler(),
ft_min_max_scaler(), ft_ngram(), ft_one_hot_encoder_estimator(), ft_one_hot_encoder(),
ft_pca(), ft_polynomial_expansion(), ft_quantile_discretizer(), ft_r_formula(), ft_regex_tokenizer(),
ft_robust_scaler(), ft_sql_transformer(), ft_standard_scaler(), ft_stop_words_remover(),
ft_string_indexer(), ft_tokenizer(), ft_vector_assembler(), ft_vector_indexer(), ft_vector_slicer(),
ft_word2vec()
```

---

```
ft_one_hot_encoder      Feature Transformation – OneHotEncoder (Transformer)
```

---

### Description

One-hot encoding maps a column of label indices to a column of binary vectors, with at most a single one-value. This encoding allows algorithms which expect continuous features, such as Logistic Regression, to use categorical features. Typically, used with `ft_string_indexer()` to index a column first.

### Usage

```
ft_one_hot_encoder(
  x,
  input_cols = NULL,
  output_cols = NULL,
  handle_invalid = NULL,
  drop_last = TRUE,
  uid = random_string("one_hot_encoder_"),
  ...
)
```

### Arguments

<code>x</code>	A <code>spark_connection</code> , <code>ml_pipeline</code> , or a <code>tbl_spark</code> .
<code>input_cols</code>	The name of the input columns.
<code>output_cols</code>	The name of the output columns.
<code>handle_invalid</code>	(Spark 2.1.0+) Param for how to handle invalid entries. Options are 'skip' (filter out rows with invalid values), 'error' (throw an error), or 'keep' (keep invalid values in a special additional bucket). Default: "error"
<code>drop_last</code>	Whether to drop the last category. Defaults to TRUE.
<code>uid</code>	A character string used to uniquely identify the feature transformer.
<code>...</code>	Optional arguments; currently unused.

**Value**

The object returned depends on the class of `x`.

- `spark_connection`: When `x` is a `spark_connection`, the function returns a `ml_transformer`, a `ml_estimator`, or one of their subclasses. The object contains a pointer to a Spark Transformer or Estimator object and can be used to compose Pipeline objects.
- `ml_pipeline`: When `x` is a `ml_pipeline`, the function returns a `ml_pipeline` with the transformer or estimator appended to the pipeline.
- `tbl_spark`: When `x` is a `tbl_spark`, a transformer is constructed then immediately applied to the input `tbl_spark`, returning a `tbl_spark`

**See Also**

See <http://spark.apache.org/docs/latest/ml-features.html> for more information on the set of transformations available for DataFrame columns in Spark.

Other feature transformers: `ft_binarizer()`, `ft_bucketizer()`, `ft_chisq_selector()`, `ft_count_vectorizer()`, `ft_dct()`, `ft_elementwise_product()`, `ft_feature_hasher()`, `ft_hashing_tf()`, `ft_idf()`, `ft_imputer()`, `ft_index_to_string()`, `ft_interaction()`, `ft_lsh`, `ft_max_abs_scaler()`, `ft_min_max_scaler()`, `ft_ngram()`, `ft_normalizer()`, `ft_one_hot_encoder_estimator()`, `ft_pca()`, `ft_polynomial_expansion()`, `ft_quantile_discretizer()`, `ft_r_formula()`, `ft_regex_tokenizer()`, `ft_robust_scaler()`, `ft_sql_transformer()`, `ft_standard_scaler()`, `ft_stop_words_remover()`, `ft_string_indexer()`, `ft_tokenizer()`, `ft_vector_assembler()`, `ft_vector_indexer()`, `ft_vector_slicer()`, `ft_word2vec()`

---

ft\_one\_hot\_encoder\_estimator

*Feature Transformation – OneHotEncoderEstimator (Estimator)*

---

**Description**

A one-hot encoder that maps a column of category indices to a column of binary vectors, with at most a single one-value per row that indicates the input category index. For example with 5 categories, an input value of 2.0 would map to an output vector of [0.0, 0.0, 1.0, 0.0]. The last category is not included by default (configurable via `dropLast`), because it makes the vector entries sum up to one, and hence linearly dependent. So an input value of 4.0 maps to [0.0, 0.0, 0.0, 0.0].

**Usage**

```
ft_one_hot_encoder_estimator(
  x,
  input_cols = NULL,
  output_cols = NULL,
  handle_invalid = "error",
  drop_last = TRUE,
  uid = random_string("one_hot_encoder_estimator_"),
  ...
)
```

**Arguments**

x	A spark_connection, ml_pipeline, or a tbl_spark.
input_cols	Names of input columns.
output_cols	Names of output columns.
handle_invalid	(Spark 2.1.0+) Param for how to handle invalid entries. Options are 'skip' (filter out rows with invalid values), 'error' (throw an error), or 'keep' (keep invalid values in a special additional bucket). Default: "error"
drop_last	Whether to drop the last category. Defaults to TRUE.
uid	A character string used to uniquely identify the feature transformer.
...	Optional arguments; currently unused.

**Details**

In the case where x is a tbl\_spark, the estimator fits against x to obtain a transformer, which is then immediately used to transform x, returning a tbl\_spark.

**Value**

The object returned depends on the class of x.

- spark\_connection: When x is a spark\_connection, the function returns a ml\_transformer, a ml\_estimator, or one of their subclasses. The object contains a pointer to a Spark Transformer or Estimator object and can be used to compose Pipeline objects.
- ml\_pipeline: When x is a ml\_pipeline, the function returns a ml\_pipeline with the transformer or estimator appended to the pipeline.
- tbl\_spark: When x is a tbl\_spark, a transformer is constructed then immediately applied to the input tbl\_spark, returning a tbl\_spark

**See Also**

See <http://spark.apache.org/docs/latest/ml-features.html> for more information on the set of transformations available for DataFrame columns in Spark.

Other feature transformers: [ft\\_binarizer\(\)](#), [ft\\_bucketizer\(\)](#), [ft\\_chisq\\_selector\(\)](#), [ft\\_count\\_vectorizer\(\)](#), [ft\\_dct\(\)](#), [ft\\_elementwise\\_product\(\)](#), [ft\\_feature\\_hasher\(\)](#), [ft\\_hashing\\_tf\(\)](#), [ft\\_idf\(\)](#), [ft\\_imputer\(\)](#), [ft\\_index\\_to\\_string\(\)](#), [ft\\_interaction\(\)](#), [ft\\_lsh](#), [ft\\_max\\_abs\\_scaler\(\)](#), [ft\\_min\\_max\\_scaler\(\)](#), [ft\\_ngram\(\)](#), [ft\\_normalizer\(\)](#), [ft\\_one\\_hot\\_encoder\(\)](#), [ft\\_pca\(\)](#), [ft\\_polynomial\\_expansion](#), [ft\\_quantile\\_discretizer\(\)](#), [ft\\_r\\_formula\(\)](#), [ft\\_regex\\_tokenizer\(\)](#), [ft\\_robust\\_scaler\(\)](#), [ft\\_sql\\_transformer\(\)](#), [ft\\_standard\\_scaler\(\)](#), [ft\\_stop\\_words\\_remover\(\)](#), [ft\\_string\\_indexer\(\)](#), [ft\\_tokenizer\(\)](#), [ft\\_vector\\_assembler\(\)](#), [ft\\_vector\\_indexer\(\)](#), [ft\\_vector\\_slicer\(\)](#), [ft\\_word2vec\(\)](#)

ft\_pca

*Feature Transformation – PCA (Estimator)***Description**

PCA trains a model to project vectors to a lower dimensional space of the top k principal components.

**Usage**

```
ft_pca(
  x,
  input_col = NULL,
  output_col = NULL,
  k = NULL,
  uid = random_string("pca_"),
  ...
)
```

```
ml_pca(x, features = tbl_vars(x), k = length(features), pc_prefix = "PC", ...)
```

**Arguments**

x	A spark_connection, ml_pipeline, or a tbl_spark.
input_col	The name of the input column.
output_col	The name of the output column.
k	The number of principal components
uid	A character string used to uniquely identify the feature transformer.
...	Optional arguments; currently unused.
features	The columns to use in the principal components analysis. Defaults to all columns in x.
pc_prefix	Length-one character vector used to prepend names of components.

**Details**

In the case where x is a tbl\_spark, the estimator fits against x to obtain a transformer, which is then immediately used to transform x, returning a tbl\_spark.

ml\_pca() is a wrapper around ft\_pca() that returns a ml\_model.

**Value**

The object returned depends on the class of x.

- spark\_connection: When x is a spark\_connection, the function returns a ml\_transformer, a ml\_estimator, or one of their subclasses. The object contains a pointer to a Spark Transformer or Estimator object and can be used to compose Pipeline objects.

- `ml_pipeline`: When `x` is a `ml_pipeline`, the function returns a `ml_pipeline` with the transformer or estimator appended to the pipeline.
- `tbl_spark`: When `x` is a `tbl_spark`, a transformer is constructed then immediately applied to the input `tbl_spark`, returning a `tbl_spark`

### See Also

See <http://spark.apache.org/docs/latest/ml-features.html> for more information on the set of transformations available for DataFrame columns in Spark.

Other feature transformers: `ft_binarizer()`, `ft_bucketizer()`, `ft_chisq_selector()`, `ft_count_vectorizer()`, `ft_dct()`, `ft_elementwise_product()`, `ft_feature_hasher()`, `ft_hashing_tf()`, `ft_idf()`, `ft_imputer()`, `ft_index_to_string()`, `ft_interaction()`, `ft_lsh`, `ft_max_abs_scaler()`, `ft_min_max_scaler()`, `ft_ngram()`, `ft_normalizer()`, `ft_one_hot_encoder_estimator()`, `ft_one_hot_encoder()`, `ft_polynomial_expansion()`, `ft_quantile_discretizer()`, `ft_r_formula()`, `ft_regex_tokenizer()`, `ft_robust_scaler()`, `ft_sql_transformer()`, `ft_standard_scaler()`, `ft_stop_words_remover()`, `ft_string_indexer()`, `ft_tokenizer()`, `ft_vector_assembler()`, `ft_vector_indexer()`, `ft_vector_slicer()`, `ft_word2vec()`

### Examples

```
## Not run:
library(dplyr)

sc <- spark_connect(master = "local")
iris_tbl <- sdf_copy_to(sc, iris, name = "iris_tbl", overwrite = TRUE)

iris_tbl %>%
  select(-Species) %>%
  ml_pca(k = 2)

## End(Not run)
```

---

ft\_polynomial\_expansion

*Feature Transformation – PolynomialExpansion (Transformer)*

---

### Description

Perform feature expansion in a polynomial space. E.g. take a 2-variable feature vector as an example:  $(x, y)$ , if we want to expand it with degree 2, then we get  $(x, x * x, y, x * y, y * y)$ .

### Usage

```
ft_polynomial_expansion(
  x,
  input_col = NULL,
  output_col = NULL,
```

```

    degree = 2,
    uid = random_string("polynomial_expansion_"),
    ...
)

```

### Arguments

x	A spark_connection, ml_pipeline, or a tbl_spark.
input_col	The name of the input column.
output_col	The name of the output column.
degree	The polynomial degree to expand, which should be greater than equal to 1. A value of 1 means no expansion. Default: 2
uid	A character string used to uniquely identify the feature transformer.
...	Optional arguments; currently unused.

### Value

The object returned depends on the class of x.

- spark\_connection: When x is a spark\_connection, the function returns a ml\_transformer, a ml\_estimator, or one of their subclasses. The object contains a pointer to a Spark Transformer or Estimator object and can be used to compose Pipeline objects.
- ml\_pipeline: When x is a ml\_pipeline, the function returns a ml\_pipeline with the transformer or estimator appended to the pipeline.
- tbl\_spark: When x is a tbl\_spark, a transformer is constructed then immediately applied to the input tbl\_spark, returning a tbl\_spark

### See Also

See <http://spark.apache.org/docs/latest/ml-features.html> for more information on the set of transformations available for DataFrame columns in Spark.

Other feature transformers: `ft_binarizer()`, `ft_bucketizer()`, `ft_chisq_selector()`, `ft_count_vectorizer()`, `ft_dct()`, `ft_elementwise_product()`, `ft_feature_hasher()`, `ft_hashing_tf()`, `ft_idf()`, `ft_imputer()`, `ft_index_to_string()`, `ft_interaction()`, `ft_lsh`, `ft_max_abs_scaler()`, `ft_min_max_scaler()`, `ft_ngram()`, `ft_normalizer()`, `ft_one_hot_encoder_estimator()`, `ft_one_hot_encoder()`, `ft_pca()`, `ft_quantile_discretizer()`, `ft_r_formula()`, `ft_regex_tokenizer()`, `ft_robust_scaler()`, `ft_sql_transformer()`, `ft_standard_scaler()`, `ft_stop_words_remover()`, `ft_string_indexer()`, `ft_tokenizer()`, `ft_vector_assembler()`, `ft_vector_indexer()`, `ft_vector_slicer()`, `ft_word2vec()`

---

 ft\_quantile\_discretizer

*Feature Transformation – QuantileDiscretizer (Estimator)*


---

## Description

ft\_quantile\_discretizer takes a column with continuous features and outputs a column with binned categorical features. The number of bins can be set using the num\_buckets parameter. It is possible that the number of buckets used will be smaller than this value, for example, if there are too few distinct values of the input to create enough distinct quantiles.

## Usage

```
ft_quantile_discretizer(
  x,
  input_col = NULL,
  output_col = NULL,
  num_buckets = 2,
  input_cols = NULL,
  output_cols = NULL,
  num_buckets_array = NULL,
  handle_invalid = "error",
  relative_error = 0.001,
  uid = random_string("quantile_discretizer_"),
  ...
)
```

## Arguments

x	A spark_connection, ml_pipeline, or a tbl_spark.
input_col	The name of the input column.
output_col	The name of the output column.
num_buckets	Number of buckets (quantiles, or categories) into which data points are grouped. Must be greater than or equal to 2.
input_cols	Names of input columns.
output_cols	Names of output columns.
num_buckets_array	Array of number of buckets (quantiles, or categories) into which data points are grouped. Each value must be greater than or equal to 2.
handle_invalid	(Spark 2.1.0+) Param for how to handle invalid entries. Options are 'skip' (filter out rows with invalid values), 'error' (throw an error), or 'keep' (keep invalid values in a special additional bucket). Default: "error"
relative_error	(Spark 2.0.0+) Relative error (see documentation for org.apache.spark.sql.DataFrameStatFunctions.approx here for description). Must be in the range [0, 1]. default: 0.001
uid	A character string used to uniquely identify the feature transformer.
...	Optional arguments; currently unused.

## Details

NaN handling: null and NaN values will be ignored from the column during `QuantileDiscretizer` fitting. This will produce a `Bucketizer` model for making predictions. During the transformation, `Bucketizer` will raise an error when it finds NaN values in the dataset, but the user can also choose to either keep or remove NaN values within the dataset by setting `handle_invalid`. If the user chooses to keep NaN values, they will be handled specially and placed into their own bucket, for example, if 4 buckets are used, then non-NaN data will be put into `buckets[0-3]`, but NaNs will be counted in a special bucket[4].

Algorithm: The bin ranges are chosen using an approximate algorithm (see the documentation for `org.apache.spark.sql.DataFrameStatFunctions.approxQuantile` [here](#) for a detailed description). The precision of the approximation can be controlled with the `relative_error` parameter. The lower and upper bin bounds will be `-Infinity` and `+Infinity`, covering all real values.

Note that the result may be different every time you run it, since the sample strategy behind it is non-deterministic.

In the case where `x` is a `tbl_spark`, the estimator fits against `x` to obtain a transformer, which is then immediately used to transform `x`, returning a `tbl_spark`.

## Value

The object returned depends on the class of `x`.

- `spark_connection`: When `x` is a `spark_connection`, the function returns a `ml_transformer`, a `ml_estimator`, or one of their subclasses. The object contains a pointer to a Spark Transformer or Estimator object and can be used to compose Pipeline objects.
- `ml_pipeline`: When `x` is a `ml_pipeline`, the function returns a `ml_pipeline` with the transformer or estimator appended to the pipeline.
- `tbl_spark`: When `x` is a `tbl_spark`, a transformer is constructed then immediately applied to the input `tbl_spark`, returning a `tbl_spark`.

## See Also

See <http://spark.apache.org/docs/latest/ml-features.html> for more information on the set of transformations available for DataFrame columns in Spark.

### ft\_bucketizer

Other feature transformers: `ft_binarizer()`, `ft_bucketizer()`, `ft_chisq_selector()`, `ft_count_vectorizer()`, `ft_dct()`, `ft_elementwise_product()`, `ft_feature_hasher()`, `ft_hashing_tf()`, `ft_idf()`, `ft_imputer()`, `ft_index_to_string()`, `ft_interaction()`, `ft_lsh`, `ft_max_abs_scaler()`, `ft_min_max_scaler()`, `ft_ngram()`, `ft_normalizer()`, `ft_one_hot_encoder_estimator()`, `ft_one_hot_encoder()`, `ft_pca()`, `ft_polynomial_expansion()`, `ft_r_formula()`, `ft_regex_tokenizer()`, `ft_robust_scaler()`, `ft_sql_transformer()`, `ft_standard_scaler()`, `ft_stop_words_remover()`, `ft_string_indexer()`, `ft_tokenizer()`, `ft_vector_assembler()`, `ft_vector_indexer()`, `ft_vector_slicer()`, `ft_word2vec()`



---

ft\_regex\_tokenizer      *Feature Transformation – RegexTokenizer (Transformer)*

---

### Description

A regex based tokenizer that extracts tokens either by using the provided regex pattern to split the text (default) or repeatedly matching the regex (if gaps is false). Optional parameters also allow filtering tokens using a minimal length. It returns an array of strings that can be empty.

### Usage

```
ft_regex_tokenizer(
  x,
  input_col = NULL,
  output_col = NULL,
  gaps = TRUE,
  min_token_length = 1,
  pattern = "\\s+",
  to_lower_case = TRUE,
  uid = random_string("regex_tokenizer_"),
  ...
)
```

### Arguments

x	A spark_connection, ml_pipeline, or a tbl_spark.
input_col	The name of the input column.
output_col	The name of the output column.
gaps	Indicates whether regex splits on gaps (TRUE) or matches tokens (FALSE).
min_token_length	Minimum token length, greater than or equal to 0.
pattern	The regular expression pattern to be used.
to_lower_case	Indicates whether to convert all characters to lowercase before tokenizing.
uid	A character string used to uniquely identify the feature transformer.
...	Optional arguments; currently unused.

### Value

The object returned depends on the class of x.

- `spark_connection`: When x is a `spark_connection`, the function returns a `ml_transformer`, a `ml_estimator`, or one of their subclasses. The object contains a pointer to a Spark Transformer or Estimator object and can be used to compose Pipeline objects.
- `ml_pipeline`: When x is a `ml_pipeline`, the function returns a `ml_pipeline` with the transformer or estimator appended to the pipeline.
- `tbl_spark`: When x is a `tbl_spark`, a transformer is constructed then immediately applied to the input `tbl_spark`, returning a `tbl_spark`.

**See Also**

See <http://spark.apache.org/docs/latest/ml-features.html> for more information on the set of transformations available for DataFrame columns in Spark.

Other feature transformers: `ft_binarizer()`, `ft_bucketizer()`, `ft_chisq_selector()`, `ft_count_vectorizer()`, `ft_dct()`, `ft_elementwise_product()`, `ft_feature_hasher()`, `ft_hashing_tf()`, `ft_idf()`, `ft_imputer()`, `ft_index_to_string()`, `ft_interaction()`, `ft_lsh`, `ft_max_abs_scaler()`, `ft_min_max_scaler()`, `ft_ngram()`, `ft_normalizer()`, `ft_one_hot_encoder_estimator()`, `ft_one_hot_encoder()`, `ft_pca()`, `ft_polynomial_expansion()`, `ft_quantile_discretizer()`, `ft_r_formula()`, `ft_robust_scaler()`, `ft_sql_transformer()`, `ft_standard_scaler()`, `ft_stop_words_remover()`, `ft_string_indexer()`, `ft_tokenizer()`, `ft_vector_assembler()`, `ft_vector_indexer()`, `ft_vector_slicer()`, `ft_word2vec()`

---

 ft\_robust\_scaler

*Feature Transformation – RobustScaler (Estimator)*


---

**Description**

RobustScaler removes the median and scales the data according to the quantile range. The quantile range is by default IQR (Interquartile Range, quantile range between the 1st quartile = 25th quantile and the 3rd quartile = 75th quantile) but can be configured. Centering and scaling happen independently on each feature by computing the relevant statistics on the samples in the training set. Median and quantile range are then stored to be used on later data using the transform method. Note that missing values are ignored in the computation of medians and ranges.

**Usage**

```
ft_robust_scaler(
  x,
  input_col = NULL,
  output_col = NULL,
  lower = 0.25,
  upper = 0.75,
  with_centering = TRUE,
  with_scaling = TRUE,
  relative_error = 0.001,
  uid = random_string("ft_robust_scaler_"),
  ...
)
```

**Arguments**

x	A spark_connection, ml_pipeline, or a tbl_spark.
input_col	The name of the input column.
output_col	The name of the output column.
lower	Lower quantile to calculate quantile range.
upper	Upper quantile to calculate quantile range.

with_centering	Whether to center data with median.
with_scaling	Whether to scale the data to quantile range.
relative_error	The target relative error for quantile computation.
uid	A character string used to uniquely identify the feature transformer.
...	Optional arguments; currently unused.

### Details

In the case where `x` is a `tbl_spark`, the estimator fits against `x` to obtain a transformer, which is then immediately used to transform `x`, returning a `tbl_spark`.

### Value

The object returned depends on the class of `x`.

- `spark_connection`: When `x` is a `spark_connection`, the function returns a `ml_transformer`, a `ml_estimator`, or one of their subclasses. The object contains a pointer to a Spark Transformer or Estimator object and can be used to compose Pipeline objects.
- `ml_pipeline`: When `x` is a `ml_pipeline`, the function returns a `ml_pipeline` with the transformer or estimator appended to the pipeline.
- `tbl_spark`: When `x` is a `tbl_spark`, a transformer is constructed then immediately applied to the input `tbl_spark`, returning a `tbl_spark`

### See Also

See <http://spark.apache.org/docs/latest/ml-features.html> for more information on the set of transformations available for DataFrame columns in Spark.

Other feature transformers: `ft_binarizer()`, `ft_bucketizer()`, `ft_chisq_selector()`, `ft_count_vectorizer()`, `ft_dct()`, `ft_elementwise_product()`, `ft_feature_hasher()`, `ft_hashing_tf()`, `ft_idf()`, `ft_imputer()`, `ft_index_to_string()`, `ft_interaction()`, `ft_lsh`, `ft_max_abs_scaler()`, `ft_min_max_scaler()`, `ft_ngram()`, `ft_normalizer()`, `ft_one_hot_encoder_estimator()`, `ft_one_hot_encoder()`, `ft_pca()`, `ft_polynomial_expansion()`, `ft_quantile_discretizer()`, `ft_r_formula()`, `ft_regex_tokenizer()`, `ft_sql_transformer()`, `ft_standard_scaler()`, `ft_stop_words_remover()`, `ft_string_indexer()`, `ft_tokenizer()`, `ft_vector_assembler()`, `ft_vector_indexer()`, `ft_vector_slicer()`, `ft_word2vec()`

---

 ft\_r\_formula

*Feature Transformation – RFormula (Estimator)*


---

### Description

Implements the transforms required for fitting a dataset against an R model formula. Currently we support a limited subset of the R operators, including `~`, `.`, `:`, `+`, and `-`. Also see the R formula docs here: <http://stat.ethz.ch/R-manual/R-patched/library/stats/html/formula.html>

**Usage**

```
ft_r_formula(
  x,
  formula = NULL,
  features_col = "features",
  label_col = "label",
  force_index_label = FALSE,
  uid = random_string("r_formula_"),
  ...
)
```

**Arguments**

x	A spark_connection, ml_pipeline, or a tbl_spark.
formula	R formula as a character string or a formula. Formula objects are converted to character strings directly and the environment is not captured.
features_col	Features column name, as a length-one character vector. The column should be single vector column of numeric values. Usually this column is output by <a href="#">ft_r_formula</a> .
label_col	Label column name. The column should be a numeric column. Usually this column is output by <a href="#">ft_r_formula</a> .
force_index_label	(Spark 2.1.0+) Force to index label whether it is numeric or string type. Usually we index label only when it is string type. If the formula was used by classification algorithms, we can force to index label even it is numeric type by setting this param with true. Default: FALSE.
uid	A character string used to uniquely identify the feature transformer.
...	Optional arguments; currently unused.

**Details**

The basic operators in the formula are:

- ~ separate target and terms
- + concat terms, "+ 0" means removing intercept
- - remove a term, "- 1" means removing intercept
- : interaction (multiplication for numeric values, or binarized categorical values)
- . all columns except target

Suppose a and b are double columns, we use the following simple examples to illustrate the effect of RFormula:

- $y \sim a + b$  means model  $y \sim w_0 + w_1 * a + w_2 * b$  where  $w_0$  is the intercept and  $w_1, w_2$  are coefficients.
- $y \sim a + b + a:b - 1$  means model  $y \sim w_1 * a + w_2 * b + w_3 * a * b$  where  $w_1, w_2, w_3$  are coefficients.

RFormula produces a vector column of features and a double or string column of label. Like when formulas are used in R for linear regression, string input columns will be one-hot encoded, and numeric columns will be cast to doubles. If the label column is of type string, it will be first transformed to double with StringIndexer. If the label column does not exist in the DataFrame, the output label column will be created from the specified response variable in the formula.

In the case where `x` is a `tbl_spark`, the estimator fits against `x` to obtain a transformer, which is then immediately used to transform `x`, returning a `tbl_spark`.

## Value

The object returned depends on the class of `x`.

- `spark_connection`: When `x` is a `spark_connection`, the function returns a `ml_transformer`, a `ml_estimator`, or one of their subclasses. The object contains a pointer to a Spark Transformer or Estimator object and can be used to compose Pipeline objects.
- `ml_pipeline`: When `x` is a `ml_pipeline`, the function returns a `ml_pipeline` with the transformer or estimator appended to the pipeline.
- `tbl_spark`: When `x` is a `tbl_spark`, a transformer is constructed then immediately applied to the input `tbl_spark`, returning a `tbl_spark`

## See Also

See <http://spark.apache.org/docs/latest/ml-features.html> for more information on the set of transformations available for DataFrame columns in Spark.

Other feature transformers: `ft_binarizer()`, `ft_bucketizer()`, `ft_chisq_selector()`, `ft_count_vectorizer()`, `ft_dct()`, `ft_elementwise_product()`, `ft_feature_hasher()`, `ft_hashing_tf()`, `ft_idf()`, `ft_imputer()`, `ft_index_to_string()`, `ft_interaction()`, `ft_lsh`, `ft_max_abs_scaler()`, `ft_min_max_scaler()`, `ft_ngram()`, `ft_normalizer()`, `ft_one_hot_encoder_estimator()`, `ft_one_hot_encoder()`, `ft_pca()`, `ft_polynomial_expansion()`, `ft_quantile_discretizer()`, `ft_regex_tokenizer()`, `ft_robust_scaler()`, `ft_sql_transformer()`, `ft_standard_scaler()`, `ft_stop_words_remover()`, `ft_string_indexer()`, `ft_tokenizer()`, `ft_vector_assembler()`, `ft_vector_indexer()`, `ft_vector_slicer()`, `ft_word2vec()`

---

ft\_sql\_transformer      *Feature Transformation – SQLTransformer*

---

## Description

Implements the transformations which are defined by SQL statement. Currently we only support SQL syntax like 'SELECT ... FROM \_\_THIS\_\_ ...' where ' \_\_THIS\_\_ ' represents the underlying table of the input dataset. The select clause specifies the fields, constants, and expressions to display in the output, it can be any select clause that Spark SQL supports. Users can also use Spark SQL built-in function and UDFs to operate on these selected columns.

**Usage**

```
ft_sql_transformer(
  x,
  statement = NULL,
  uid = random_string("sql_transformer_"),
  ...
)

ft_dplyr_transformer(x, tbl, uid = random_string("dplyr_transformer_"), ...)
```

**Arguments**

x	A spark_connection, ml_pipeline, or a tbl_spark.
statement	A SQL statement.
uid	A character string used to uniquely identify the feature transformer.
...	Optional arguments; currently unused.
tbl	A tbl_spark generated using dplyr transformations.

**Details**

ft\_dplyr\_transformer() is mostly a wrapper around ft\_sql\_transformer() that takes a tbl\_spark instead of a SQL statement. Internally, the ft\_dplyr\_transformer() extracts the dplyr transformations used to generate tbl as a SQL statement or a sampling operation. Note that only single-table dplyr verbs are supported and that the sdf\_ family of functions are not.

**Value**

The object returned depends on the class of x.

- spark\_connection: When x is a spark\_connection, the function returns a ml\_transformer, a ml\_estimator, or one of their subclasses. The object contains a pointer to a Spark Transformer or Estimator object and can be used to compose Pipeline objects.
- ml\_pipeline: When x is a ml\_pipeline, the function returns a ml\_pipeline with the transformer or estimator appended to the pipeline.
- tbl\_spark: When x is a tbl\_spark, a transformer is constructed then immediately applied to the input tbl\_spark, returning a tbl\_spark

**See Also**

See <http://spark.apache.org/docs/latest/ml-features.html> for more information on the set of transformations available for DataFrame columns in Spark.

Other feature transformers: [ft\\_binarizer\(\)](#), [ft\\_bucketizer\(\)](#), [ft\\_chisq\\_selector\(\)](#), [ft\\_count\\_vectorizer\(\)](#), [ft\\_dct\(\)](#), [ft\\_elementwise\\_product\(\)](#), [ft\\_feature\\_hasher\(\)](#), [ft\\_hashing\\_tf\(\)](#), [ft\\_idf\(\)](#), [ft\\_imputer\(\)](#), [ft\\_index\\_to\\_string\(\)](#), [ft\\_interaction\(\)](#), [ft\\_lsh](#), [ft\\_max\\_abs\\_scaler\(\)](#), [ft\\_min\\_max\\_scaler\(\)](#), [ft\\_ngram\(\)](#), [ft\\_normalizer\(\)](#), [ft\\_one\\_hot\\_encoder\\_estimator\(\)](#), [ft\\_one\\_hot\\_encoder\(\)](#), [ft\\_pca\(\)](#), [ft\\_polynomial\\_expansion\(\)](#), [ft\\_quantile\\_discretizer\(\)](#), [ft\\_r\\_formula\(\)](#), [ft\\_regex\\_tokenizer\(\)](#), [ft\\_robust\\_scaler\(\)](#), [ft\\_standard\\_scaler\(\)](#), [ft\\_stop\\_words\\_remover\(\)](#), [ft\\_string\\_indexer\(\)](#), [ft\\_tokenizer\(\)](#), [ft\\_vector\\_assembler\(\)](#), [ft\\_vector\\_indexer\(\)](#), [ft\\_vector\\_slicer\(\)](#), [ft\\_word2vec\(\)](#)

---

 ft\_standard\_scaler      *Feature Transformation – StandardScaler (Estimator)*


---

### Description

Standardizes features by removing the mean and scaling to unit variance using column summary statistics on the samples in the training set. The "unit std" is computed using the corrected sample standard deviation, which is computed as the square root of the unbiased sample variance.

### Usage

```
ft_standard_scaler(
  x,
  input_col = NULL,
  output_col = NULL,
  with_mean = FALSE,
  with_std = TRUE,
  uid = random_string("standard_scaler_"),
  ...
)
```

### Arguments

x	A spark_connection, ml_pipeline, or a tbl_spark.
input_col	The name of the input column.
output_col	The name of the output column.
with_mean	Whether to center the data with mean before scaling. It will build a dense output, so take care when applying to sparse input. Default: FALSE
with_std	Whether to scale the data to unit standard deviation. Default: TRUE
uid	A character string used to uniquely identify the feature transformer.
...	Optional arguments; currently unused.

### Details

In the case where x is a tbl\_spark, the estimator fits against x to obtain a transformer, which is then immediately used to transform x, returning a tbl\_spark.

### Value

The object returned depends on the class of x.

- spark\_connection: When x is a spark\_connection, the function returns a ml\_transformer, a ml\_estimator, or one of their subclasses. The object contains a pointer to a Spark Transformer or Estimator object and can be used to compose Pipeline objects.
- ml\_pipeline: When x is a ml\_pipeline, the function returns a ml\_pipeline with the transformer or estimator appended to the pipeline.

- `tbl_spark`: When `x` is a `tbl_spark`, a transformer is constructed then immediately applied to the input `tbl_spark`, returning a `tbl_spark`

### See Also

See <http://spark.apache.org/docs/latest/ml-features.html> for more information on the set of transformations available for DataFrame columns in Spark.

Other feature transformers: `ft_binarizer()`, `ft_bucketizer()`, `ft_chisq_selector()`, `ft_count_vectorizer()`, `ft_dct()`, `ft_elementwise_product()`, `ft_feature_hasher()`, `ft_hashing_tf()`, `ft_idf()`, `ft_imputer()`, `ft_index_to_string()`, `ft_interaction()`, `ft_lsh`, `ft_max_abs_scaler()`, `ft_min_max_scaler()`, `ft_ngram()`, `ft_normalizer()`, `ft_one_hot_encoder_estimator()`, `ft_one_hot_encoder()`, `ft_pca()`, `ft_polynomial_expansion()`, `ft_quantile_discretizer()`, `ft_r_formula()`, `ft_regex_tokenizer()`, `ft_robust_scaler()`, `ft_sql_transformer()`, `ft_stop_words_remover()`, `ft_string_indexer()`, `ft_tokenizer()`, `ft_vector_assembler()`, `ft_vector_indexer()`, `ft_vector_slicer()`, `ft_word2vec()`

### Examples

```
## Not run:
sc <- spark_connect(master = "local")
iris_tbl <- sdf_copy_to(sc, iris, name = "iris_tbl", overwrite = TRUE)

features <- c("Sepal_Length", "Sepal_Width", "Petal_Length", "Petal_Width")

iris_tbl %>%
  ft_vector_assembler(
    input_col = features,
    output_col = "features_temp"
  ) %>%
  ft_standard_scaler(
    input_col = "features_temp",
    output_col = "features",
    with_mean = TRUE
  )

## End(Not run)
```

---

`ft_stop_words_remover` *Feature Transformation – StopWordsRemover (Transformer)*

---

### Description

A feature transformer that filters out stop words from input.

### Usage

```
ft_stop_words_remover(
  x,
  input_col = NULL,
```



```

    output_col = NULL,
    case_sensitive = FALSE,
    stop_words = ml_default_stop_words(spark_connection(x), "english"),
    uid = random_string("stop_words_remover_"),
    ...
)

```

### Arguments

x	A spark_connection, ml_pipeline, or a tbl_spark.
input_col	The name of the input column.
output_col	The name of the output column.
case_sensitive	Whether to do a case sensitive comparison over the stop words.
stop_words	The words to be filtered out.
uid	A character string used to uniquely identify the feature transformer.
...	Optional arguments; currently unused.

### Value

The object returned depends on the class of x.

- `spark_connection`: When x is a `spark_connection`, the function returns a `ml_transformer`, a `ml_estimator`, or one of their subclasses. The object contains a pointer to a Spark Transformer or Estimator object and can be used to compose Pipeline objects.
- `ml_pipeline`: When x is a `ml_pipeline`, the function returns a `ml_pipeline` with the transformer or estimator appended to the pipeline.
- `tbl_spark`: When x is a `tbl_spark`, a transformer is constructed then immediately applied to the input `tbl_spark`, returning a `tbl_spark`

### See Also

See <http://spark.apache.org/docs/latest/ml-features.html> for more information on the set of transformations available for DataFrame columns in Spark.

[ml\\_default\\_stop\\_words](#)

Other feature transformers: `ft_binarizer()`, `ft_bucketizer()`, `ft_chisq_selector()`, `ft_count_vectorizer()`, `ft_dct()`, `ft_elementwise_product()`, `ft_feature_hasher()`, `ft_hashing_tf()`, `ft_idf()`, `ft_imputer()`, `ft_index_to_string()`, `ft_interaction()`, `ft_lsh`, `ft_max_abs_scaler()`, `ft_min_max_scaler()`, `ft_ngram()`, `ft_normalizer()`, `ft_one_hot_encoder_estimator()`, `ft_one_hot_encoder()`, `ft_pca()`, `ft_polynomial_expansion()`, `ft_quantile_discretizer()`, `ft_r_formula()`, `ft_regex_tokenizer()`, `ft_robust_scaler()`, `ft_sql_transformer()`, `ft_standard_scaler()`, `ft_string_indexer()`, `ft_tokenizer()`, `ft_vector_assembler()`, `ft_vector_indexer()`, `ft_vector_slicer()`, `ft_word2vec()`

---

 ft\_string\_indexer      *Feature Transformation – StringIndexer (Estimator)*


---

## Description

A label indexer that maps a string column of labels to an ML column of label indices. If the input column is numeric, we cast it to string and index the string values. The indices are in  $[\emptyset, \text{numLabels})$ , ordered by label frequencies. So the most frequent label gets index 0. This function is the inverse of [ft\\_index\\_to\\_string](#).

## Usage

```
ft_string_indexer(
  x,
  input_col = NULL,
  output_col = NULL,
  handle_invalid = "error",
  string_order_type = "frequencyDesc",
  uid = random_string("string_indexer_"),
  ...
)

ml_labels(model)

ft_string_indexer_model(
  x,
  input_col = NULL,
  output_col = NULL,
  labels,
  handle_invalid = "error",
  uid = random_string("string_indexer_model_"),
  ...
)
```

## Arguments

x	A spark_connection, ml_pipeline, or a tbl_spark.
input_col	The name of the input column.
output_col	The name of the output column.
handle_invalid	(Spark 2.1.0+) Param for how to handle invalid entries. Options are 'skip' (filter out rows with invalid values), 'error' (throw an error), or 'keep' (keep invalid values in a special additional bucket). Default: "error"
string_order_type	(Spark 2.3+)How to order labels of string column. The first label after ordering is assigned an index of 0. Options are "frequencyDesc", "frequencyAsc", "alphabetDesc", and "alphabetAsc". Defaults to "frequencyDesc".

uid	A character string used to uniquely identify the feature transformer.
...	Optional arguments; currently unused.
model	A fitted StringIndexer model returned by ft_string_indexer()
labels	Vector of labels, corresponding to indices to be assigned.

### Details

In the case where `x` is a `tbl_spark`, the estimator fits against `x` to obtain a transformer, which is then immediately used to transform `x`, returning a `tbl_spark`.

### Value

The object returned depends on the class of `x`.

- `spark_connection`: When `x` is a `spark_connection`, the function returns a `ml_transformer`, a `ml_estimator`, or one of their subclasses. The object contains a pointer to a Spark Transformer or Estimator object and can be used to compose Pipeline objects.
- `ml_pipeline`: When `x` is a `ml_pipeline`, the function returns a `ml_pipeline` with the transformer or estimator appended to the pipeline.
- `tbl_spark`: When `x` is a `tbl_spark`, a transformer is constructed then immediately applied to the input `tbl_spark`, returning a `tbl_spark`

`ml_labels()` returns a vector of labels, corresponding to indices to be assigned.

### See Also

See <http://spark.apache.org/docs/latest/ml-features.html> for more information on the set of transformations available for DataFrame columns in Spark.

`ft_index_to_string`

Other feature transformers: `ft_binarizer()`, `ft_bucketizer()`, `ft_chisq_selector()`, `ft_count_vectorizer()`, `ft_dct()`, `ft_elementwise_product()`, `ft_feature_hasher()`, `ft_hashing_tf()`, `ft_idf()`, `ft_imputer()`, `ft_index_to_string()`, `ft_interaction()`, `ft_lsh`, `ft_max_abs_scaler()`, `ft_min_max_scaler()`, `ft_ngram()`, `ft_normalizer()`, `ft_one_hot_encoder_estimator()`, `ft_one_hot_encoder()`, `ft_pca()`, `ft_polynomial_expansion()`, `ft_quantile_discretizer()`, `ft_r_formula()`, `ft_regex_tokenizer()`, `ft_robust_scaler()`, `ft_sql_transformer()`, `ft_standard_scaler()`, `ft_stop_words_remover()`, `ft_tokenizer()`, `ft_vector_assembler()`, `ft_vector_indexer()`, `ft_vector_slicer()`, `ft_word2vec()`

---

ft\_tokenizer

*Feature Transformation – Tokenizer (Transformer)*

---

### Description

A tokenizer that converts the input string to lowercase and then splits it by white spaces.

**Usage**

```
ft_tokenizer(
  x,
  input_col = NULL,
  output_col = NULL,
  uid = random_string("tokenizer_"),
  ...
)
```

**Arguments**

x	A spark_connection, ml_pipeline, or a tbl_spark.
input_col	The name of the input column.
output_col	The name of the output column.
uid	A character string used to uniquely identify the feature transformer.
...	Optional arguments; currently unused.

**Value**

The object returned depends on the class of x.

- `spark_connection`: When x is a `spark_connection`, the function returns a `ml_transformer`, a `ml_estimator`, or one of their subclasses. The object contains a pointer to a Spark Transformer or Estimator object and can be used to compose Pipeline objects.
- `ml_pipeline`: When x is a `ml_pipeline`, the function returns a `ml_pipeline` with the transformer or estimator appended to the pipeline.
- `tbl_spark`: When x is a `tbl_spark`, a transformer is constructed then immediately applied to the input `tbl_spark`, returning a `tbl_spark`.

**See Also**

See <http://spark.apache.org/docs/latest/ml-features.html> for more information on the set of transformations available for DataFrame columns in Spark.

Other feature transformers: `ft_binarizer()`, `ft_bucketizer()`, `ft_chisq_selector()`, `ft_count_vectorizer()`, `ft_dct()`, `ft_elementwise_product()`, `ft_feature_hasher()`, `ft_hashing_tf()`, `ft_idf()`, `ft_imputer()`, `ft_index_to_string()`, `ft_interaction()`, `ft_lsh`, `ft_max_abs_scaler()`, `ft_min_max_scaler()`, `ft_ngram()`, `ft_normalizer()`, `ft_one_hot_encoder_estimator()`, `ft_one_hot_encoder()`, `ft_pca()`, `ft_polynomial_expansion()`, `ft_quantile_discretizer()`, `ft_r_formula()`, `ft_regex_tokenizer()`, `ft_robust_scaler()`, `ft_sql_transformer()`, `ft_standard_scaler()`, `ft_stop_words_remove()`, `ft_string_indexer()`, `ft_vector_assembler()`, `ft_vector_indexer()`, `ft_vector_slicer()`, `ft_word2vec()`

---

 ft\_vector\_assembler     *Feature Transformation – VectorAssembler (Transformer)*


---

### Description

Combine multiple vectors into a single row-vector; that is, where each row element of the newly generated column is a vector formed by concatenating each row element from the specified input columns.

### Usage

```
ft_vector_assembler(
  x,
  input_cols = NULL,
  output_col = NULL,
  uid = random_string("vector_assembler_"),
  ...
)
```

### Arguments

x	A spark_connection, ml_pipeline, or a tbl_spark.
input_cols	The names of the input columns
output_col	The name of the output column.
uid	A character string used to uniquely identify the feature transformer.
...	Optional arguments; currently unused.

### Value

The object returned depends on the class of x.

- spark\_connection: When x is a spark\_connection, the function returns a ml\_transformer, a ml\_estimator, or one of their subclasses. The object contains a pointer to a Spark Transformer or Estimator object and can be used to compose Pipeline objects.
- ml\_pipeline: When x is a ml\_pipeline, the function returns a ml\_pipeline with the transformer or estimator appended to the pipeline.
- tbl\_spark: When x is a tbl\_spark, a transformer is constructed then immediately applied to the input tbl\_spark, returning a tbl\_spark

### See Also

See <http://spark.apache.org/docs/latest/ml-features.html> for more information on the set of transformations available for DataFrame columns in Spark.

Other feature transformers: [ft\\_binarizer\(\)](#), [ft\\_bucketizer\(\)](#), [ft\\_chisq\\_selector\(\)](#), [ft\\_count\\_vectorizer\(\)](#), [ft\\_dct\(\)](#), [ft\\_elementwise\\_product\(\)](#), [ft\\_feature\\_hasher\(\)](#), [ft\\_hashing\\_tf\(\)](#), [ft\\_idf\(\)](#),

```
ft_imputer(), ft_index_to_string(), ft_interaction(), ft_lsh, ft_max_abs_scaler(),
ft_min_max_scaler(), ft_ngram(), ft_normalizer(), ft_one_hot_encoder_estimator(), ft_one_hot_encoder(),
ft_pca(), ft_polynomial_expansion(), ft_quantile_discretizer(), ft_r_formula(), ft_regex_tokenizer(),
ft_robust_scaler(), ft_sql_transformer(), ft_standard_scaler(), ft_stop_words_remover(),
ft_string_indexer(), ft_tokenizer(), ft_vector_indexer(), ft_vector_slicer(), ft_word2vec()
```

---

ft_vector_indexer	<i>Feature Transformation – VectorIndexer (Estimator)</i>
-------------------	-----------------------------------------------------------

---

## Description

Indexing categorical feature columns in a dataset of Vector.

## Usage

```
ft_vector_indexer(
  x,
  input_col = NULL,
  output_col = NULL,
  max_categories = 20,
  uid = random_string("vector_indexer_"),
  ...
)
```

## Arguments

x	A spark_connection, ml_pipeline, or a tbl_spark.
input_col	The name of the input column.
output_col	The name of the output column.
max_categories	Threshold for the number of values a categorical feature can take. If a feature is found to have > max_categories values, then it is declared continuous. Must be greater than or equal to 2. Defaults to 20.
uid	A character string used to uniquely identify the feature transformer.
...	Optional arguments; currently unused.

## Details

In the case where x is a tbl\_spark, the estimator fits against x to obtain a transformer, which is then immediately used to transform x, returning a tbl\_spark.

## Value

The object returned depends on the class of x.

- spark\_connection: When x is a spark\_connection, the function returns a ml\_transformer, a ml\_estimator, or one of their subclasses. The object contains a pointer to a Spark Transformer or Estimator object and can be used to compose Pipeline objects.

- `ml_pipeline`: When `x` is a `ml_pipeline`, the function returns a `ml_pipeline` with the transformer or estimator appended to the pipeline.
- `tbl_spark`: When `x` is a `tbl_spark`, a transformer is constructed then immediately applied to the input `tbl_spark`, returning a `tbl_spark`

### See Also

See <http://spark.apache.org/docs/latest/ml-features.html> for more information on the set of transformations available for DataFrame columns in Spark.

Other feature transformers: `ft_binarizer()`, `ft_bucketizer()`, `ft_chisq_selector()`, `ft_count_vectorizer()`, `ft_dct()`, `ft_elementwise_product()`, `ft_feature_hasher()`, `ft_hashing_tf()`, `ft_idf()`, `ft_imputer()`, `ft_index_to_string()`, `ft_interaction()`, `ft_lsh`, `ft_max_abs_scaler()`, `ft_min_max_scaler()`, `ft_ngram()`, `ft_normalizer()`, `ft_one_hot_encoder_estimator()`, `ft_one_hot_encoder()`, `ft_pca()`, `ft_polynomial_expansion()`, `ft_quantile_discretizer()`, `ft_r_formula()`, `ft_regex_tokenizer()`, `ft_robust_scaler()`, `ft_sql_transformer()`, `ft_standard_scaler()`, `ft_stop_words_remover()`, `ft_string_indexer()`, `ft_tokenizer()`, `ft_vector_assembler()`, `ft_vector_slicer()`, `ft_word2vec()`

---

ft\_vector\_slicer

*Feature Transformation – VectorSlicer (Transformer)*

---

### Description

Takes a feature vector and outputs a new feature vector with a subarray of the original features.

### Usage

```
ft_vector_slicer(
  x,
  input_col = NULL,
  output_col = NULL,
  indices = NULL,
  uid = random_string("vector_slicer_"),
  ...
)
```

### Arguments

<code>x</code>	A <code>spark_connection</code> , <code>ml_pipeline</code> , or a <code>tbl_spark</code> .
<code>input_col</code>	The name of the input column.
<code>output_col</code>	The name of the output column.
<code>indices</code>	An vector of indices to select features from a vector column. Note that the indices are 0-based.
<code>uid</code>	A character string used to uniquely identify the feature transformer.
<code>...</code>	Optional arguments; currently unused.

**Value**

The object returned depends on the class of `x`.

- `spark_connection`: When `x` is a `spark_connection`, the function returns a `ml_transformer`, a `ml_estimator`, or one of their subclasses. The object contains a pointer to a Spark Transformer or Estimator object and can be used to compose Pipeline objects.
- `ml_pipeline`: When `x` is a `ml_pipeline`, the function returns a `ml_pipeline` with the transformer or estimator appended to the pipeline.
- `tbl_spark`: When `x` is a `tbl_spark`, a transformer is constructed then immediately applied to the input `tbl_spark`, returning a `tbl_spark`

**See Also**

See <http://spark.apache.org/docs/latest/ml-features.html> for more information on the set of transformations available for DataFrame columns in Spark.

Other feature transformers: `ft_binarizer()`, `ft_bucketizer()`, `ft_chisq_selector()`, `ft_count_vectorizer()`, `ft_dct()`, `ft_elementwise_product()`, `ft_feature_hasher()`, `ft_hashing_tf()`, `ft_idf()`, `ft_imputer()`, `ft_index_to_string()`, `ft_interaction()`, `ft_lsh`, `ft_max_abs_scaler()`, `ft_min_max_scaler()`, `ft_ngram()`, `ft_normalizer()`, `ft_one_hot_encoder_estimator()`, `ft_one_hot_encoder()`, `ft_pca()`, `ft_polynomial_expansion()`, `ft_quantile_discretizer()`, `ft_r_formula()`, `ft_regex_tokenizer()`, `ft_robust_scaler()`, `ft_sql_transformer()`, `ft_standard_scaler()`, `ft_stop_words_remover()`, `ft_string_indexer()`, `ft_tokenizer()`, `ft_vector_assembler()`, `ft_vector_indexer()`, `ft_word2vec()`

---

 ft\_word2vec

*Feature Transformation – Word2Vec (Estimator)*


---

**Description**

Word2Vec transforms a word into a code for further natural language processing or machine learning process.

**Usage**

```
ft_word2vec(
  x,
  input_col = NULL,
  output_col = NULL,
  vector_size = 100,
  min_count = 5,
  max_sentence_length = 1000,
  num_partitions = 1,
  step_size = 0.025,
  max_iter = 1,
  seed = NULL,
  uid = random_string("word2vec_"),
  ...
)
```



```
)
ml_find_synonyms(model, word, num)
```

### Arguments

x	A spark_connection, ml_pipeline, or a tbl_spark.
input_col	The name of the input column.
output_col	The name of the output column.
vector_size	The dimension of the code that you want to transform from words. Default: 100
min_count	The minimum number of times a token must appear to be included in the word2vec model's vocabulary. Default: 5
max_sentence_length	(Spark 2.0.0+) Sets the maximum length (in words) of each sentence in the input data. Any sentence longer than this threshold will be divided into chunks of up to max_sentence_length size. Default: 1000
num_partitions	Number of partitions for sentences of words. Default: 1
step_size	Param for Step size to be used for each iteration of optimization (> 0).
max_iter	The maximum number of iterations to use.
seed	A random seed. Set this value if you need your results to be reproducible across repeated calls.
uid	A character string used to uniquely identify the feature transformer.
...	Optional arguments; currently unused.
model	A fitted Word2Vec model, returned by ft_word2vec().
word	A word, as a length-one character vector.
num	Number of words closest in similarity to the given word to find.

### Details

In the case where x is a tbl\_spark, the estimator fits against x to obtain a transformer, which is then immediately used to transform x, returning a tbl\_spark.

### Value

The object returned depends on the class of x.

- spark\_connection: When x is a spark\_connection, the function returns a ml\_transformer, a ml\_estimator, or one of their subclasses. The object contains a pointer to a Spark Transformer or Estimator object and can be used to compose Pipeline objects.
- ml\_pipeline: When x is a ml\_pipeline, the function returns a ml\_pipeline with the transformer or estimator appended to the pipeline.
- tbl\_spark: When x is a tbl\_spark, a transformer is constructed then immediately applied to the input tbl\_spark, returning a tbl\_spark

ml\_find\_synonyms() returns a DataFrame of synonyms and cosine similarities

**See Also**

See <http://spark.apache.org/docs/latest/ml-features.html> for more information on the set of transformations available for DataFrame columns in Spark.

Other feature transformers: `ft_binarizer()`, `ft_bucketizer()`, `ft_chisq_selector()`, `ft_count_vectorizer()`, `ft_dct()`, `ft_elementwise_product()`, `ft_feature_hasher()`, `ft_hashing_tf()`, `ft_idf()`, `ft_imputer()`, `ft_index_to_string()`, `ft_interaction()`, `ft_lsh`, `ft_max_abs_scaler()`, `ft_min_max_scaler()`, `ft_ngram()`, `ft_normalizer()`, `ft_one_hot_encoder_estimator()`, `ft_one_hot_encoder()`, `ft_pca()`, `ft_polynomial_expansion()`, `ft_quantile_discretizer()`, `ft_r_formula()`, `ft_regex_tokenizer()`, `ft_robust_scaler()`, `ft_sql_transformer()`, `ft_standard_scaler()`, `ft_stop_words_remover()`, `ft_string_indexer()`, `ft_tokenizer()`, `ft_vector_assembler()`, `ft_vector_indexer()`, `ft_vector_slicer()`

---

full\_join

*Full join*

---

**Description**

See `full_join` for more details.

---

get\_spark\_sql\_catalog\_implementation

*Retrieve the Spark connection's SQL catalog implementation property*

---

**Description**

Retrieve the Spark connection's SQL catalog implementation property

**Usage**

```
get_spark_sql_catalog_implementation(sc)
```

**Arguments**

sc	spark_connection
----	------------------

**Value**

spark.sql.catalogImplementation property from the connection's runtime configuration

---

hive_context_config	<i>Runtime configuration interface for Hive</i>
---------------------	-------------------------------------------------

---

**Description**

Retrieves the runtime configuration interface for Hive.

**Usage**

```
hive_context_config(sc)
```

**Arguments**

sc	A spark_connection.
----	---------------------

---

hof_aggregate	<i>Apply Aggregate Function to Array Column</i>
---------------	-------------------------------------------------

---

**Description**

Apply an element-wise aggregation function to an array column (this is essentially a dplyr wrapper for the `aggregate(array<T>, A, function<A, T, A>[, function<A, R>])`: R built-in Spark SQL functions)

**Usage**

```
hof_aggregate(
  x,
  start,
  merge,
  finish = NULL,
  expr = NULL,
  dest_col = NULL,
  ...
)
```

**Arguments**

x	The Spark data frame to run aggregation on
start	The starting value of the aggregation
merge	The aggregation function
finish	Optional param specifying a transformation to apply on the final value of the aggregation
expr	The array being aggregated, could be any SQL expression evaluating to an array (default: the last column of the Spark data frame)
dest_col	Column to store the aggregated result (default: expr)
...	Additional params to <code>dplyr::mutate</code>

**Examples**

```
## Not run:

library(sparklyr)
sc <- spark_connect(master = "local")
# concatenates all numbers of each array in `array_column` and add parentheses
# around the resulting string
copy_to(sc, tibble::tibble(array_column = list(1:5, 21:25))) %>%
  hof_aggregate(
    start = "",
    merge = ~ CONCAT(.y, .x),
    finish = ~ CONCAT("(", .x, ")")
  )

## End(Not run)
```

---

hof_array_sort	<i>Sorts array using a custom comparator</i>
----------------	----------------------------------------------

---

**Description**

Applies a custom comparator function to sort an array (this is essentially a dplyr wrapper to the `'array_sort(expr, func)'` higher- order function, which is supported since Spark 3.0)

**Usage**

```
hof_array_sort(x, func, expr = NULL, dest_col = NULL, ...)
```

**Arguments**

<code>x</code>	The Spark data frame to be processed
<code>func</code>	The comparator function to apply (it should take 2 array elements as arguments and return an integer, with a return value of -1 indicating the first element is less than the second, 0 indicating equality, or 1 indicating the first element is greater than the second)
<code>expr</code>	The array being sorted, could be any SQL expression evaluating to an array (default: the last column of the Spark data frame)
<code>dest_col</code>	Column to store the sorted result (default: <code>expr</code> )
<code>...</code>	Additional params to <code>dplyr::mutate</code>

**Examples**

```
## Not run:

library(sparklyr)
sc <- spark_connect(master = "local", version = "3.0.0")
```

```

copy_to(
  sc,
  tibble::tibble(
    # x contains 2 arrays each having elements in ascending order
    x = list(1:5, 6:10)
  )
) %>%
  # now each array from x gets sorted in descending order
  hof_array_sort(~ as.integer(sign(.y - .x)))

## End(Not run)

```

---

hof\_exists

*Determine Whether Some Element Exists in an Array Column*


---

### Description

Determines whether an element satisfying the given predicate exists in each array from an array column (this is essentially a dplyr wrapper for the `exists(array<T>, function<T, Boolean>): Boolean` built-in Spark SQL function)

### Usage

```
hof_exists(x, pred, expr = NULL, dest_col = NULL, ...)
```

### Arguments

x	The Spark data frame to search
pred	A boolean predicate
expr	The array being searched (could be any SQL expression evaluating to an array)
dest_col	Column to store the search result
...	Additional params to <code>dplyr::mutate</code>

---

hof\_filter

*Filter Array Column*


---

### Description

Apply an element-wise filtering function to an array column (this is essentially a dplyr wrapper for the `filter(array<T>, function<T, Boolean>): array<T>` built-in Spark SQL functions)

### Usage

```
hof_filter(x, func, expr = NULL, dest_col = NULL, ...)
```

**Arguments**

x	The Spark data frame to filter
func	The filtering function
expr	The array being filtered, could be any SQL expression evaluating to an array (default: the last column of the Spark data frame)
dest_col	Column to store the filtered result (default: expr)
...	Additional params to dplyr::mutate

**Examples**

```
## Not run:

library(sparklyr)
sc <- spark_connect(master = "local")
# only keep odd elements in each array in `array_column`
copy_to(sc, tibble::tibble(array_column = list(1:5, 21:25))) %>%
  hof_filter(~ .x %% 2 == 1)

## End(Not run)
```

---

hof\_forall

*Checks whether all elements in an array satisfy a predicate*


---

**Description**

Checks whether the predicate specified holds for all elements in an array (this is essentially a dplyr wrapper to the 'forall(expr, pred)' higher- order function, which is supported since Spark 3.0)

**Usage**

```
hof_forall(x, pred, expr = NULL, dest_col = NULL, ...)
```

**Arguments**

x	The Spark data frame to be processed
pred	The predicate to test (it should take an array element as argument and return a boolean value)
expr	The array being tested, could be any SQL expression evaluating to an array (default: the last column of the Spark data frame)
dest_col	Column to store the boolean result (default: expr)
...	Additional params to dplyr::mutate

**Examples**

```
## Not run:

sc <- spark_connect(master = "local", version = "3.0.0")
df <- tibble::tibble(
  x = list(c(1, 2, 3, 4, 5), c(6, 7, 8, 9, 10)),
  y = list(c(1, 4, 2, 8, 5), c(7, 1, 4, 2, 8)),
)
sdf <- sdf_copy_to(sc, df, overwrite = TRUE)

all_positive_tbl <- sdf %>%
  hof_forall(pred = ~ .x > 0, expr = y, dest_col = all_positive) %>%
  dplyr::select(all_positive)

## End(Not run)
```

---

hof_map_filter	<i>Filters a map</i>
----------------	----------------------

---

**Description**

Filters entries in a map using the function specified (this is essentially a dplyr wrapper to the ‘map\_filter(expr, func)’ higher- order function, which is supported since Spark 3.0)

**Usage**

```
hof_map_filter(x, func, expr = NULL, dest_col = NULL, ...)
```

**Arguments**

x	The Spark data frame to be processed
func	The filter function to apply (it should take (key, value) as arguments and return a boolean value, with FALSE indicating the key-value pair should be discarded and TRUE otherwise)
expr	The map being filtered, could be any SQL expression evaluating to a map (default: the last column of the Spark data frame)
dest_col	Column to store the filtered result (default: expr)
...	Additional params to dplyr::mutate

**Examples**

```
## Not run:

library(sparklyr)
sc <- spark_connect(master = "local", version = "3.0.0")
sdf <- sdf_len(sc, 1) %>% dplyr::mutate(m = map(1, 0, 2, 2, 3, -1))
```

```
filtered_sdf <- sdf %>% hof_map_filter(~ .x > .y)

## End(Not run)
```

---

hof_map_zip_with	<i>Merges two maps into one</i>
------------------	---------------------------------

---

## Description

Merges two maps into a single map by applying the function specified to pairs of values with the same key (this is essentially a dplyr wrapper to the ‘map\_zip\_with(map1, map2, func)’ higher-order function, which is supported since Spark 3.0)

## Usage

```
hof_map_zip_with(x, func, dest_col = NULL, map1 = NULL, map2 = NULL, ...)
```

## Arguments

x	The Spark data frame to be processed
func	The function to apply (it should take (key, value1, value2) as arguments, where (key, value1) is a key-value pair present in map1, (key, value2) is a key-value pair present in map2, and return a transformed value associated with key in the resulting map)
dest_col	Column to store the query result (default: the last column of the Spark data frame)
map1	The first map being merged, could be any SQL expression evaluating to a map (default: the first column of the Spark data frame)
map2	The second map being merged, could be any SQL expression evaluating to a map (default: the second column of the Spark data frame)
...	Additional params to dplyr::mutate

## Examples

```
## Not run:

library(sparklyr)
sc <- spark_connect(master = "local", version = "3.0.0")

# create a Spark dataframe with 2 columns of type MAP<STRING, INT>
two_maps_tbl <- sdf_copy_to(
  sc,
  tibble::tibble(
    m1 = c("{\"1\":2,\"3\":4,\"5\":6}", "{\"2\":1,\"4\":3,\"6\":5}"),
    m2 = c("{\"1\":1,\"3\":3,\"5\":5}", "{\"2\":2,\"4\":4,\"6\":6}"),
  ),
```



```

    overwrite = TRUE
  ) %>%
    dplyr::mutate(m1 = from_json(m1, "MAP<STRING, INT>"),
                  m2 = from_json(m2, "MAP<STRING, INT>"))

# create a 3rd column containing MAP<STRING, INT> values derived from the
# first 2 columns

transformed_two_maps_tbl <- two_maps_tbl %>%
  hof_map_zip_with(
    func = .(k, v1, v2) %->% (CONCAT(k, "_", v1, "_", v2)),
    dest_col = m3
  )

## End(Not run)

```

---

hof\_transform

*Transform Array Column*


---

### Description

Apply an element-wise transformation function to an array column (this is essentially a dplyr wrapper for the `transform(array<T>, function<T,U>): array<U>` and the `transform(array<T>, function<T,Int,U>): array<U>` built-in Spark SQL functions)

### Usage

```
hof_transform(x, func, expr = NULL, dest_col = NULL, ...)
```

### Arguments

x	The Spark data frame to transform
func	The transformation to apply
expr	The array being transformed, could be any SQL expression evaluating to an array (default: the last column of the Spark data frame)
dest_col	Column to store the transformed result (default: expr)
...	Additional params to dplyr::mutate

### Examples

```

## Not run:

library(sparklyr)
sc <- spark_connect(master = "local")
# applies the (x -> x * x) transformation to elements of all arrays
copy_to(sc, tibble::tibble(arr = list(1:5, 21:25))) %>%
  hof_transform(~ .x * .x)

```

```
## End(Not run)
```

---

hof\_transform\_keys      *Transforms keys of a map*

---

### Description

Applies the transformation function specified to all keys of a map (this is essentially a dplyr wrapper to the ‘transform\_keys(expr, func)’ higher- order function, which is supported since Spark 3.0)

### Usage

```
hof_transform_keys(x, func, expr = NULL, dest_col = NULL, ...)
```

### Arguments

x	The Spark data frame to be processed
func	The transformation function to apply (it should take (key, value) as arguments and return a transformed key)
expr	The map being transformed, could be any SQL expression evaluating to a map (default: the last column of the Spark data frame)
dest_col	Column to store the transformed result (default: expr)
...	Additional params to dplyr::mutate

### Examples

```
## Not run:

library(sparklyr)
sc <- spark_connect(master = "local", version = "3.0.0")
sdf <- sdf_len(sc, 1) %>% dplyr::mutate(m = map("a", 0L, "b", 2L, "c", -1L))
transformed_sdf <- sdf %>% hof_transform_keys(~ CONCAT(.x, " == ", .y))

## End(Not run)
```

---

hof\_transform\_values    *Transforms values of a map*

---

### Description

Applies the transformation function specified to all values of a map (this is essentially a dplyr wrapper to the 'transform\_values(expr, func)' higher- order function, which is supported since Spark 3.0)

### Usage

```
hof_transform_values(x, func, expr = NULL, dest_col = NULL, ...)
```

### Arguments

x	The Spark data frame to be processed
func	The transformation function to apply (it should take (key, value) as arguments and return a transformed value)
expr	The map being transformed, could be any SQL expression evaluating to a map (default: the last column of the Spark data frame)
dest_col	Column to store the transformed result (default: expr)
...	Additional params to dplyr::mutate

### Examples

```
## Not run:

library(sparklyr)
sc <- spark_connect(master = "local", version = "3.0.0")
sdf <- sdf_len(sc, 1) %>% dplyr::mutate(m = map("a", 0L, "b", 2L, "c", -1L))
transformed_sdf <- sdf %>% hof_transform_values(~ CONCAT(.x, " == ", .y))

## End(Not run)
```

---

hof\_zip\_with    *Combines 2 Array Columns*

---

### Description

Applies an element-wise function to combine elements from 2 array columns (this is essentially a dplyr wrapper for the zip\_with(array<T>, array<U>, function<T,U,R>): array<R> built-in function in Spark SQL)

**Usage**

```
hof_zip_with(x, func, dest_col = NULL, left = NULL, right = NULL, ...)
```

**Arguments**

x	The Spark data frame to process
func	Element-wise combining function to be applied
dest_col	Column to store the query result (default: the last column of the Spark data frame)
left	Any expression evaluating to an array (default: the first column of the Spark data frame)
right	Any expression evaluating to an array (default: the second column of the Spark data frame)
...	Additional params to dplyr::mutate

**Examples**

```
## Not run:

library(sparklyr)
sc <- spark_connect(master = "local")
# compute element-wise products of 2 arrays from each row of `left` and `right`
# and store the resulting array in `res`
copy_to(
  sc,
  tibble::tibble(
    left = list(1:5, 21:25),
    right = list(6:10, 16:20),
    res = c(0, 0)
  )
) %>%
  hof_zip_with(~ .x * .y)

## End(Not run)
```

---

inner\_join

*Inner join*


---

**Description**

See [inner\\_join](#) for more details.

---

invoke	<i>Invoke a Method on a JVM Object</i>
--------	----------------------------------------

---

### Description

Invoke methods on Java object references. These functions provide a mechanism for invoking various Java object methods directly from R.

### Usage

```
invoke(jobj, method, ...)
invoke_static(sc, class, method, ...)
invoke_new(sc, class, ...)
```

### Arguments

jobj	An R object acting as a Java object reference (typically, a spark_jobj).
method	The name of the method to be invoked.
...	Optional arguments, currently unused.
sc	A spark_connection.
class	The name of the Java class whose methods should be invoked.

### Details

Use each of these functions in the following scenarios:

invoke	Execute a method on a Java object reference (typically, a spark_jobj).
invoke_static	Execute a static method associated with a Java class.
invoke_new	Invoke a constructor associated with a Java class.

### Examples

```
sc <- spark_connect(master = "spark://HOST:PORT")
spark_context(sc) %>%
  invoke("textFile", "file.csv", 1L) %>%
  invoke("count")
```

---

join.tbl_spark	<i>Join Spark tbls.</i>
----------------	-------------------------

---

## Description

These functions are wrappers around their ‘dplyr’ equivalents that set Spark SQL-compliant values for the ‘suffix’ argument by replacing dots (‘.’) with underscores (‘\_’). See [join] for a description of the general purpose of the functions.

## Usage

```
## S3 method for class 'tbl_spark'
inner_join(
  x,
  y,
  by = NULL,
  copy = FALSE,
  suffix = c("_x", "_y"),
  auto_index = FALSE,
  ...,
  sql_on = NULL
)

## S3 method for class 'tbl_spark'
left_join(
  x,
  y,
  by = NULL,
  copy = FALSE,
  suffix = c("_x", "_y"),
  auto_index = FALSE,
  ...,
  sql_on = NULL
)

## S3 method for class 'tbl_spark'
right_join(
  x,
  y,
  by = NULL,
  copy = FALSE,
  suffix = c("_x", "_y"),
  auto_index = FALSE,
  ...,
  sql_on = NULL
)

## S3 method for class 'tbl_spark'
full_join(
  x,
  y,
  by = NULL,
```

```

copy = FALSE,
suffix = c("_x", "_y"),
auto_index = FALSE,
...,
sql_on = NULL
)

```

### Arguments

x	A pair of lazy data frames backed by database queries.
y	A pair of lazy data frames backed by database queries.
by	<p>A character vector of variables to join by.</p> <p>If NULL, the default, *_join() will perform a natural join, using all variables in common across x and y. A message lists the variables so that you can check they're correct; suppress the message by supplying by explicitly.</p> <p>To join by different variables on x and y, use a named vector. For example, by = c("a" = "b") will match x\$a to y\$b.</p> <p>To join by multiple variables, use a vector with length &gt; 1. For example, by = c("a", "b") will match x\$a to y\$a and x\$b to y\$b. Use a named vector to match different variables in x and y. For example, by = c("a" = "b", "c" = "d") will match x\$a to y\$b and x\$c to y\$d.</p> <p>To perform a cross-join, generating all combinations of x and y, use by = character().</p>
copy	<p>If x and y are not from the same data source, and copy is TRUE, then y will be copied into a temporary table in same database as x. *_join() will automatically run ANALYZE on the created table in the hope that this will make you queries as efficient as possible by giving more data to the query planner.</p> <p>This allows you to join tables across srcs, but it's potentially expensive operation so you must opt into it.</p>
suffix	If there are non-joined duplicate variables in x and y, these suffixes will be added to the output to disambiguate them. Should be a character vector of length 2.
auto_index	if copy is TRUE, automatically create indices for the variables in by. This may speed up the join if there are matching indexes in x.
...	Other parameters passed onto methods.
sql_on	A custom join predicate as an SQL expression. Usually joins use column equality, but you can perform more complex queries by supply sql_on which should be a SQL expression that uses LHS and RHS aliases to refer to the left-hand side or right-hand side of the join respectively.

---

left\_join

*Left join*


---

### Description

See [left\\_join](#) for more details.

---

```
list_sparklyr_jars    list all sparklyr-*.jar files that have been built
```

---

**Description**

list all sparklyr-\*.jar files that have been built

**Usage**

```
list_sparklyr_jars()
```

---

```
livy_config          Create a Spark Configuration for Livy
```

---

**Description**

Create a Spark Configuration for Livy

**Usage**

```
livy_config(
  config = spark_config(),
  username = NULL,
  password = NULL,
  negotiate = FALSE,
  custom_headers = list(`X-Requested-By` = "sparklyr"),
  proxy = NULL,
  curl_opts = NULL,
  ...
)
```

**Arguments**

config	Optional base configuration
username	The username to use in the Authorization header
password	The password to use in the Authorization header
negotiate	Whether to use gssnegotiate method or not
custom_headers	List of custom headers to append to http requests. Defaults to <code>list("X-Requested-By" = "sparklyr")</code> .
proxy	Either NULL or a proxy specified by <code>httr::use_proxy()</code> . Defaults to NULL.
curl_opts	List of CURL options (e.g., <code>verbose</code> , <code>connecttimeout</code> , <code>dns_cache_timeout</code> , etc, see <code>httr:httr_options()</code> for a list of valid options) – NOTE: these configurations are for libcurl only and separate from HTTP headers or Livy session parameters.
...	additional Livy session parameters



**Details**

Extends a Spark `spark_config()` configuration with settings for Livy. For instance, username and password define the basic authentication settings for a Livy session.

The default value of "custom\_headers" is set to `list("X-Requested-By" = "sparklyr")` in order to facilitate connection to Livy servers with CSRF protection enabled.

Additional parameters for Livy sessions are:

`proxy_user` User to impersonate when starting the session

`jars` jars to be used in this session

`py_files` Python files to be used in this session

`files` files to be used in this session

`driver_memory` Amount of memory to use for the driver process

`driver_cores` Number of cores to use for the driver process

`executor_memory` Amount of memory to use per executor process

`executor_cores` Number of cores to use for each executor

`num_executors` Number of executors to launch for this session

`archives` Archives to be used in this session

`queue` The name of the YARN queue to which submitted

`name` The name of this session

`heartbeat_timeout` Timeout in seconds to which session be orphaned

`conf` Spark configuration properties (Map of key=value)

Note that `queue` is supported only by version 0.4.0 of Livy or newer. If you are using the older one, specify `queue` via `config` (e.g. `config = spark_config(spark.yarn.queue = "my_queue")`).

**Value**

Named list with configuration data

---

<code>livy_service_start</code>	<i>Start Livy</i>
---------------------------------	-------------------

---

**Description**

Starts the livy service.

Stops the running instances of the livy service.

**Usage**

```

livy_service_start(
  version = NULL,
  spark_version = NULL,
  stdout = "",
  stderr = "",
  ...
)

livy_service_stop()

```

**Arguments**

version	The version of 'livy' to use.
spark_version	The version of 'spark' to connect to.
stdout, stderr	where output to 'stdout' or 'stderr' should be sent. Same options as system2.
...	Optional arguments; currently unused.

---

ml-params

*Spark ML – ML Params*


---

**Description**

Helper methods for working with parameters for ML objects.

**Usage**

```

ml_is_set(x, param, ...)

ml_param_map(x, ...)

ml_param(x, param, allow_null = FALSE, ...)

ml_params(x, params = NULL, allow_null = FALSE, ...)

```

**Arguments**

x	A Spark ML object, either a pipeline stage or an evaluator.
param	The parameter to extract or set.
...	Optional arguments; currently unused.
allow_null	Whether to allow NULL results when extracting parameters. If FALSE, an error will be thrown if the specified parameter is not found. Defaults to FALSE.
params	A vector of parameters to extract.

**Description**

Save/load Spark ML objects

**Usage**

```
ml_save(x, path, overwrite = FALSE, ...)

## S3 method for class 'ml_model'
ml_save(
  x,
  path,
  overwrite = FALSE,
  type = c("pipeline_model", "pipeline"),
  ...
)

ml_load(sc, path)
```

**Arguments**

x	A ML object, which could be a <code>ml_pipeline_stage</code> or a <code>ml_model</code>
path	The path where the object is to be serialized/deserialized.
overwrite	Whether to overwrite the existing path, defaults to FALSE.
...	Optional arguments; currently unused.
type	Whether to save the pipeline model or the pipeline.
sc	A Spark connection.

**Value**

`ml_save()` serializes a Spark object into a format that can be read back into sparklyr or by the Scala or PySpark APIs. When called on `ml_model` objects, i.e. those that were created via the `tbl_spark -formula` signature, the associated pipeline model is serialized. In other words, the saved model contains both the data processing (`RFormulaModel`) stage and the machine learning stage.

`ml_load()` reads a saved Spark object into sparklyr. It calls the correct Scala load method based on parsing the saved metadata. Note that a `PipelineModel` object saved from a sparklyr `ml_model` via `ml_save()` will be read back in as an `ml_pipeline_model`, rather than the `ml_model` object.

---

 ml-transform-methods *Spark ML – Transform, fit, and predict methods (ml\_ interface)*


---

## Description

Methods for transformation, fit, and prediction. These are mirrors of the corresponding [sdf-transform-methods](#).

## Usage

```
is_ml_transformer(x)

is_ml_estimator(x)

ml_fit(x, dataset, ...)

ml_transform(x, dataset, ...)

ml_fit_and_transform(x, dataset, ...)

ml_predict(x, dataset, ...)

## S3 method for class 'ml_model_classification'
ml_predict(x, dataset, probability_prefix = "probability_", ...)
```

## Arguments

x	A ml_estimator, ml_transformer (or a list thereof), or ml_model object.
dataset	A tbl_spark.
...	Optional arguments; currently unused.
probability_prefix	String used to prepend the class probability output columns.

## Details

These methods are

## Value

When x is an estimator, ml\_fit() returns a transformer whereas ml\_fit\_and\_transform() returns a transformed dataset. When x is a transformer, ml\_transform() and ml\_predict() return a transformed dataset. When ml\_predict() is called on a ml\_model object, additional columns (e.g. probabilities in case of classification models) are appended to the transformed output for the user's convenience.

**Description**

Perform hyper-parameter tuning using either K-fold cross validation or train-validation split.

**Usage**

```
ml_sub_models(model)
```

```
ml_validation_metrics(model)
```

```
ml_cross_validator(  
  x,  
  estimator = NULL,  
  estimator_param_maps = NULL,  
  evaluator = NULL,  
  num_folds = 3,  
  collect_sub_models = FALSE,  
  parallelism = 1,  
  seed = NULL,  
  uid = random_string("cross_validator_"),  
  ...  
)
```

```
ml_train_validation_split(  
  x,  
  estimator = NULL,  
  estimator_param_maps = NULL,  
  evaluator = NULL,  
  train_ratio = 0.75,  
  collect_sub_models = FALSE,  
  parallelism = 1,  
  seed = NULL,  
  uid = random_string("train_validation_split_"),  
  ...  
)
```

**Arguments**

model	A cross validation or train-validation-split model.
x	A spark_connection, ml_pipeline, or a tbl_spark.
estimator	A ml_estimator object.
estimator_param_maps	A named list of stages and hyper-parameter sets to tune. See details.

evaluator	A <code>ml_evaluator</code> object, see <a href="#">ml_evaluator</a> .
num_folds	Number of folds for cross validation. Must be $\geq 2$ . Default: 3
collect_sub_models	Whether to collect a list of sub-models trained during tuning. If set to <code>FALSE</code> , then only the single best sub-model will be available after fitting. If set to <code>true</code> , then all sub-models will be available. Warning: For large models, collecting all sub-models can cause OOMs on the Spark driver.
parallelism	The number of threads to use when running parallel algorithms. Default is 1 for serial execution.
seed	A random seed. Set this value if you need your results to be reproducible across repeated calls.
uid	A character string used to uniquely identify the ML estimator.
...	Optional arguments; currently unused.
train_ratio	Ratio between train and validation data. Must be between 0 and 1. Default: 0.75

### Details

`ml_cross_validator()` performs k-fold cross validation while `ml_train_validation_split()` performs tuning on one pair of train and validation datasets.

### Value

The object returned depends on the class of `x`.

- `spark_connection`: When `x` is a `spark_connection`, the function returns an instance of a `ml_cross_validator` or `ml_train_validation_split` object.
- `ml_pipeline`: When `x` is a `ml_pipeline`, the function returns a `ml_pipeline` with the tuning estimator appended to the pipeline.
- `tbl_spark`: When `x` is a `tbl_spark`, a tuning estimator is constructed then immediately fit with the input `tbl_spark`, returning a `ml_cross_validation_model` or a `ml_train_validation_split_model` object.

For cross validation, `ml_sub_models()` returns a nested list of models, where the first layer represents fold indices and the second layer represents param maps. For train-validation split, `ml_sub_models()` returns a list of models, corresponding to the order of the estimator param maps.

`ml_validation_metrics()` returns a data frame of performance metrics and hyperparameter combinations.

### Examples

```
## Not run:
sc <- spark_connect(master = "local")
iris_tbl <- sdf_copy_to(sc, iris, name = "iris_tbl", overwrite = TRUE)

# Create a pipeline
pipeline <- ml_pipeline(sc) %>%
  ft_r_formula(Species ~ .) %>%
```

```

ml_random_forest_classifier()

# Specify hyperparameter grid
grid <- list(
  random_forest = list(
    num_trees = c(5, 10),
    max_depth = c(5, 10),
    impurity = c("entropy", "gini")
  )
)

# Create the cross validator object
cv <- ml_cross_validator(
  sc,
  estimator = pipeline, estimator_param_maps = grid,
  evaluator = ml_multiclass_classification_evaluator(sc),
  num_folds = 3,
  parallelism = 4
)

# Train the models
cv_model <- ml_fit(cv, iris_tbl)

# Print the metrics
ml_validation_metrics(cv_model)

## End(Not run)

```

---

ml\_aft\_survival\_regression

*Spark ML – Survival Regression*


---

## Description

Fit a parametric survival regression model named accelerated failure time (AFT) model (see [Accelerated failure time model \(Wikipedia\)](#)) based on the Weibull distribution of the survival time.

## Usage

```

ml_aft_survival_regression(
  x,
  formula = NULL,
  censor_col = "censor",
  quantile_probabilities = c(0.01, 0.05, 0.1, 0.25, 0.5, 0.75, 0.9, 0.95, 0.99),
  fit_intercept = TRUE,
  max_iter = 100L,
  tol = 1e-06,
  aggregation_depth = 2,

```

```

    quantiles_col = NULL,
    features_col = "features",
    label_col = "label",
    prediction_col = "prediction",
    uid = random_string("aft_survival_regression_"),
    ...
)

ml_survival_regression(
  x,
  formula = NULL,
  censor_col = "censor",
  quantile_probabilities = c(0.01, 0.05, 0.1, 0.25, 0.5, 0.75, 0.9, 0.95, 0.99),
  fit_intercept = TRUE,
  max_iter = 100L,
  tol = 1e-06,
  aggregation_depth = 2,
  quantiles_col = NULL,
  features_col = "features",
  label_col = "label",
  prediction_col = "prediction",
  uid = random_string("aft_survival_regression_"),
  response = NULL,
  features = NULL,
  ...
)

```

### Arguments

x	A spark_connection, ml_pipeline, or a tbl_spark.
formula	Used when x is a tbl_spark. R formula as a character string or a formula. This is used to transform the input dataframe before fitting, see <a href="#">ft_r_formula</a> for details.
censor_col	Censor column name. The value of this column could be 0 or 1. If the value is 1, it means the event has occurred i.e. uncensored; otherwise censored.
quantile_probabilities	Quantile probabilities array. Values of the quantile probabilities array should be in the range (0, 1) and the array should be non-empty.
fit_intercept	Boolean; should the model be fit with an intercept term?
max_iter	The maximum number of iterations to use.
tol	Param for the convergence tolerance for iterative algorithms.
aggregation_depth	(Spark 2.1.0+) Suggested depth for treeAggregate (>= 2).
quantiles_col	Quantiles column name. This column will output quantiles of corresponding quantileProbabilities if it is set.



features_col	Features column name, as a length-one character vector. The column should be single vector column of numeric values. Usually this column is output by <a href="#">ft_r_formula</a> .
label_col	Label column name. The column should be a numeric column. Usually this column is output by <a href="#">ft_r_formula</a> .
prediction_col	Prediction column name.
uid	A character string used to uniquely identify the ML estimator.
...	Optional arguments; see Details.
response	(Deprecated) The name of the response column (as a length-one character vector.)
features	(Deprecated) The name of features (terms) to use for the model fit.

### Details

When `x` is a `tbl_spark` and `formula` (alternatively, `response` and `features`) is specified, the function returns a `ml_model` object wrapping a `ml_pipeline_model` which contains data pre-processing transformers, the ML predictor, and, for classification models, a post-processing transformer that converts predictions into class labels. For classification, an optional argument `predicted_label_col` (defaults to "predicted\_label") can be used to specify the name of the predicted label column. In addition to the fitted `ml_pipeline_model`, `ml_model` objects also contain a `ml_pipeline` object where the ML predictor stage is an estimator ready to be fit against data. This is utilized by [ml\\_save](#) with `type = "pipeline"` to facilitate model refresh workflows.

`ml_survival_regression()` is an alias for `ml_aft_survival_regression()` for backwards compatibility.

### Value

The object returned depends on the class of `x`.

- `spark_connection`: When `x` is a `spark_connection`, the function returns an instance of a `ml_estimator` object. The object contains a pointer to a Spark Predictor object and can be used to compose Pipeline objects.
- `ml_pipeline`: When `x` is a `ml_pipeline`, the function returns a `ml_pipeline` with the predictor appended to the pipeline.
- `tbl_spark`: When `x` is a `tbl_spark`, a predictor is constructed then immediately fit with the input `tbl_spark`, returning a prediction model.
- `tbl_spark`, with `formula`: specified When `formula` is specified, the input `tbl_spark` is first transformed using a `RFormula` transformer before being fit by the predictor. The object returned in this case is a `ml_model` which is a wrapper of a `ml_pipeline_model`.

### See Also

See <http://spark.apache.org/docs/latest/ml-classification-regression.html> for more information on the set of supervised learning algorithms.

Other ml algorithms: [ml\\_decision\\_tree\\_classifier\(\)](#), [ml\\_gbt\\_classifier\(\)](#), [ml\\_generalized\\_linear\\_regression](#), [ml\\_isotonic\\_regression\(\)](#), [ml\\_linear\\_regression\(\)](#), [ml\\_linear\\_svc\(\)](#), [ml\\_logistic\\_regression\(\)](#), [ml\\_multilayer\\_perceptron\\_classifier\(\)](#), [ml\\_naive\\_bayes\(\)](#), [ml\\_one\\_vs\\_rest\(\)](#), [ml\\_random\\_forest\\_classifier](#)

## Examples

```
## Not run:

library(survival)
library(sparklyr)

sc <- spark_connect(master = "local")
ovarian_tbl <- sdf_copy_to(sc, ovarian, name = "ovarian_tbl", overwrite = TRUE)

partitions <- ovarian_tbl %>%
  sdf_random_split(training = 0.7, test = 0.3, seed = 1111)

ovarian_training <- partitions$training
ovarian_test <- partitions$test

sur_reg <- ovarian_training %>%
  ml_aft_survival_regression(futime ~ ecog_ps + rx + age + resid_ds, censor_col = "fustat")

pred <- ml_predict(sur_reg, ovarian_test)
pred

## End(Not run)
```

---

ml\_als

*Spark ML – ALS*

---

## Description

Perform recommendation using Alternating Least Squares (ALS) matrix factorization.

## Usage

```
ml_als(
  x,
  formula = NULL,
  rating_col = "rating",
  user_col = "user",
  item_col = "item",
  rank = 10,
  reg_param = 0.1,
  implicit_prefs = FALSE,
  alpha = 1,
  nonnegative = FALSE,
  max_iter = 10,
  num_user_blocks = 10,
  num_item_blocks = 10,
  checkpoint_interval = 10,
```

```

    cold_start_strategy = "nan",
    intermediate_storage_level = "MEMORY_AND_DISK",
    final_storage_level = "MEMORY_AND_DISK",
    uid = random_string("als_"),
    ...
)

ml_recommender(model, type = c("items", "users"), n = 1)

```

### Arguments

<code>x</code>	A <code>spark_connection</code> , <code>ml_pipeline</code> , or a <code>tbl_spark</code> .
<code>formula</code>	Used when <code>x</code> is a <code>tbl_spark</code> . R formula as a character string or a formula. This is used to transform the input dataframe before fitting, see <a href="#">ft_r_formula</a> for details. The ALS model requires a specific formula format, please use <code>rating_col ~ user_col + item_col</code> .
<code>rating_col</code>	Column name for ratings. Default: "rating"
<code>user_col</code>	Column name for user ids. Ids must be integers. Other numeric types are supported for this column, but will be cast to integers as long as they fall within the integer value range. Default: "user"
<code>item_col</code>	Column name for item ids. Ids must be integers. Other numeric types are supported for this column, but will be cast to integers as long as they fall within the integer value range. Default: "item"
<code>rank</code>	Rank of the matrix factorization (positive). Default: 10
<code>reg_param</code>	Regularization parameter.
<code>implicit_prefs</code>	Whether to use implicit preference. Default: FALSE.
<code>alpha</code>	Alpha parameter in the implicit preference formulation (nonnegative).
<code>nonnegative</code>	Whether to apply nonnegativity constraints. Default: FALSE.
<code>max_iter</code>	Maximum number of iterations.
<code>num_user_blocks</code>	Number of user blocks (positive). Default: 10
<code>num_item_blocks</code>	Number of item blocks (positive). Default: 10
<code>checkpoint_interval</code>	Set checkpoint interval ( $\geq 1$ ) or disable checkpoint (-1). E.g. 10 means that the cache will get checkpointed every 10 iterations, defaults to 10.
<code>cold_start_strategy</code>	(Spark 2.2.0+) Strategy for dealing with unknown or new users/items at prediction time. This may be useful in cross-validation or production scenarios, for handling user/item ids the model has not seen in the training data. Supported values: - "nan": predicted value for unknown ids will be NaN. - "drop": rows in the input DataFrame containing unknown ids will be dropped from the output DataFrame containing predictions. Default: "nan".
<code>intermediate_storage_level</code>	(Spark 2.0.0+) StorageLevel for intermediate datasets. Pass in a string representation of StorageLevel. Cannot be "NONE". Default: "MEMORY_AND_DISK".

final_storage_level	(Spark 2.0.0+) StorageLevel for ALS model factors. Pass in a string representation of StorageLevel. Default: "MEMORY_AND_DISK".
uid	A character string used to uniquely identify the ML estimator.
...	Optional arguments; currently unused.
model	An ALS model object
type	What to recommend, one of items or users
n	Maximum number of recommendations to return

### Details

ml\_recommend() returns the top n users/items recommended for each item/user, for all items/users. The output has been transformed (exploded and separated) from the default Spark outputs to be more user friendly.

### Value

ALS attempts to estimate the ratings matrix  $R$  as the product of two lower-rank matrices,  $X$  and  $Y$ , i.e.  $X * Y^t = R$ . Typically these approximations are called 'factor' matrices. The general approach is iterative. During each iteration, one of the factor matrices is held constant, while the other is solved for using least squares. The newly-solved factor matrix is then held constant while solving for the other factor matrix.

This is a blocked implementation of the ALS factorization algorithm that groups the two sets of factors (referred to as "users" and "products") into blocks and reduces communication by only sending one copy of each user vector to each product block on each iteration, and only for the product blocks that need that user's feature vector. This is achieved by pre-computing some information about the ratings matrix to determine the "out-links" of each user (which blocks of products it will contribute to) and "in-link" information for each product (which of the feature vectors it receives from each user block it will depend on). This allows us to send only an array of feature vectors between each user block and product block, and have the product block find the users' ratings and update the products based on these messages.

For implicit preference data, the algorithm used is based on "Collaborative Filtering for Implicit Feedback Datasets", available at <https://doi.org/10.1109/ICDM.2008.22>, adapted for the blocked approach used here.

Essentially instead of finding the low-rank approximations to the rating matrix  $R$ , this finds the approximations for a preference matrix  $P$  where the elements of  $P$  are 1 if  $r$  is greater than 0 and 0 if  $r$  is less than or equal to 0. The ratings then act as 'confidence' values related to strength of indicated user preferences rather than explicit ratings given to items.

The object returned depends on the class of  $x$ .

- spark\_connection: When  $x$  is a spark\_connection, the function returns an instance of a ml\_als recommender object, which is an Estimator.
- ml\_pipeline: When  $x$  is a ml\_pipeline, the function returns a ml\_pipeline with the recommender appended to the pipeline.
- tbl\_spark: When  $x$  is a tbl\_spark, a recommender estimator is constructed then immediately fit with the input tbl\_spark, returning a recommendation model, i.e. ml\_als\_model.

## Examples

```
## Not run:

library(sparklyr)
sc <- spark_connect(master = "local")

movies <- data.frame(
  user   = c(1, 2, 0, 1, 2, 0),
  item   = c(1, 1, 1, 2, 2, 0),
  rating = c(3, 1, 2, 4, 5, 4)
)
movies_tbl <- sdf_copy_to(sc, movies)

model <- ml_als(movies_tbl, rating ~ user + item)

ml_predict(model, movies_tbl)

ml_recommend(model, type = "item", 1)

## End(Not run)
```

---

ml\_als\_tidiers

*Tidying methods for Spark ML ALS*

---

## Description

These methods summarize the results of Spark ML models into tidy forms.

## Usage

```
## S3 method for class 'ml_model_als'
tidy(x, ...)

## S3 method for class 'ml_model_als'
augment(x, newdata = NULL, ...)

## S3 method for class 'ml_model_als'
glance(x, ...)
```

## Arguments

x	a Spark ML model.
...	extra arguments (not used.)
newdata	a tbl_spark of new data to use for prediction.

## Description

A bisecting k-means algorithm based on the paper "A comparison of document clustering techniques" by Steinbach, Karypis, and Kumar, with modification to fit Spark. The algorithm starts from a single cluster that contains all points. Iteratively it finds divisible clusters on the bottom level and bisects each of them using k-means, until there are k leaf clusters in total or no leaf clusters are divisible. The bisecting steps of clusters on the same level are grouped together to increase parallelism. If bisecting all divisible clusters on the bottom level would result more than k leaf clusters, larger clusters get higher priority.

## Usage

```
ml_bisecting_kmeans(
  x,
  formula = NULL,
  k = 4,
  max_iter = 20,
  seed = NULL,
  min_divisible_cluster_size = 1,
  features_col = "features",
  prediction_col = "prediction",
  uid = random_string("bisecting_bisecting_kmeans_"),
  ...
)
```

## Arguments

x	A spark_connection, ml_pipeline, or a tbl_spark.
formula	Used when x is a tbl_spark. R formula as a character string or a formula. This is used to transform the input dataframe before fitting, see <a href="#">ft_r_formula</a> for details.
k	The number of clusters to create
max_iter	The maximum number of iterations to use.
seed	A random seed. Set this value if you need your results to be reproducible across repeated calls.
min_divisible_cluster_size	The minimum number of points (if greater than or equal to 1.0) or the minimum proportion of points (if less than 1.0) of a divisible cluster (default: 1.0).
features_col	Features column name, as a length-one character vector. The column should be single vector column of numeric values. Usually this column is output by <a href="#">ft_r_formula</a> .
prediction_col	Prediction column name.

uid            A character string used to uniquely identify the ML estimator.  
 ...            Optional arguments, see Details.

### Value

The object returned depends on the class of `x`.

- `spark_connection`: When `x` is a `spark_connection`, the function returns an instance of a `ml_estimator` object. The object contains a pointer to a Spark Estimator object and can be used to compose Pipeline objects.
- `ml_pipeline`: When `x` is a `ml_pipeline`, the function returns a `ml_pipeline` with the clustering estimator appended to the pipeline.
- `tbl_spark`: When `x` is a `tbl_spark`, an estimator is constructed then immediately fit with the input `tbl_spark`, returning a clustering model.
- `tbl_spark`, with `formula` or `features` specified: When `formula` is specified, the input `tbl_spark` is first transformed using a `RFormula` transformer before being fit by the estimator. The object returned in this case is a `ml_model` which is a wrapper of a `ml_pipeline_model`. This signature does not apply to `ml_lda()`.

### See Also

See <http://spark.apache.org/docs/latest/ml-clustering.html> for more information on the set of clustering algorithms.

Other ml clustering algorithms: `ml_gaussian_mixture()`, `ml_kmeans()`, `ml_lda()`

### Examples

```
## Not run:
library(dplyr)

sc <- spark_connect(master = "local")
iris_tbl <- sdf_copy_to(sc, iris, name = "iris_tbl", overwrite = TRUE)

iris_tbl %>%
  select(-Species) %>%
  ml_bisecting_kmeans(k = 4, Species ~ .)

## End(Not run)
```

---

<code>ml_chisquare_test</code>	<i>Chi-square hypothesis testing for categorical data.</i>
--------------------------------	------------------------------------------------------------

---

### Description

Conduct Pearson's independence test for every feature against the label. For each feature, the (feature, label) pairs are converted into a contingency matrix for which the Chi-squared statistic is computed. All label and feature values must be categorical.

**Usage**

```
ml_chisquare_test(x, features, label)
```

**Arguments**

x	A tbl_spark.
features	The name(s) of the feature columns. This can also be the name of a single vector column created using <code>ft_vector_assembler()</code> .
label	The name of the label column.

**Value**

A data frame with one row for each (feature, label) pair with p-values, degrees of freedom, and test statistics.

**Examples**

```
## Not run:
sc <- spark_connect(master = "local")
iris_tbl <- sdf_copy_to(sc, iris, name = "iris_tbl", overwrite = TRUE)

features <- c("Petal_Width", "Petal_Length", "Sepal_Length", "Sepal_Width")

ml_chisquare_test(iris_tbl, features = features, label = "Species")

## End(Not run)
```

---

```
ml_clustering_evaluator
```

*Spark ML - Clustering Evaluator*

---

**Description**

Evaluator for clustering results. The metric computes the Silhouette measure using the squared Euclidean distance. The Silhouette is a measure for the validation of the consistency within clusters. It ranges between 1 and -1, where a value close to 1 means that the points in a cluster are close to the other points in the same cluster and far from the points of the other clusters.

**Usage**

```
ml_clustering_evaluator(
  x,
  features_col = "features",
  prediction_col = "prediction",
  metric_name = "silhouette",
  uid = random_string("clustering_evaluator_"),
  ...
)
```



## Arguments

x	A spark_connection object or a tbl_spark containing label and prediction columns. The latter should be the output of <code>sdf_predict</code> .
features_col	Name of features column.
prediction_col	Name of the prediction column.
metric_name	The performance metric. Currently supports "silhouette".
uid	A character string used to uniquely identify the ML estimator.
...	Optional arguments; currently unused.

## Value

The calculated performance metric

## Examples

```
## Not run:
sc <- spark_connect(master = "local")
iris_tbl <- sdf_copy_to(sc, iris, name = "iris_tbl", overwrite = TRUE)

partitions <- iris_tbl %>%
  sdf_random_split(training = 0.7, test = 0.3, seed = 1111)

iris_training <- partitions$training
iris_test <- partitions$test

formula <- Species ~ .

# Train the models
kmeans_model <- ml_kmeans(iris_training, formula = formula)
b_kmeans_model <- ml_bisecting_kmeans(iris_training, formula = formula)
gmm_model <- ml_gaussian_mixture(iris_training, formula = formula)

# Predict
pred_kmeans <- ml_predict(kmeans_model, iris_test)
pred_b_kmeans <- ml_predict(b_kmeans_model, iris_test)
pred_gmm <- ml_predict(gmm_model, iris_test)

# Evaluate
ml_clustering_evaluator(pred_kmeans)
ml_clustering_evaluator(pred_b_kmeans)
ml_clustering_evaluator(pred_gmm)

## End(Not run)
```

---

ml_corr	<i>Compute correlation matrix</i>
---------	-----------------------------------

---

**Description**

Compute correlation matrix

**Usage**

```
ml_corr(x, columns = NULL, method = c("pearson", "spearman"))
```

**Arguments**

x	A tbl_spark.
columns	The names of the columns to calculate correlations of. If only one column is specified, it must be a vector column (for example, assembled using <code>ft_vector_assembler()</code> ).
method	The method to use, either "pearson" or "spearman".

**Value**

A correlation matrix organized as a data frame.

**Examples**

```
## Not run:  
sc <- spark_connect(master = "local")  
iris_tbl <- sdf_copy_to(sc, iris, name = "iris_tbl", overwrite = TRUE)  
  
features <- c("Petal_Width", "Petal_Length", "Sepal_Length", "Sepal_Width")  
  
ml_corr(iris_tbl, columns = features, method = "pearson")  
  
## End(Not run)
```

---

ml_decision_tree_classifier	<i>Spark ML – Decision Trees</i>
-----------------------------	----------------------------------

---

**Description**

Perform classification and regression using decision trees.

**Usage**

```
ml_decision_tree_classifier(  
  x,  
  formula = NULL,  
  max_depth = 5,  
  max_bins = 32,  
  min_instances_per_node = 1,  
  min_info_gain = 0,  
  impurity = "gini",  
  seed = NULL,  
  thresholds = NULL,  
  cache_node_ids = FALSE,  
  checkpoint_interval = 10,  
  max_memory_in_mb = 256,  
  features_col = "features",  
  label_col = "label",  
  prediction_col = "prediction",  
  probability_col = "probability",  
  raw_prediction_col = "rawPrediction",  
  uid = random_string("decision_tree_classifier_"),  
  ...  
)
```

```
ml_decision_tree(  
  x,  
  formula = NULL,  
  type = c("auto", "regression", "classification"),  
  features_col = "features",  
  label_col = "label",  
  prediction_col = "prediction",  
  variance_col = NULL,  
  probability_col = "probability",  
  raw_prediction_col = "rawPrediction",  
  checkpoint_interval = 10L,  
  impurity = "auto",  
  max_bins = 32L,  
  max_depth = 5L,  
  min_info_gain = 0,  
  min_instances_per_node = 1L,  
  seed = NULL,  
  thresholds = NULL,  
  cache_node_ids = FALSE,  
  max_memory_in_mb = 256L,  
  uid = random_string("decision_tree_"),  
  response = NULL,  
  features = NULL,  
  ...  
)
```

```

ml_decision_tree_regressor(
  x,
  formula = NULL,
  max_depth = 5,
  max_bins = 32,
  min_instances_per_node = 1,
  min_info_gain = 0,
  impurity = "variance",
  seed = NULL,
  cache_node_ids = FALSE,
  checkpoint_interval = 10,
  max_memory_in_mb = 256,
  variance_col = NULL,
  features_col = "features",
  label_col = "label",
  prediction_col = "prediction",
  uid = random_string("decision_tree_regressor_"),
  ...
)

```

### Arguments

x	A spark_connection, ml_pipeline, or a tbl_spark.
formula	Used when x is a tbl_spark. R formula as a character string or a formula. This is used to transform the input dataframe before fitting, see <a href="#">ft_r_formula</a> for details.
max_depth	Maximum depth of the tree ( $\geq 0$ ); that is, the maximum number of nodes separating any leaves from the root of the tree.
max_bins	The maximum number of bins used for discretizing continuous features and for choosing how to split on features at each node. More bins give higher granularity.
min_instances_per_node	Minimum number of instances each child must have after split.
min_info_gain	Minimum information gain for a split to be considered at a tree node. Should be $\geq 0$ , defaults to 0.
impurity	Criterion used for information gain calculation. Supported: "entropy" and "gini" (default) for classification and "variance" (default) for regression. For ml_decision_tree, setting "auto" will default to the appropriate criterion based on model type.
seed	Seed for random numbers.
thresholds	Thresholds in multi-class classification to adjust the probability of predicting each class. Array must have length equal to the number of classes, with values $> 0$ excepting that at most one value may be 0. The class with largest value $p/t$ is predicted, where p is the original probability of that class and t is the class's threshold.

cache_node_ids	If FALSE, the algorithm will pass trees to executors to match instances with nodes. If TRUE, the algorithm will cache node IDs for each instance. Caching can speed up training of deeper trees. Defaults to FALSE.
checkpoint_interval	Set checkpoint interval ( $\geq 1$ ) or disable checkpoint (-1). E.g. 10 means that the cache will get checkpointed every 10 iterations, defaults to 10.
max_memory_in_mb	Maximum memory in MB allocated to histogram aggregation. If too small, then 1 node will be split per iteration, and its aggregates may exceed this size. Defaults to 256.
features_col	Features column name, as a length-one character vector. The column should be single vector column of numeric values. Usually this column is output by <a href="#">ft_r_formula</a> .
label_col	Label column name. The column should be a numeric column. Usually this column is output by <a href="#">ft_r_formula</a> .
prediction_col	Prediction column name.
probability_col	Column name for predicted class conditional probabilities.
raw_prediction_col	Raw prediction (a.k.a. confidence) column name.
uid	A character string used to uniquely identify the ML estimator.
...	Optional arguments; see Details.
type	The type of model to fit. "regression" treats the response as a continuous variable, while "classification" treats the response as a categorical variable. When "auto" is used, the model type is inferred based on the response variable type – if it is a numeric type, then regression is used; classification otherwise.
variance_col	(Optional) Column name for the biased sample variance of prediction.
response	(Deprecated) The name of the response column (as a length-one character vector.)
features	(Deprecated) The name of features (terms) to use for the model fit.

## Details

When `x` is a `tbl_spark` and `formula` (alternatively, `response` and `features`) is specified, the function returns a `ml_model` object wrapping a `ml_pipeline_model` which contains data pre-processing transformers, the ML predictor, and, for classification models, a post-processing transformer that converts predictions into class labels. For classification, an optional argument `predicted_label_col` (defaults to "predicted\_label") can be used to specify the name of the predicted label column. In addition to the fitted `ml_pipeline_model`, `ml_model` objects also contain a `ml_pipeline` object where the ML predictor stage is an estimator ready to be fit against data. This is utilized by [ml\\_save](#) with `type = "pipeline"` to facilitate model refresh workflows.

`ml_decision_tree` is a wrapper around `ml_decision_tree_regressor.tbl_spark` and `ml_decision_tree_classifier` and calls the appropriate method based on model type.

**Value**

The object returned depends on the class of `x`.

- `spark_connection`: When `x` is a `spark_connection`, the function returns an instance of a `ml_estimator` object. The object contains a pointer to a Spark Predictor object and can be used to compose Pipeline objects.
- `ml_pipeline`: When `x` is a `ml_pipeline`, the function returns a `ml_pipeline` with the predictor appended to the pipeline.
- `tbl_spark`: When `x` is a `tbl_spark`, a predictor is constructed then immediately fit with the input `tbl_spark`, returning a prediction model.
- `tbl_spark`, with `formula`: specified When `formula` is specified, the input `tbl_spark` is first transformed using a `RFormula` transformer before being fit by the predictor. The object returned in this case is a `ml_model` which is a wrapper of a `ml_pipeline_model`.

**See Also**

See <http://spark.apache.org/docs/latest/ml-classification-regression.html> for more information on the set of supervised learning algorithms.

Other ml algorithms: `ml_aft_survival_regression()`, `ml_gbt_classifier()`, `ml_generalized_linear_regression()`, `ml_isotonic_regression()`, `ml_linear_regression()`, `ml_linear_svc()`, `ml_logistic_regression()`, `ml_multilayer_perceptron_classifier()`, `ml_naive_bayes()`, `ml_one_vs_rest()`, `ml_random_forest_classifier()`

**Examples**

```
## Not run:
sc <- spark_connect(master = "local")
iris_tbl <- sdf_copy_to(sc, iris, name = "iris_tbl", overwrite = TRUE)

partitions <- iris_tbl %>%
  sdf_random_split(training = 0.7, test = 0.3, seed = 1111)

iris_training <- partitions$training
iris_test <- partitions$test

dt_model <- iris_training %>%
  ml_decision_tree(Species ~ .)

pred <- ml_predict(dt_model, iris_test)

ml_multiclass_classification_evaluator(pred)

## End(Not run)
```

---

ml\_default\_stop\_words *Default stop words*

---

## Description

Loads the default stop words for the given language.

## Usage

```
ml_default_stop_words(  
  sc,  
  language = c("english", "danish", "dutch", "finnish", "french", "german",  
    "hungarian", "italian", "norwegian", "portuguese", "russian", "spanish", "swedish",  
    "turkish"),  
  ...  
)
```

## Arguments

sc	A spark_connection
language	A character string.
...	Optional arguments; currently unused.

## Details

Supported languages: danish, dutch, english, finnish, french, german, hungarian, italian, norwegian, portuguese, russian, spanish, swedish, turkish. Defaults to English. See <https://anoncv.s.postgresql.org/cvsweb.cgi/pgsql/src/backend/snowball/stopwords/> for more details

## Value

A list of stop words.

## See Also

[ft\\_stop\\_words\\_remover](#)

---

`ml_evaluate`*Evaluate the Model on a Validation Set*

---

**Description**

Compute performance metrics.

**Usage**

```
ml_evaluate(x, dataset)

## S3 method for class 'ml_model_logistic_regression'
ml_evaluate(x, dataset)

## S3 method for class 'ml_logistic_regression_model'
ml_evaluate(x, dataset)

## S3 method for class 'ml_model_linear_regression'
ml_evaluate(x, dataset)

## S3 method for class 'ml_linear_regression_model'
ml_evaluate(x, dataset)

## S3 method for class 'ml_model_generalized_linear_regression'
ml_evaluate(x, dataset)

## S3 method for class 'ml_generalized_linear_regression_model'
ml_evaluate(x, dataset)

## S3 method for class 'ml_model_clustering'
ml_evaluate(x, dataset)

## S3 method for class 'ml_model_classification'
ml_evaluate(x, dataset)

## S3 method for class 'ml_evaluator'
ml_evaluate(x, dataset)
```

**Arguments**

<code>x</code>	An ML model object or an evaluator object.
<code>dataset</code>	The dataset to be validate the model on.

**Examples**

```
## Not run:
sc <- spark_connect(master = "local")
```



```
iris_tbl <- sdf_copy_to(sc, iris, name = "iris_tbl", overwrite = TRUE)

ml_gaussian_mixture(iris_tbl, Species ~ .) %>%
  ml_evaluate(iris_tbl)

ml_kmeans(iris_tbl, Species ~ .) %>%
  ml_evaluate(iris_tbl)

ml_bisecting_kmeans(iris_tbl, Species ~ .) %>%
  ml_evaluate(iris_tbl)

## End(Not run)
```

---

ml\_evaluator

*Spark ML - Evaluators*

---

## Description

A set of functions to calculate performance metrics for prediction models. Also see the Spark ML Documentation <https://spark.apache.org/docs/latest/api/scala/index.html#org.apache.spark.ml.evaluation.package>

## Usage

```
ml_binary_classification_evaluator(  
  x,  
  label_col = "label",  
  raw_prediction_col = "rawPrediction",  
  metric_name = "areaUnderROC",  
  uid = random_string("binary_classification_evaluator_"),  
  ...  
)  
  
ml_binary_classification_eval(  
  x,  
  label_col = "label",  
  prediction_col = "prediction",  
  metric_name = "areaUnderROC"  
)  
  
ml_multiclass_classification_evaluator(  
  x,  
  label_col = "label",  
  prediction_col = "prediction",  
  metric_name = "f1",  
  uid = random_string("multiclass_classification_evaluator_"),  
  ...  
)
```

```

ml_classification_eval(
  x,
  label_col = "label",
  prediction_col = "prediction",
  metric_name = "f1"
)

ml_regression_evaluator(
  x,
  label_col = "label",
  prediction_col = "prediction",
  metric_name = "rmse",
  uid = random_string("regression_evaluator_"),
  ...
)

```

### Arguments

x	A spark_connection object or a tbl_spark containing label and prediction columns. The latter should be the output of <a href="#">sdf_predict</a> .
label_col	Name of column string specifying which column contains the true labels or values.
raw_prediction_col	Raw prediction (a.k.a. confidence) column name.
metric_name	The performance metric. See details.
uid	A character string used to uniquely identify the ML estimator.
...	Optional arguments; currently unused.
prediction_col	Name of the column that contains the predicted label or value NOT the scored probability. Column should be of type Double.

### Details

The following metrics are supported

- Binary Classification: `areaUnderROC` (default) or `areaUnderPR` (not available in Spark 2.X.)
- Multiclass Classification: `f1` (default), `precision`, `recall`, `weightedPrecision`, `weightedRecall` or `accuracy`; for Spark 2.X: `f1` (default), `weightedPrecision`, `weightedRecall` or `accuracy`.
- Regression: `rmse` (root mean squared error, default), `mse` (mean squared error), `r2`, or `mae` (mean absolute error.)

`ml_binary_classification_eval()` is an alias for `ml_binary_classification_evaluator()` for backwards compatibility.

`ml_classification_eval()` is an alias for `ml_multiclass_classification_evaluator()` for backwards compatibility.

**Value**

The calculated performance metric

**Examples**

```
## Not run:
sc <- spark_connect(master = "local")
mtcars_tbl <- sdf_copy_to(sc, mtcars, name = "mtcars_tbl", overwrite = TRUE)

partitions <- mtcars_tbl %>%
  sdf_random_split(training = 0.7, test = 0.3, seed = 1111)

mtcars_training <- partitions$training
mtcars_test <- partitions$test

# for multiclass classification
rf_model <- mtcars_training %>%
  ml_random_forest(cyl ~ ., type = "classification")

pred <- ml_predict(rf_model, mtcars_test)

ml_multiclass_classification_evaluator(pred)

# for regression
rf_model <- mtcars_training %>%
  ml_random_forest(cyl ~ ., type = "regression")

pred <- ml_predict(rf_model, mtcars_test)

ml_regression_evaluator(pred, label_col = "cyl")

# for binary classification
rf_model <- mtcars_training %>%
  ml_random_forest(am ~ gear + carb, type = "classification")

pred <- ml_predict(rf_model, mtcars_test)

ml_binary_classification_evaluator(pred)

## End(Not run)
```

---

ml\_feature\_importances

*Spark ML - Feature Importance for Tree Models*

---

**Description**

Spark ML - Feature Importance for Tree Models

**Usage**

```
ml_feature_importances(model, ...)

ml_tree_feature_importance(model, ...)
```

**Arguments**

model	A decision tree-based model.
...	Optional arguments; currently unused.

**Value**

For `ml_model`, a sorted data frame with feature labels and their relative importance. For `ml_prediction_model`, a vector of relative importances.

---

ml_fpgrowth	<i>Frequent Pattern Mining – FPGrowth</i>
-------------	-------------------------------------------

---

**Description**

A parallel FP-growth algorithm to mine frequent itemsets.

**Usage**

```
ml_fpgrowth(
  x,
  items_col = "items",
  min_confidence = 0.8,
  min_support = 0.3,
  prediction_col = "prediction",
  uid = random_string("fpgrowth-"),
  ...
)

ml_association_rules(model)

ml_freq_itemsets(model)
```

**Arguments**

x	A spark_connection, ml_pipeline, or a tbl_spark.
items_col	Items column name. Default: "items"
min_confidence	Minimal confidence for generating Association Rule. min_confidence will not affect the mining for frequent itemsets, but will affect the association rules generation. Default: 0.8

min_support	Minimal support level of the frequent pattern. [0.0, 1.0]. Any pattern that appears more than (min_support * size-of-the-dataset) times will be output in the frequent itemsets. Default: 0.3
prediction_col	Prediction column name.
uid	A character string used to uniquely identify the ML estimator.
...	Optional arguments; currently unused.
model	A fitted FPGrowth model returned by ml_fpgrowth()

---

ml\_gaussian\_mixture     *Spark ML – Gaussian Mixture clustering.*

---

### Description

This class performs expectation maximization for multivariate Gaussian Mixture Models (GMMs). A GMM represents a composite distribution of independent Gaussian distributions with associated "mixing" weights specifying each's contribution to the composite. Given a set of sample points, this class will maximize the log-likelihood for a mixture of k Gaussians, iterating until the log-likelihood changes by less than tol, or until it has reached the max number of iterations. While this process is generally guaranteed to converge, it is not guaranteed to find a global optimum.

### Usage

```
ml_gaussian_mixture(
  x,
  formula = NULL,
  k = 2,
  max_iter = 100,
  tol = 0.01,
  seed = NULL,
  features_col = "features",
  prediction_col = "prediction",
  probability_col = "probability",
  uid = random_string("gaussian_mixture_"),
  ...
)
```

### Arguments

x	A spark_connection, ml_pipeline, or a tbl_spark.
formula	Used when x is a tbl_spark. R formula as a character string or a formula. This is used to transform the input dataframe before fitting, see <a href="#">ft_r_formula</a> for details.
k	The number of clusters to create
max_iter	The maximum number of iterations to use.
tol	Param for the convergence tolerance for iterative algorithms.

seed	A random seed. Set this value if you need your results to be reproducible across repeated calls.
features_col	Features column name, as a length-one character vector. The column should be single vector column of numeric values. Usually this column is output by <code>ft_r_formula</code> .
prediction_col	Prediction column name.
probability_col	Column name for predicted class conditional probabilities. Note: Not all models output well-calibrated probability estimates! These probabilities should be treated as confidences, not precise probabilities.
uid	A character string used to uniquely identify the ML estimator.
...	Optional arguments, see Details.

### Value

The object returned depends on the class of `x`.

- `spark_connection`: When `x` is a `spark_connection`, the function returns an instance of a `ml_estimator` object. The object contains a pointer to a Spark Estimator object and can be used to compose Pipeline objects.
- `ml_pipeline`: When `x` is a `ml_pipeline`, the function returns a `ml_pipeline` with the clustering estimator appended to the pipeline.
- `tbl_spark`: When `x` is a `tbl_spark`, an estimator is constructed then immediately fit with the input `tbl_spark`, returning a clustering model.
- `tbl_spark`, with `formula` or `features` specified: When `formula` is specified, the input `tbl_spark` is first transformed using a `RFormula` transformer before being fit by the estimator. The object returned in this case is a `ml_model` which is a wrapper of a `ml_pipeline_model`. This signature does not apply to `ml_lda()`.

### See Also

See <http://spark.apache.org/docs/latest/ml-clustering.html> for more information on the set of clustering algorithms.

Other ml clustering algorithms: `ml_bisecting_kmeans()`, `ml_kmeans()`, `ml_lda()`

### Examples

```
## Not run:
sc <- spark_connect(master = "local")
iris_tbl <- sdf_copy_to(sc, iris, name = "iris_tbl", overwrite = TRUE)

gmm_model <- ml_gaussian_mixture(iris_tbl, Species ~ .)
pred <- sdf_predict(iris_tbl, gmm_model)
ml_clustering_evaluator(pred)

## End(Not run)
```

---

ml_gbt_classifier	<i>Spark ML – Gradient Boosted Trees</i>
-------------------	------------------------------------------

---

### Description

Perform binary classification and regression using gradient boosted trees. Multiclass classification is not supported yet.

### Usage

```
ml_gbt_classifier(  
  x,  
  formula = NULL,  
  max_iter = 20,  
  max_depth = 5,  
  step_size = 0.1,  
  subsampling_rate = 1,  
  feature_subset_strategy = "auto",  
  min_instances_per_node = 1L,  
  max_bins = 32,  
  min_info_gain = 0,  
  loss_type = "logistic",  
  seed = NULL,  
  thresholds = NULL,  
  checkpoint_interval = 10,  
  cache_node_ids = FALSE,  
  max_memory_in_mb = 256,  
  features_col = "features",  
  label_col = "label",  
  prediction_col = "prediction",  
  probability_col = "probability",  
  raw_prediction_col = "rawPrediction",  
  uid = random_string("gbt_classifier_"),  
  ...  
)  
  
ml_gradient_boosted_trees(  
  x,  
  formula = NULL,  
  type = c("auto", "regression", "classification"),  
  features_col = "features",  
  label_col = "label",  
  prediction_col = "prediction",  
  probability_col = "probability",  
  raw_prediction_col = "rawPrediction",  
  checkpoint_interval = 10,  
  loss_type = c("auto", "logistic", "squared", "absolute"),
```

```

max_bins = 32,
max_depth = 5,
max_iter = 20L,
min_info_gain = 0,
min_instances_per_node = 1,
step_size = 0.1,
subsampling_rate = 1,
feature_subset_strategy = "auto",
seed = NULL,
thresholds = NULL,
cache_node_ids = FALSE,
max_memory_in_mb = 256,
uid = random_string("gradient_boosted_trees_"),
response = NULL,
features = NULL,
...
)

ml_gbt_regressor(
  x,
  formula = NULL,
  max_iter = 20,
  max_depth = 5,
  step_size = 0.1,
  subsampling_rate = 1,
  feature_subset_strategy = "auto",
  min_instances_per_node = 1,
  max_bins = 32,
  min_info_gain = 0,
  loss_type = "squared",
  seed = NULL,
  checkpoint_interval = 10,
  cache_node_ids = FALSE,
  max_memory_in_mb = 256,
  features_col = "features",
  label_col = "label",
  prediction_col = "prediction",
  uid = random_string("gbt_regressor_"),
  ...
)

```

### Arguments

x	A spark_connection, ml_pipeline, or a tbl_spark.
formula	Used when x is a tbl_spark. R formula as a character string or a formula. This is used to transform the input dataframe before fitting, see <a href="#">ft_r_formula</a> for details.
max_iter	Maximum number of iterations.



max_depth	Maximum depth of the tree ( $\geq 0$ ); that is, the maximum number of nodes separating any leaves from the root of the tree.
step_size	Step size (a.k.a. learning rate) in interval (0, 1] for shrinking the contribution of each estimator. (default = 0.1)
subsampling_rate	Fraction of the training data used for learning each decision tree, in range (0, 1]. (default = 1.0)
feature_subset_strategy	The number of features to consider for splits at each tree node. See details for options.
min_instances_per_node	Minimum number of instances each child must have after split.
max_bins	The maximum number of bins used for discretizing continuous features and for choosing how to split on features at each node. More bins give higher granularity.
min_info_gain	Minimum information gain for a split to be considered at a tree node. Should be $\geq 0$ , defaults to 0.
loss_type	Loss function which GBT tries to minimize. Supported: "squared" (L2) and "absolute" (L1) (default = squared) for regression and "logistic" (default) for classification. For ml_gradient_boosted_trees, setting "auto" will default to the appropriate loss type based on model type.
seed	Seed for random numbers.
thresholds	Thresholds in multi-class classification to adjust the probability of predicting each class. Array must have length equal to the number of classes, with values $> 0$ excepting that at most one value may be 0. The class with largest value $p/t$ is predicted, where $p$ is the original probability of that class and $t$ is the class's threshold.
checkpoint_interval	Set checkpoint interval ( $\geq 1$ ) or disable checkpoint (-1). E.g. 10 means that the cache will get checkpointed every 10 iterations, defaults to 10.
cache_node_ids	If FALSE, the algorithm will pass trees to executors to match instances with nodes. If TRUE, the algorithm will cache node IDs for each instance. Caching can speed up training of deeper trees. Defaults to FALSE.
max_memory_in_mb	Maximum memory in MB allocated to histogram aggregation. If too small, then 1 node will be split per iteration, and its aggregates may exceed this size. Defaults to 256.
features_col	Features column name, as a length-one character vector. The column should be single vector column of numeric values. Usually this column is output by <a href="#">ft_r_formula</a> .
label_col	Label column name. The column should be a numeric column. Usually this column is output by <a href="#">ft_r_formula</a> .
prediction_col	Prediction column name.
probability_col	Column name for predicted class conditional probabilities.

raw_prediction_col	Raw prediction (a.k.a. confidence) column name.
uid	A character string used to uniquely identify the ML estimator.
...	Optional arguments; see Details.
type	The type of model to fit. "regression" treats the response as a continuous variable, while "classification" treats the response as a categorical variable. When "auto" is used, the model type is inferred based on the response variable type – if it is a numeric type, then regression is used; classification otherwise.
response	(Deprecated) The name of the response column (as a length-one character vector.)
features	(Deprecated) The name of features (terms) to use for the model fit.

### Details

When `x` is a `tbl_spark` and `formula` (alternatively, `response` and `features`) is specified, the function returns a `ml_model` object wrapping a `ml_pipeline_model` which contains data pre-processing transformers, the ML predictor, and, for classification models, a post-processing transformer that converts predictions into class labels. For classification, an optional argument `predicted_label_col` (defaults to "predicted\_label") can be used to specify the name of the predicted label column. In addition to the fitted `ml_pipeline_model`, `ml_model` objects also contain a `ml_pipeline` object where the ML predictor stage is an estimator ready to be fit against data. This is utilized by `ml_save` with `type = "pipeline"` to facilitate model refresh workflows.

The supported options for `feature_subset_strategy` are

- "auto": Choose automatically for task: If `num_trees == 1`, set to "all". If `num_trees > 1` (forest), set to "sqrt" for classification and to "onethird" for regression.
- "all": use all features
- "onethird": use 1/3 of the features
- "sqrt": use use `sqrt(number of features)`
- "log2": use `log2(number of features)`
- "n": when `n` is in the range (0, 1.0], use `n * number of features`. When `n` is in the range (1, number of features), use `n` features. (default = "auto")

`ml_gradient_boosted_trees` is a wrapper around `ml_gbt_regressor.tbl_spark` and `ml_gbt_classifier.tbl_spark` and calls the appropriate method based on model type.

### Value

The object returned depends on the class of `x`.

- `spark_connection`: When `x` is a `spark_connection`, the function returns an instance of a `ml_estimator` object. The object contains a pointer to a Spark Predictor object and can be used to compose Pipeline objects.
- `ml_pipeline`: When `x` is a `ml_pipeline`, the function returns a `ml_pipeline` with the predictor appended to the pipeline.

- `tbl_spark`: When `x` is a `tbl_spark`, a predictor is constructed then immediately fit with the input `tbl_spark`, returning a prediction model.
- `tbl_spark`, with `formula`: specified When `formula` is specified, the input `tbl_spark` is first transformed using a `RFormula` transformer before being fit by the predictor. The object returned in this case is a `ml_model` which is a wrapper of a `ml_pipeline_model`.

### See Also

See <http://spark.apache.org/docs/latest/ml-classification-regression.html> for more information on the set of supervised learning algorithms.

Other ml algorithms: `ml_aft_survival_regression()`, `ml_decision_tree_classifier()`, `ml_generalized_linear_regression()`, `ml_isotonic_regression()`, `ml_linear_regression()`, `ml_linear_svc()`, `ml_logistic_regression()`, `ml_multilayer_perceptron_classifier()`, `ml_naive_bayes()`, `ml_one_vs_rest()`, `ml_random_forest_classifier()`

### Examples

```
## Not run:
sc <- spark_connect(master = "local")
iris_tbl <- sdf_copy_to(sc, iris, name = "iris_tbl", overwrite = TRUE)

partitions <- iris_tbl %>%
  sdf_random_split(training = 0.7, test = 0.3, seed = 1111)

iris_training <- partitions$training
iris_test <- partitions$test

gbt_model <- iris_training %>%
  ml_gradient_boosted_trees(Sepal_Length ~ Petal_Length + Petal_Width)

pred <- ml_predict(gbt_model, iris_test)

ml_regression_evaluator(pred, label_col = "Sepal_Length")

## End(Not run)
```

---

`ml_generalized_linear_regression`

*Spark ML – Generalized Linear Regression*

---

### Description

Perform regression using Generalized Linear Model (GLM).

**Usage**

```
ml_generalized_linear_regression(
  x,
  formula = NULL,
  family = "gaussian",
  link = NULL,
  fit_intercept = TRUE,
  offset_col = NULL,
  link_power = NULL,
  link_prediction_col = NULL,
  reg_param = 0,
  max_iter = 25,
  weight_col = NULL,
  solver = "irls",
  tol = 1e-06,
  variance_power = 0,
  features_col = "features",
  label_col = "label",
  prediction_col = "prediction",
  uid = random_string("generalized_linear_regression_"),
  ...
)
```

**Arguments**

x	A spark_connection, ml_pipeline, or a tbl_spark.
formula	Used when x is a tbl_spark. R formula as a character string or a formula. This is used to transform the input dataframe before fitting, see <a href="#">ft_r_formula</a> for details.
family	Name of family which is a description of the error distribution to be used in the model. Supported options: "gaussian", "binomial", "poisson", "gamma" and "tweedie". Default is "gaussian".
link	Name of link function which provides the relationship between the linear predictor and the mean of the distribution function. See for supported link functions.
fit_intercept	Boolean; should the model be fit with an intercept term?
offset_col	Offset column name. If this is not set, we treat all instance offsets as 0.0. The feature specified as offset has a constant coefficient of 1.0.
link_power	Index in the power link function. Only applicable to the Tweedie family. Note that link power 0, 1, -1 or 0.5 corresponds to the Log, Identity, Inverse or Sqrt link, respectively. When not set, this value defaults to 1 - variancePower, which matches the R "statmod" package.
link_prediction_col	Link prediction (linear predictor) column name. Default is not set, which means we do not output link prediction.
reg_param	Regularization parameter (aka lambda)
max_iter	The maximum number of iterations to use.

weight_col	The name of the column to use as weights for the model fit.
solver	Solver algorithm for optimization.
tol	Param for the convergence tolerance for iterative algorithms.
variance_power	Power in the variance function of the Tweedie distribution which provides the relationship between the variance and mean of the distribution. Only applicable to the Tweedie family. (see <a href="#">Tweedie Distribution (Wikipedia)</a> ) Supported values: 0 and [1, Inf). Note that variance power 0, 1, or 2 corresponds to the Gaussian, Poisson or Gamma family, respectively.
features_col	Features column name, as a length-one character vector. The column should be single vector column of numeric values. Usually this column is output by <a href="#">ft_r_formula</a> .
label_col	Label column name. The column should be a numeric column. Usually this column is output by <a href="#">ft_r_formula</a> .
prediction_col	Prediction column name.
uid	A character string used to uniquely identify the ML estimator.
...	Optional arguments; see Details.

## Details

When `x` is a `tbl_spark` and `formula` (alternatively, `response` and `features`) is specified, the function returns a `ml_model` object wrapping a `ml_pipeline_model` which contains data pre-processing transformers, the ML predictor, and, for classification models, a post-processing transformer that converts predictions into class labels. For classification, an optional argument `predicted_label_col` (defaults to `"predicted_label"`) can be used to specify the name of the predicted label column. In addition to the fitted `ml_pipeline_model`, `ml_model` objects also contain a `ml_pipeline` object where the ML predictor stage is an estimator ready to be fit against data. This is utilized by [ml\\_save](#) with `type = "pipeline"` to facilitate model refresh workflows.

Valid link functions for each family is listed below. The first link function of each family is the default one.

- gaussian: "identity", "log", "inverse"
- binomial: "logit", "probit", "loglog"
- poisson: "log", "identity", "sqrt"
- gamma: "inverse", "identity", "log"
- tweedie: power link function specified through `link_power`. The default link power in the tweedie family is  $1 - \text{variance\_power}$ .

## Value

The object returned depends on the class of `x`.

- `spark_connection`: When `x` is a `spark_connection`, the function returns an instance of a `ml_estimator` object. The object contains a pointer to a Spark Predictor object and can be used to compose Pipeline objects.
- `ml_pipeline`: When `x` is a `ml_pipeline`, the function returns a `ml_pipeline` with the predictor appended to the pipeline.

- `tbl_spark`: When `x` is a `tbl_spark`, a predictor is constructed then immediately fit with the input `tbl_spark`, returning a prediction model.
- `tbl_spark`, with `formula`: specified When `formula` is specified, the input `tbl_spark` is first transformed using a `RFormula` transformer before being fit by the predictor. The object returned in this case is a `ml_model` which is a wrapper of a `ml_pipeline_model`.

### See Also

See <http://spark.apache.org/docs/latest/ml-classification-regression.html> for more information on the set of supervised learning algorithms.

Other ml algorithms: `ml_aft_survival_regression()`, `ml_decision_tree_classifier()`, `ml_gbt_classifier()`, `ml_isotonic_regression()`, `ml_linear_regression()`, `ml_linear_svc()`, `ml_logistic_regression()`, `ml_multilayer_perceptron_classifier()`, `ml_naive_bayes()`, `ml_one_vs_rest()`, `ml_random_forest_classifier()`

### Examples

```
## Not run:
library(sparklyr)

sc <- spark_connect(master = "local")
mtcars_tbl <- sdf_copy_to(sc, mtcars, name = "mtcars_tbl", overwrite = TRUE)

partitions <- mtcars_tbl %>%
  sdf_random_split(training = 0.7, test = 0.3, seed = 1111)

mtcars_training <- partitions$training
mtcars_test <- partitions$test

# Specify the grid
family <- c("gaussian", "gamma", "poisson")
link <- c("identity", "log")
family_link <- expand_grid(family = family, link = link, stringsAsFactors = FALSE)
family_link <- data.frame(family_link, rmse = 0)

# Train the models
for (i in 1:nrow(family_link)) {
  glm_model <- mtcars_training %>%
    ml_generalized_linear_regression(mpg ~ .,
      family = family_link[i, 1],
      link = family_link[i, 2]
    )

  pred <- ml_predict(glm_model, mtcars_test)
  family_link[i, 3] <- ml_regression_evaluator(pred, label_col = "mpg")
}

family_link

## End(Not run)
```

**Description**

These methods summarize the results of Spark ML models into tidy forms.

**Usage**

```
## S3 method for class 'ml_model_generalized_linear_regression'
tidy(x, exponentiate = FALSE, ...)

## S3 method for class 'ml_model_linear_regression'
tidy(x, ...)

## S3 method for class 'ml_model_generalized_linear_regression'
augment(
  x,
  newdata = NULL,
  type.residuals = c("working", "deviance", "pearson", "response"),
  ...
)

## S3 method for class 'ml_model_linear_regression'
augment(
  x,
  newdata = NULL,
  type.residuals = c("working", "deviance", "pearson", "response"),
  ...
)

## S3 method for class 'ml_model_generalized_linear_regression'
glance(x, ...)

## S3 method for class 'ml_model_linear_regression'
glance(x, ...)
```

**Arguments**

x	a Spark ML model.
exponentiate	For GLM, whether to exponentiate the coefficient estimates (typical for logistic regression.)
...	extra arguments (not used.)
newdata	a <code>tbl_spark</code> of new data to use for prediction.
type.residuals	type of residuals, defaults to "working". Must be set to "working" when newdata is supplied.

**Details**

The residuals attached by augment are of type "working" by default, which is different from the default of "deviance" for residuals() or sdf\_residuals().

---

ml\_isotonic\_regression

*Spark ML – Isotonic Regression*


---

**Description**

Currently implemented using parallelized pool adjacent violators algorithm. Only univariate (single feature) algorithm supported.

**Usage**

```
ml_isotonic_regression(
  x,
  formula = NULL,
  feature_index = 0,
  isotonic = TRUE,
  weight_col = NULL,
  features_col = "features",
  label_col = "label",
  prediction_col = "prediction",
  uid = random_string("isotonic_regression_"),
  ...
)
```

**Arguments**

x	A spark_connection, ml_pipeline, or a tbl_spark.
formula	Used when x is a tbl_spark. R formula as a character string or a formula. This is used to transform the input dataframe before fitting, see <a href="#">ft_r_formula</a> for details.
feature_index	Index of the feature if features_col is a vector column (default: 0), no effect otherwise.
isotonic	Whether the output sequence should be isotonic/increasing (true) or antitonic/decreasing (false). Default: true
weight_col	The name of the column to use as weights for the model fit.
features_col	Features column name, as a length-one character vector. The column should be single vector column of numeric values. Usually this column is output by <a href="#">ft_r_formula</a> .
label_col	Label column name. The column should be a numeric column. Usually this column is output by <a href="#">ft_r_formula</a> .



prediction\_col Prediction column name.  
 uid A character string used to uniquely identify the ML estimator.  
 ... Optional arguments; see Details.

### Details

When `x` is a `tbl_spark` and `formula` (alternatively, `response` and `features`) is specified, the function returns a `ml_model` object wrapping a `ml_pipeline_model` which contains data pre-processing transformers, the ML predictor, and, for classification models, a post-processing transformer that converts predictions into class labels. For classification, an optional argument `predicted_label_col` (defaults to `"predicted_label"`) can be used to specify the name of the predicted label column. In addition to the fitted `ml_pipeline_model`, `ml_model` objects also contain a `ml_pipeline` object where the ML predictor stage is an estimator ready to be fit against data. This is utilized by `ml_save` with `type = "pipeline"` to facilitate model refresh workflows.

### Value

The object returned depends on the class of `x`.

- `spark_connection`: When `x` is a `spark_connection`, the function returns an instance of a `ml_estimator` object. The object contains a pointer to a Spark Predictor object and can be used to compose Pipeline objects.
- `ml_pipeline`: When `x` is a `ml_pipeline`, the function returns a `ml_pipeline` with the predictor appended to the pipeline.
- `tbl_spark`: When `x` is a `tbl_spark`, a predictor is constructed then immediately fit with the input `tbl_spark`, returning a prediction model.
- `tbl_spark`, with `formula`: specified When `formula` is specified, the input `tbl_spark` is first transformed using a `RFormula` transformer before being fit by the predictor. The object returned in this case is a `ml_model` which is a wrapper of a `ml_pipeline_model`.

### See Also

See <http://spark.apache.org/docs/latest/ml-classification-regression.html> for more information on the set of supervised learning algorithms.

Other ml algorithms: `ml_aft_survival_regression()`, `ml_decision_tree_classifier()`, `ml_gbt_classifier()`, `ml_generalized_linear_regression()`, `ml_linear_regression()`, `ml_linear_svc()`, `ml_logistic_regression()`, `ml_multilayer_perceptron_classifier()`, `ml_naive_bayes()`, `ml_one_vs_rest()`, `ml_random_forest_classifier()`

### Examples

```
## Not run:
sc <- spark_connect(master = "local")
iris_tbl <- sdf_copy_to(sc, iris, name = "iris_tbl", overwrite = TRUE)

partitions <- iris_tbl %>%
  sdf_random_split(training = 0.7, test = 0.3, seed = 1111)

iris_training <- partitions$training
```

```
iris_test <- partitions$test

iso_res <- iris_tbl %>%
  ml_isotonic_regression(Petal_Length ~ Petal_Width)

pred <- ml_predict(iso_res, iris_test)

pred

## End(Not run)
```

---

ml\_isotonic\_regression\_tidiers

*Tidying methods for Spark ML Isotonic Regression*

---

### Description

These methods summarize the results of Spark ML models into tidy forms.

### Usage

```
## S3 method for class 'ml_model_isotonic_regression'
tidy(x, ...)

## S3 method for class 'ml_model_isotonic_regression'
augment(x, newdata = NULL, ...)

## S3 method for class 'ml_model_isotonic_regression'
glance(x, ...)
```

### Arguments

x	a Spark ML model.
...	extra arguments (not used.)
newdata	a tbl_spark of new data to use for prediction.

---

ml\_kmeans

*Spark ML – K-Means Clustering*

---

### Description

K-means clustering with support for k-meansll initialization proposed by Bahmani et al. Using 'ml\_kmeans()' with the formula interface requires Spark 2.0+.

**Usage**

```
ml_kmeans(
  x,
  formula = NULL,
  k = 2,
  max_iter = 20,
  tol = 1e-04,
  init_steps = 2,
  init_mode = "k-means||",
  seed = NULL,
  features_col = "features",
  prediction_col = "prediction",
  uid = random_string("kmeans_"),
  ...
)

ml_compute_cost(model, dataset)
```

**Arguments**

x	A spark_connection, ml_pipeline, or a tbl_spark.
formula	Used when x is a tbl_spark. R formula as a character string or a formula. This is used to transform the input dataframe before fitting, see <a href="#">ft_r_formula</a> for details.
k	The number of clusters to create
max_iter	The maximum number of iterations to use.
tol	Param for the convergence tolerance for iterative algorithms.
init_steps	Number of steps for the k-meansll initialization mode. This is an advanced setting – the default of 2 is almost always enough. Must be > 0. Default: 2.
init_mode	Initialization algorithm. This can be either "random" to choose random points as initial cluster centers, or "k-meansll" to use a parallel variant of k-means++ (Bahmani et al., Scalable K-Means++, VLDB 2012). Default: k-meansll.
seed	A random seed. Set this value if you need your results to be reproducible across repeated calls.
features_col	Features column name, as a length-one character vector. The column should be single vector column of numeric values. Usually this column is output by <a href="#">ft_r_formula</a> .
prediction_col	Prediction column name.
uid	A character string used to uniquely identify the ML estimator.
...	Optional arguments, see Details.
model	A fitted K-means model returned by ml_kmeans()
dataset	Dataset on which to calculate K-means cost

**Value**

The object returned depends on the class of `x`.

- `spark_connection`: When `x` is a `spark_connection`, the function returns an instance of a `ml_estimator` object. The object contains a pointer to a Spark Estimator object and can be used to compose Pipeline objects.
- `ml_pipeline`: When `x` is a `ml_pipeline`, the function returns a `ml_pipeline` with the clustering estimator appended to the pipeline.
- `tbl_spark`: When `x` is a `tbl_spark`, an estimator is constructed then immediately fit with the input `tbl_spark`, returning a clustering model.
- `tbl_spark`, with `formula` or `features` specified: When `formula` is specified, the input `tbl_spark` is first transformed using a `RFormula` transformer before being fit by the estimator. The object returned in this case is a `ml_model` which is a wrapper of a `ml_pipeline_model`. This signature does not apply to `ml_lda()`.

`ml_compute_cost()` returns the K-means cost (sum of squared distances of points to their nearest center) for the model on the given data.

**See Also**

See <http://spark.apache.org/docs/latest/ml-clustering.html> for more information on the set of clustering algorithms.

Other ml clustering algorithms: `ml_bisecting_kmeans()`, `ml_gaussian_mixture()`, `ml_lda()`

**Examples**

```
## Not run:
sc <- spark_connect(master = "local")
iris_tbl <- sdf_copy_to(sc, iris, name = "iris_tbl", overwrite = TRUE)
ml_kmeans(iris_tbl, Species ~ .)

## End(Not run)
```

---

ml\_lda

*Spark ML – Latent Dirichlet Allocation*


---

**Description**

Latent Dirichlet Allocation (LDA), a topic model designed for text documents.

**Usage**

```

ml_lda(
  x,
  formula = NULL,
  k = 10,
  max_iter = 20,
  doc_concentration = NULL,
  topic_concentration = NULL,
  subsampling_rate = 0.05,
  optimizer = "online",
  checkpoint_interval = 10,
  keep_last_checkpoint = TRUE,
  learning_decay = 0.51,
  learning_offset = 1024,
  optimize_doc_concentration = TRUE,
  seed = NULL,
  features_col = "features",
  topic_distribution_col = "topicDistribution",
  uid = random_string("lda_"),
  ...
)

ml_describe_topics(model, max_terms_per_topic = 10)

ml_log_likelihood(model, dataset)

ml_log_perplexity(model, dataset)

ml_topics_matrix(model)

```

**Arguments**

x	A spark_connection, ml_pipeline, or a tbl_spark.
formula	Used when x is a tbl_spark. R formula as a character string or a formula. This is used to transform the input dataframe before fitting, see <a href="#">ft_r_formula</a> for details.
k	The number of clusters to create
max_iter	The maximum number of iterations to use.
doc_concentration	Concentration parameter (commonly named "alpha") for the prior placed on documents' distributions over topics ("theta"). See details.
topic_concentration	Concentration parameter (commonly named "beta" or "eta") for the prior placed on topics' distributions over terms.
subsampling_rate	(For Online optimizer only) Fraction of the corpus to be sampled and used in each iteration of mini-batch gradient descent, in range (0, 1]. Note that this

should be adjusted in synch with `max_iter` so the entire corpus is used. Specifically, set both so that `maxIterations * miniBatchFraction` greater than or equal to 1.

<code>optimizer</code>	Optimizer or inference algorithm used to estimate the LDA model. Supported: "online" for Online Variational Bayes (default) and "em" for Expectation-Maximization.
<code>checkpoint_interval</code>	Set checkpoint interval ( $\geq 1$ ) or disable checkpoint (-1). E.g. 10 means that the cache will get checkpointed every 10 iterations, defaults to 10.
<code>keep_last_checkpoint</code>	(Spark 2.0.0+) (For EM optimizer only) If using checkpointing, this indicates whether to keep the last checkpoint. If FALSE, then the checkpoint will be deleted. Deleting the checkpoint can cause failures if a data partition is lost, so set this bit with care. Note that checkpoints will be cleaned up via reference counting, regardless.
<code>learning_decay</code>	(For Online optimizer only) Learning rate, set as an exponential decay rate. This should be between (0.5, 1.0] to guarantee asymptotic convergence. This is called "kappa" in the Online LDA paper (Hoffman et al., 2010). Default: 0.51, based on Hoffman et al.
<code>learning_offset</code>	(For Online optimizer only) A (positive) learning parameter that downweights early iterations. Larger values make early iterations count less. This is called "tau0" in the Online LDA paper (Hoffman et al., 2010) Default: 1024, following Hoffman et al.
<code>optimize_doc_concentration</code>	(For Online optimizer only) Indicates whether the <code>doc_concentration</code> (Dirichlet parameter for document-topic distribution) will be optimized during training. Setting this to true will make the model more expressive and fit the training data better. Default: FALSE
<code>seed</code>	A random seed. Set this value if you need your results to be reproducible across repeated calls.
<code>features_col</code>	Features column name, as a length-one character vector. The column should be single vector column of numeric values. Usually this column is output by <a href="#">ft_r_formula</a> .
<code>topic_distribution_col</code>	Output column with estimates of the topic mixture distribution for each document (often called "theta" in the literature). Returns a vector of zeros for an empty document.
<code>uid</code>	A character string used to uniquely identify the ML estimator.
<code>...</code>	Optional arguments, see Details.
<code>model</code>	A fitted LDA model returned by <code>ml_lda()</code> .
<code>max_terms_per_topic</code>	Maximum number of terms to collect for each topic. Default value of 10.
<code>dataset</code>	test corpus to use for calculating log likelihood or log perplexity

## Details

For `ml_lda.tbl_spark` with the formula interface, you can specify named arguments in `'...'` that will be passed `'ft_regex_tokenizer()'`, `'ft_stop_words_remover()'`, and `'ft_count_vectorizer()'`. For example, to increase the default `'min_token_length'`, you can use `'ml_lda(dataset, ~ text, min_token_length = 4)'`.

Terminology for LDA:

- "term" = "word": an element of the vocabulary
- "token": instance of a term appearing in a document
- "topic": multinomial distribution over terms representing some concept
- "document": one piece of text, corresponding to one row in the input data

Original LDA paper (journal version): Blei, Ng, and Jordan. "Latent Dirichlet Allocation." JMLR, 2003.

Input data (`features_col`): LDA is given a collection of documents as input data, via the `features_col` parameter. Each document is specified as a Vector of length `vocab_size`, where each entry is the count for the corresponding term (word) in the document. Feature transformers such as `ft_tokenizer` and `ft_count_vectorizer` can be useful for converting text to word count vectors

## Value

The object returned depends on the class of `x`.

- `spark_connection`: When `x` is a `spark_connection`, the function returns an instance of a `ml_estimator` object. The object contains a pointer to a Spark Estimator object and can be used to compose Pipeline objects.
- `ml_pipeline`: When `x` is a `ml_pipeline`, the function returns a `ml_pipeline` with the clustering estimator appended to the pipeline.
- `tbl_spark`: When `x` is a `tbl_spark`, an estimator is constructed then immediately fit with the input `tbl_spark`, returning a clustering model.
- `tbl_spark`, with `formula` or `features` specified: When `formula` is specified, the input `tbl_spark` is first transformed using a `RFormula` transformer before being fit by the estimator. The object returned in this case is a `ml_model` which is a wrapper of a `ml_pipeline_model`. This signature does not apply to `ml_lda()`.

`ml_describe_topics` returns a `DataFrame` with topics and their top-weighted terms.

`ml_log_likelihood` calculates a lower bound on the log likelihood of the entire corpus

## Parameter details

`doc_concentration`: This is the parameter to a Dirichlet distribution, where larger values mean more smoothing (more regularization). If not set by the user, then `doc_concentration` is set automatically. If set to singleton vector `[alpha]`, then `alpha` is replicated to a vector of length `k` in fitting. Otherwise, the `doc_concentration` vector must be length `k`. (default = automatic)

Optimizer-specific parameter settings:

EM

- Currently only supports symmetric distributions, so all values in the vector should be the same.
- Values should be greater than 1.0
- default = uniformly  $(50 / k) + 1$ , where  $50/k$  is common in LDA libraries and +1 follows from Asuncion et al. (2009), who recommend a +1 adjustment for EM.

#### Online

- Values should be greater than or equal to 0
- default = uniformly  $(1.0 / k)$ , following the implementation from [here](#)

#### topic\_concentration:

This is the parameter to a symmetric Dirichlet distribution.

Note: The topics' distributions over terms are called "beta" in the original LDA paper by Blei et al., but are called "phi" in many later papers such as Asuncion et al., 2009.

If not set by the user, then `topic_concentration` is set automatically. (default = automatic)

Optimizer-specific parameter settings:

#### EM

- Value should be greater than 1.0
- default =  $0.1 + 1$ , where 0.1 gives a small amount of smoothing and +1 follows Asuncion et al. (2009), who recommend a +1 adjustment for EM.

#### Online

- Value should be greater than or equal to 0
- default =  $(1.0 / k)$ , following the implementation from [here](#).

`topic_distribution_col`: This uses a variational approximation following Hoffman et al. (2010), where the approximate distribution is called "gamma." Technically, this method returns this approximation "gamma" for each document.

### See Also

See <http://spark.apache.org/docs/latest/ml-clustering.html> for more information on the set of clustering algorithms.

Other ml clustering algorithms: [ml\\_bisecting\\_kmeans\(\)](#), [ml\\_gaussian\\_mixture\(\)](#), [ml\\_kmeans\(\)](#)

### Examples

```
## Not run:
library(janeaustenr)
library(dplyr)
sc <- spark_connect(master = "local")

lines_tbl <- sdf_copy_to(sc,
  austen_books()[c(1:30), ],
  name = "lines_tbl",
  overwrite = TRUE
)

# transform the data in a tidy form
```



```
lines_tbl_tidy <- lines_tbl %>%
  ft_tokenizer(
    input_col = "text",
    output_col = "word_list"
  ) %>%
  ft_stop_words_remover(
    input_col = "word_list",
    output_col = "wo_stop_words"
  ) %>%
  mutate(text = explode(wo_stop_words)) %>%
  filter(text != "") %>%
  select(text, book)

lda_model <- lines_tbl_tidy %>%
  ml_lda(~text, k = 4)

# vocabulary and topics
tidy(lda_model)

## End(Not run)
```

---

ml\_lda\_tidiers

*Tidying methods for Spark ML LDA models*

---

## Description

These methods summarize the results of Spark ML models into tidy forms.

## Usage

```
## S3 method for class 'ml_model_lda'
tidy(x, ...)
```

```
## S3 method for class 'ml_model_lda'
augment(x, newdata = NULL, ...)
```

```
## S3 method for class 'ml_model_lda'
glance(x, ...)
```

## Arguments

x	a Spark ML model.
...	extra arguments (not used.)
newdata	a tbl_spark of new data to use for prediction.

---

 ml\_linear\_regression *Spark ML – Linear Regression*


---

## Description

Perform regression using linear regression.

## Usage

```
ml_linear_regression(
  x,
  formula = NULL,
  fit_intercept = TRUE,
  elastic_net_param = 0,
  reg_param = 0,
  max_iter = 100,
  weight_col = NULL,
  loss = "squaredError",
  solver = "auto",
  standardization = TRUE,
  tol = 1e-06,
  features_col = "features",
  label_col = "label",
  prediction_col = "prediction",
  uid = random_string("linear_regression_"),
  ...
)
```

## Arguments

x	A spark_connection, ml_pipeline, or a tbl_spark.
formula	Used when x is a tbl_spark. R formula as a character string or a formula. This is used to transform the input dataframe before fitting, see <a href="#">fit_r_formula</a> for details.
fit_intercept	Boolean; should the model be fit with an intercept term?
elastic_net_param	ElasticNet mixing parameter, in range [0, 1]. For alpha = 0, the penalty is an L2 penalty. For alpha = 1, it is an L1 penalty.
reg_param	Regularization parameter (aka lambda)
max_iter	The maximum number of iterations to use.
weight_col	The name of the column to use as weights for the model fit.
loss	The loss function to be optimized. Supported options: "squaredError" and "huber". Default: "squaredError"
solver	Solver algorithm for optimization.

standardization	Whether to standardize the training features before fitting the model.
tol	Param for the convergence tolerance for iterative algorithms.
features_col	Features column name, as a length-one character vector. The column should be single vector column of numeric values. Usually this column is output by <a href="#">ft_r_formula</a> .
label_col	Label column name. The column should be a numeric column. Usually this column is output by <a href="#">ft_r_formula</a> .
prediction_col	Prediction column name.
uid	A character string used to uniquely identify the ML estimator.
...	Optional arguments; see Details.

### Details

When `x` is a `tbl_spark` and `formula` (alternatively, `response` and `features`) is specified, the function returns a `ml_model` object wrapping a `ml_pipeline_model` which contains data pre-processing transformers, the ML predictor, and, for classification models, a post-processing transformer that converts predictions into class labels. For classification, an optional argument `predicted_label_col` (defaults to "predicted\_label") can be used to specify the name of the predicted label column. In addition to the fitted `ml_pipeline_model`, `ml_model` objects also contain a `ml_pipeline` object where the ML predictor stage is an estimator ready to be fit against data. This is utilized by [ml\\_save](#) with `type = "pipeline"` to facilitate model refresh workflows.

### Value

The object returned depends on the class of `x`.

- `spark_connection`: When `x` is a `spark_connection`, the function returns an instance of a `ml_estimator` object. The object contains a pointer to a Spark Predictor object and can be used to compose Pipeline objects.
- `ml_pipeline`: When `x` is a `ml_pipeline`, the function returns a `ml_pipeline` with the predictor appended to the pipeline.
- `tbl_spark`: When `x` is a `tbl_spark`, a predictor is constructed then immediately fit with the input `tbl_spark`, returning a prediction model.
- `tbl_spark`, with `formula`: specified When `formula` is specified, the input `tbl_spark` is first transformed using a `RFormula` transformer before being fit by the predictor. The object returned in this case is a `ml_model` which is a wrapper of a `ml_pipeline_model`.

### See Also

See <http://spark.apache.org/docs/latest/ml-classification-regression.html> for more information on the set of supervised learning algorithms.

Other ml algorithms: [ml\\_aft\\_survival\\_regression\(\)](#), [ml\\_decision\\_tree\\_classifier\(\)](#), [ml\\_gbt\\_classifier\(\)](#), [ml\\_generalized\\_linear\\_regression\(\)](#), [ml\\_isotonic\\_regression\(\)](#), [ml\\_linear\\_svc\(\)](#), [ml\\_logistic\\_regression\(\)](#), [ml\\_multilayer\\_perceptron\\_classifier\(\)](#), [ml\\_naive\\_bayes\(\)](#), [ml\\_one\\_vs\\_rest\(\)](#), [ml\\_random\\_forest\\_classifier\(\)](#)

**Examples**

```

## Not run:
sc <- spark_connect(master = "local")
mtcars_tbl <- sdf_copy_to(sc, mtcars, name = "mtcars_tbl", overwrite = TRUE)

partitions <- mtcars_tbl %>%
  sdf_random_split(training = 0.7, test = 0.3, seed = 1111)

mtcars_training <- partitions$training
mtcars_test <- partitions$test

lm_model <- mtcars_training %>%
  ml_linear_regression(mpg ~ .)

pred <- ml_predict(lm_model, mtcars_test)

ml_regression_evaluator(pred, label_col = "mpg")

## End(Not run)

```

---

ml\_linear\_svc

*Spark ML – LinearSVC*


---

**Description**

Perform classification using linear support vector machines (SVM). This binary classifier optimizes the Hinge Loss using the OWLQN optimizer. Only supports L2 regularization currently.

**Usage**

```

ml_linear_svc(
  x,
  formula = NULL,
  fit_intercept = TRUE,
  reg_param = 0,
  max_iter = 100,
  standardization = TRUE,
  weight_col = NULL,
  tol = 1e-06,
  threshold = 0,
  aggregation_depth = 2,
  features_col = "features",
  label_col = "label",
  prediction_col = "prediction",
  raw_prediction_col = "rawPrediction",
  uid = random_string("linear_svc_"),
  ...
)

```

**Arguments**

x	A spark_connection, ml_pipeline, or a tbl_spark.
formula	Used when x is a tbl_spark. R formula as a character string or a formula. This is used to transform the input dataframe before fitting, see <a href="#">ft_r_formula</a> for details.
fit_intercept	Boolean; should the model be fit with an intercept term?
reg_param	Regularization parameter (aka lambda)
max_iter	The maximum number of iterations to use.
standardization	Whether to standardize the training features before fitting the model.
weight_col	The name of the column to use as weights for the model fit.
tol	Param for the convergence tolerance for iterative algorithms.
threshold	in binary classification prediction, in range [0, 1].
aggregation_depth	(Spark 2.1.0+) Suggested depth for treeAggregate (>= 2).
features_col	Features column name, as a length-one character vector. The column should be single vector column of numeric values. Usually this column is output by <a href="#">ft_r_formula</a> .
label_col	Label column name. The column should be a numeric column. Usually this column is output by <a href="#">ft_r_formula</a> .
prediction_col	Prediction column name.
raw_prediction_col	Raw prediction (a.k.a. confidence) column name.
uid	A character string used to uniquely identify the ML estimator.
...	Optional arguments; see Details.

**Details**

When x is a tbl\_spark and formula (alternatively, response and features) is specified, the function returns a ml\_model object wrapping a ml\_pipeline\_model which contains data pre-processing transformers, the ML predictor, and, for classification models, a post-processing transformer that converts predictions into class labels. For classification, an optional argument predicted\_label\_col (defaults to "predicted\_label") can be used to specify the name of the predicted label column. In addition to the fitted ml\_pipeline\_model, ml\_model objects also contain a ml\_pipeline object where the ML predictor stage is an estimator ready to be fit against data. This is utilized by [ml\\_save](#) with type = "pipeline" to facilitate model refresh workflows.

**Value**

The object returned depends on the class of x.

- spark\_connection: When x is a spark\_connection, the function returns an instance of a ml\_estimator object. The object contains a pointer to a Spark Predictor object and can be used to compose Pipeline objects.

- `ml_pipeline`: When `x` is a `ml_pipeline`, the function returns a `ml_pipeline` with the predictor appended to the pipeline.
- `tbl_spark`: When `x` is a `tbl_spark`, a predictor is constructed then immediately fit with the input `tbl_spark`, returning a prediction model.
- `tbl_spark`, with `formula`: specified When `formula` is specified, the input `tbl_spark` is first transformed using a `RFormula` transformer before being fit by the predictor. The object returned in this case is a `ml_model` which is a wrapper of a `ml_pipeline_model`.

### See Also

See <http://spark.apache.org/docs/latest/ml-classification-regression.html> for more information on the set of supervised learning algorithms.

Other ml algorithms: `ml_aft_survival_regression()`, `ml_decision_tree_classifier()`, `ml_gbt_classifier()`, `ml_generalized_linear_regression()`, `ml_isotonic_regression()`, `ml_linear_regression()`, `ml_logistic_regression()`, `ml_multilayer_perceptron_classifier()`, `ml_naive_bayes()`, `ml_one_vs_rest()`, `ml_random_forest_classifier()`

### Examples

```
## Not run:
library(dplyr)

sc <- spark_connect(master = "local")
iris_tbl <- sdf_copy_to(sc, iris, name = "iris_tbl", overwrite = TRUE)

partitions <- iris_tbl %>%
  filter(Species != "setosa") %>%
  sdf_random_split(training = 0.7, test = 0.3, seed = 1111)

iris_training <- partitions$training
iris_test <- partitions$test

svc_model <- iris_training %>%
  ml_linear_svc(Species ~ .)

pred <- ml_predict(svc_model, iris_test)

ml_binary_classification_evaluator(pred)

## End(Not run)
```

---

`ml_linear_svc_tidiers` *Tidying methods for Spark ML linear svc*

---

### Description

These methods summarize the results of Spark ML models into tidy forms.

**Usage**

```
## S3 method for class 'ml_model_linear_svc'  
tidy(x, ...)  
  
## S3 method for class 'ml_model_linear_svc'  
augment(x, newdata = NULL, ...)  
  
## S3 method for class 'ml_model_linear_svc'  
glance(x, ...)
```

**Arguments**

x	a Spark ML model.
...	extra arguments (not used.)
newdata	a tbl_spark of new data to use for prediction.

---

ml\_logistic\_regression

*Spark ML – Logistic Regression*

---

**Description**

Perform classification using logistic regression.

**Usage**

```
ml_logistic_regression(  
  x,  
  formula = NULL,  
  fit_intercept = TRUE,  
  elastic_net_param = 0,  
  reg_param = 0,  
  max_iter = 100,  
  threshold = 0.5,  
  thresholds = NULL,  
  tol = 1e-06,  
  weight_col = NULL,  
  aggregation_depth = 2,  
  lower_bounds_on_coefficients = NULL,  
  lower_bounds_on_intercepts = NULL,  
  upper_bounds_on_coefficients = NULL,  
  upper_bounds_on_intercepts = NULL,  
  features_col = "features",  
  label_col = "label",  
  family = "auto",  
  prediction_col = "prediction",
```

```

probability_col = "probability",
raw_prediction_col = "rawPrediction",
uid = random_string("logistic_regression_"),
...
)

```

### Arguments

x	A spark_connection, ml_pipeline, or a tbl_spark.
formula	Used when x is a tbl_spark. R formula as a character string or a formula. This is used to transform the input dataframe before fitting, see <a href="#">ft_r_formula</a> for details.
fit_intercept	Boolean; should the model be fit with an intercept term?
elastic_net_param	ElasticNet mixing parameter, in range [0, 1]. For alpha = 0, the penalty is an L2 penalty. For alpha = 1, it is an L1 penalty.
reg_param	Regularization parameter (aka lambda)
max_iter	The maximum number of iterations to use.
threshold	in binary classification prediction, in range [0, 1].
thresholds	Thresholds in multi-class classification to adjust the probability of predicting each class. Array must have length equal to the number of classes, with values > 0 excepting that at most one value may be 0. The class with largest value p/t is predicted, where p is the original probability of that class and t is the class's threshold.
tol	Param for the convergence tolerance for iterative algorithms.
weight_col	The name of the column to use as weights for the model fit.
aggregation_depth	(Spark 2.1.0+) Suggested depth for treeAggregate (>= 2).
lower_bounds_on_coefficients	(Spark 2.2.0+) Lower bounds on coefficients if fitting under bound constrained optimization. The bound matrix must be compatible with the shape (1, number of features) for binomial regression, or (number of classes, number of features) for multinomial regression.
lower_bounds_on_intercepts	(Spark 2.2.0+) Lower bounds on intercepts if fitting under bound constrained optimization. The bounds vector size must be equal with 1 for binomial regression, or the number of classes for multinomial regression.
upper_bounds_on_coefficients	(Spark 2.2.0+) Upper bounds on coefficients if fitting under bound constrained optimization. The bound matrix must be compatible with the shape (1, number of features) for binomial regression, or (number of classes, number of features) for multinomial regression.
upper_bounds_on_intercepts	(Spark 2.2.0+) Upper bounds on intercepts if fitting under bound constrained optimization. The bounds vector size must be equal with 1 for binomial regression, or the number of classes for multinomial regression.



features_col	Features column name, as a length-one character vector. The column should be single vector column of numeric values. Usually this column is output by <a href="#">ft_r_formula</a> .
label_col	Label column name. The column should be a numeric column. Usually this column is output by <a href="#">ft_r_formula</a> .
family	(Spark 2.1.0+) Param for the name of family which is a description of the label distribution to be used in the model. Supported options: "auto", "binomial", and "multinomial."
prediction_col	Prediction column name.
probability_col	Column name for predicted class conditional probabilities.
raw_prediction_col	Raw prediction (a.k.a. confidence) column name.
uid	A character string used to uniquely identify the ML estimator.
...	Optional arguments; see Details.

### Details

When `x` is a `tbl_spark` and `formula` (alternatively, `response` and `features`) is specified, the function returns a `ml_model` object wrapping a `ml_pipeline_model` which contains data pre-processing transformers, the ML predictor, and, for classification models, a post-processing transformer that converts predictions into class labels. For classification, an optional argument `predicted_label_col` (defaults to `"predicted_label"`) can be used to specify the name of the predicted label column. In addition to the fitted `ml_pipeline_model`, `ml_model` objects also contain a `ml_pipeline` object where the ML predictor stage is an estimator ready to be fit against data. This is utilized by [ml\\_save](#) with `type = "pipeline"` to facilitate model refresh workflows.

### Value

The object returned depends on the class of `x`.

- `spark_connection`: When `x` is a `spark_connection`, the function returns an instance of a `ml_estimator` object. The object contains a pointer to a Spark Predictor object and can be used to compose Pipeline objects.
- `ml_pipeline`: When `x` is a `ml_pipeline`, the function returns a `ml_pipeline` with the predictor appended to the pipeline.
- `tbl_spark`: When `x` is a `tbl_spark`, a predictor is constructed then immediately fit with the input `tbl_spark`, returning a prediction model.
- `tbl_spark`, with `formula`: specified When `formula` is specified, the input `tbl_spark` is first transformed using a `RFormula` transformer before being fit by the predictor. The object returned in this case is a `ml_model` which is a wrapper of a `ml_pipeline_model`.

### See Also

See <http://spark.apache.org/docs/latest/ml-classification-regression.html> for more information on the set of supervised learning algorithms.

Other ml algorithms: `ml_aft_survival_regression()`, `ml_decision_tree_classifier()`, `ml_gbt_classifier()`, `ml_generalized_linear_regression()`, `ml_isotonic_regression()`, `ml_linear_regression()`, `ml_linear_svc()`, `ml_multilayer_perceptron_classifier()`, `ml_naive_bayes()`, `ml_one_vs_rest()`, `ml_random_forest_classifier()`

## Examples

```
## Not run:
sc <- spark_connect(master = "local")
mtcars_tbl <- sdf_copy_to(sc, mtcars, name = "mtcars_tbl", overwrite = TRUE)

partitions <- mtcars_tbl %>%
  sdf_random_split(training = 0.7, test = 0.3, seed = 1111)

mtcars_training <- partitions$training
mtcars_test <- partitions$test

lr_model <- mtcars_training %>%
  ml_logistic_regression(am ~ gear + carb)

pred <- ml_predict(lr_model, mtcars_test)

ml_binary_classification_evaluator(pred)

## End(Not run)
```

---

ml\_logistic\_regression\_tidiers

*Tidying methods for Spark ML Logistic Regression*

---

## Description

These methods summarize the results of Spark ML models into tidy forms.

## Usage

```
## S3 method for class 'ml_model_logistic_regression'
tidy(x, ...)

## S3 method for class 'ml_model_logistic_regression'
augment(x, newdata = NULL, ...)

## S3 method for class 'ml_model_logistic_regression'
glance(x, ...)
```

**Arguments**

x	a Spark ML model.
...	extra arguments (not used.)
newdata	a tbl_spark of new data to use for prediction.

---

ml_model_data	<i>Extracts data associated with a Spark ML model</i>
---------------	-------------------------------------------------------

---

**Description**

Extracts data associated with a Spark ML model

**Usage**

```
ml_model_data(object)
```

**Arguments**

object	a Spark ML model
--------	------------------

**Value**

A tbl\_spark

---

ml_multilayer_perceptron_classifier	<i>Spark ML – Multilayer Perceptron</i>
-------------------------------------	-----------------------------------------

---

**Description**

Classification model based on the Multilayer Perceptron. Each layer has sigmoid activation function, output layer has softmax.

**Usage**

```
ml_multilayer_perceptron_classifier(
  x,
  formula = NULL,
  layers = NULL,
  max_iter = 100,
  step_size = 0.03,
  tol = 1e-06,
  block_size = 128,
  solver = "l-bfgs",
  seed = NULL,
```

```

    initial_weights = NULL,
    thresholds = NULL,
    features_col = "features",
    label_col = "label",
    prediction_col = "prediction",
    probability_col = "probability",
    raw_prediction_col = "rawPrediction",
    uid = random_string("multilayer_perceptron_classifier_"),
    ...
)

ml_multilayer_perceptron(
  x,
  formula = NULL,
  layers,
  max_iter = 100,
  step_size = 0.03,
  tol = 1e-06,
  block_size = 128,
  solver = "l-bfgs",
  seed = NULL,
  initial_weights = NULL,
  features_col = "features",
  label_col = "label",
  thresholds = NULL,
  prediction_col = "prediction",
  probability_col = "probability",
  raw_prediction_col = "rawPrediction",
  uid = random_string("multilayer_perceptron_classifier_"),
  response = NULL,
  features = NULL,
  ...
)

```

### Arguments

x	A spark_connection, ml_pipeline, or a tbl_spark.
formula	Used when x is a tbl_spark. R formula as a character string or a formula. This is used to transform the input dataframe before fitting, see <a href="#">ft_r_formula</a> for details.
layers	A numeric vector describing the layers – each element in the vector gives the size of a layer. For example, c(4, 5, 2) would imply three layers, with an input (feature) layer of size 4, an intermediate layer of size 5, and an output (class) layer of size 2.
max_iter	The maximum number of iterations to use.
step_size	Step size to be used for each iteration of optimization (> 0).
tol	Param for the convergence tolerance for iterative algorithms.

block_size	Block size for stacking input data in matrices to speed up the computation. Data is stacked within partitions. If block size is more than remaining data in a partition then it is adjusted to the size of this data. Recommended size is between 10 and 1000. Default: 128
solver	The solver algorithm for optimization. Supported options: "gd" (minibatch gradient descent) or "l-bfgs". Default: "l-bfgs"
seed	A random seed. Set this value if you need your results to be reproducible across repeated calls.
initial_weights	The initial weights of the model.
thresholds	Thresholds in multi-class classification to adjust the probability of predicting each class. Array must have length equal to the number of classes, with values > 0 excepting that at most one value may be 0. The class with largest value p/t is predicted, where p is the original probability of that class and t is the class's threshold.
features_col	Features column name, as a length-one character vector. The column should be single vector column of numeric values. Usually this column is output by <a href="#">ft_r_formula</a> .
label_col	Label column name. The column should be a numeric column. Usually this column is output by <a href="#">ft_r_formula</a> .
prediction_col	Prediction column name.
probability_col	Column name for predicted class conditional probabilities.
raw_prediction_col	Raw prediction (a.k.a. confidence) column name.
uid	A character string used to uniquely identify the ML estimator.
...	Optional arguments; see Details.
response	(Deprecated) The name of the response column (as a length-one character vector.)
features	(Deprecated) The name of features (terms) to use for the model fit.

## Details

When `x` is a `tbl_spark` and `formula` (alternatively, `response` and `features`) is specified, the function returns a `ml_model` object wrapping a `ml_pipeline_model` which contains data pre-processing transformers, the ML predictor, and, for classification models, a post-processing transformer that converts predictions into class labels. For classification, an optional argument `predicted_label_col` (defaults to "predicted\_label") can be used to specify the name of the predicted label column. In addition to the fitted `ml_pipeline_model`, `ml_model` objects also contain a `ml_pipeline` object where the ML predictor stage is an estimator ready to be fit against data. This is utilized by [ml\\_save](#) with `type = "pipeline"` to facilitate model refresh workflows.

`ml_multilayer_perceptron()` is an alias for `ml_multilayer_perceptron_classifier()` for backwards compatibility.

**Value**

The object returned depends on the class of x.

- spark\_connection: When x is a spark\_connection, the function returns an instance of a ml\_estimator object. The object contains a pointer to a Spark Predictor object and can be used to compose Pipeline objects.
- ml\_pipeline: When x is a ml\_pipeline, the function returns a ml\_pipeline with the predictor appended to the pipeline.
- tbl\_spark: When x is a tbl\_spark, a predictor is constructed then immediately fit with the input tbl\_spark, returning a prediction model.
- tbl\_spark, with formula: specified When formula is specified, the input tbl\_spark is first transformed using a RFormula transformer before being fit by the predictor. The object returned in this case is a ml\_model which is a wrapper of a ml\_pipeline\_model.

**See Also**

See <http://spark.apache.org/docs/latest/ml-classification-regression.html> for more information on the set of supervised learning algorithms.

Other ml algorithms: ml\_aft\_survival\_regression(), ml\_decision\_tree\_classifier(), ml\_gbt\_classifier(), ml\_generalized\_linear\_regression(), ml\_isotonic\_regression(), ml\_linear\_regression(), ml\_linear\_svc(), ml\_logistic\_regression(), ml\_naive\_bayes(), ml\_one\_vs\_rest(), ml\_random\_forest\_classifier()

**Examples**

```
## Not run:
sc <- spark_connect(master = "local")

iris_tbl <- sdf_copy_to(sc, iris, name = "iris_tbl", overwrite = TRUE)
partitions <- iris_tbl %>%
  sdf_random_split(training = 0.7, test = 0.3, seed = 1111)

iris_training <- partitions$training
iris_test <- partitions$test

mlp_model <- iris_training %>%
  ml_multilayer_perceptron_classifier(Species ~ ., layers = c(4, 3, 3))

pred <- ml_predict(mlp_model, iris_test)

ml_multiclass_classification_evaluator(pred)

## End(Not run)
```

---

```
ml_multilayer_perceptron_tidiers
    Tidying methods for Spark ML MLP
```

---

### Description

These methods summarize the results of Spark ML models into tidy forms.

### Usage

```
## S3 method for class 'ml_model_multilayer_perceptron_classification'
tidy(x, ...)

## S3 method for class 'ml_model_multilayer_perceptron_classification'
augment(x, newdata = NULL, ...)

## S3 method for class 'ml_model_multilayer_perceptron_classification'
glance(x, ...)
```

### Arguments

x	a Spark ML model.
...	extra arguments (not used.)
newdata	a tbl_spark of new data to use for prediction.

---

```
ml_naive_bayes    Spark ML – Naive-Bayes
```

---

### Description

Naive Bayes Classifiers. It supports Multinomial NB (see [here](#)) which can handle finitely supported discrete data. For example, by converting documents into TF-IDF vectors, it can be used for document classification. By making every vector a binary (0/1) data, it can also be used as Bernoulli NB (see [here](#)). The input feature values must be nonnegative.

### Usage

```
ml_naive_bayes(
  x,
  formula = NULL,
  model_type = "multinomial",
  smoothing = 1,
  thresholds = NULL,
  weight_col = NULL,
  features_col = "features",
```

```

    label_col = "label",
    prediction_col = "prediction",
    probability_col = "probability",
    raw_prediction_col = "rawPrediction",
    uid = random_string("naive_bayes_"),
    ...
  )

```

### Arguments

x	A spark_connection, ml_pipeline, or a tbl_spark.
formula	Used when x is a tbl_spark. R formula as a character string or a formula. This is used to transform the input dataframe before fitting, see <a href="#">ft_r_formula</a> for details.
model_type	The model type. Supported options: "multinomial" and "bernoulli". (default = multinomial)
smoothing	The (Laplace) smoothing parameter. Defaults to 1.
thresholds	Thresholds in multi-class classification to adjust the probability of predicting each class. Array must have length equal to the number of classes, with values > 0 excepting that at most one value may be 0. The class with largest value p/t is predicted, where p is the original probability of that class and t is the class's threshold.
weight_col	(Spark 2.1.0+) Weight column name. If this is not set or empty, we treat all instance weights as 1.0.
features_col	Features column name, as a length-one character vector. The column should be single vector column of numeric values. Usually this column is output by <a href="#">ft_r_formula</a> .
label_col	Label column name. The column should be a numeric column. Usually this column is output by <a href="#">ft_r_formula</a> .
prediction_col	Prediction column name.
probability_col	Column name for predicted class conditional probabilities.
raw_prediction_col	Raw prediction (a.k.a. confidence) column name.
uid	A character string used to uniquely identify the ML estimator.
...	Optional arguments; see Details.

### Details

When x is a tbl\_spark and formula (alternatively, response and features) is specified, the function returns a ml\_model object wrapping a ml\_pipeline\_model which contains data pre-processing transformers, the ML predictor, and, for classification models, a post-processing transformer that converts predictions into class labels. For classification, an optional argument predicted\_label\_col (defaults to "predicted\_label") can be used to specify the name of the predicted label column. In addition to the fitted ml\_pipeline\_model, ml\_model objects also contain a ml\_pipeline object where the ML predictor stage is an estimator ready to be fit against data. This is utilized by [ml\\_save](#) with type = "pipeline" to facilitate model refresh workflows.



## Value

The object returned depends on the class of x.

- `spark_connection`: When x is a `spark_connection`, the function returns an instance of a `ml_estimator` object. The object contains a pointer to a Spark Predictor object and can be used to compose Pipeline objects.
- `ml_pipeline`: When x is a `ml_pipeline`, the function returns a `ml_pipeline` with the predictor appended to the pipeline.
- `tbl_spark`: When x is a `tbl_spark`, a predictor is constructed then immediately fit with the input `tbl_spark`, returning a prediction model.
- `tbl_spark`, with `formula`: specified When `formula` is specified, the input `tbl_spark` is first transformed using a `RFormula` transformer before being fit by the predictor. The object returned in this case is a `ml_model` which is a wrapper of a `ml_pipeline_model`.

## See Also

See <http://spark.apache.org/docs/latest/ml-classification-regression.html> for more information on the set of supervised learning algorithms.

Other ml algorithms: `ml_aft_survival_regression()`, `ml_decision_tree_classifier()`, `ml_gbt_classifier()`, `ml_generalized_linear_regression()`, `ml_isotonic_regression()`, `ml_linear_regression()`, `ml_linear_svc()`, `ml_logistic_regression()`, `ml_multilayer_perceptron_classifier()`, `ml_one_vs_rest()`, `ml_random_forest_classifier()`

## Examples

```
## Not run:
sc <- spark_connect(master = "local")
iris_tbl <- sdf_copy_to(sc, iris, name = "iris_tbl", overwrite = TRUE)

partitions <- iris_tbl %>%
  sdf_random_split(training = 0.7, test = 0.3, seed = 1111)

iris_training <- partitions$training
iris_test <- partitions$test

nb_model <- iris_training %>%
  ml_naive_bayes(Species ~ .)

pred <- ml_predict(nb_model, iris_test)

ml_multiclass_classification_evaluator(pred)

## End(Not run)
```

---

 ml\_naive\_bayes\_tidiers

*Tidying methods for Spark ML Naive Bayes*


---

### Description

These methods summarize the results of Spark ML models into tidy forms.

### Usage

```
## S3 method for class 'ml_model_naive_bayes'
tidy(x, ...)

## S3 method for class 'ml_model_naive_bayes'
augment(x, newdata = NULL, ...)

## S3 method for class 'ml_model_naive_bayes'
glance(x, ...)
```

### Arguments

x	a Spark ML model.
...	extra arguments (not used.)
newdata	a tbl_spark of new data to use for prediction.

---

 ml\_one\_vs\_rest

*Spark ML – OneVsRest*


---

### Description

Reduction of Multiclass Classification to Binary Classification. Performs reduction using one against all strategy. For a multiclass classification with k classes, train k models (one per class). Each example is scored against all k models and the model with highest score is picked to label the example.

### Usage

```
ml_one_vs_rest(
  x,
  formula = NULL,
  classifier = NULL,
  features_col = "features",
  label_col = "label",
  prediction_col = "prediction",
  uid = random_string("one_vs_rest_"),
  ...
)
```

**Arguments**

x	A spark_connection, ml_pipeline, or a tbl_spark.
formula	Used when x is a tbl_spark. R formula as a character string or a formula. This is used to transform the input dataframe before fitting, see <a href="#">ft_r_formula</a> for details.
classifier	Object of class ml_estimator. Base binary classifier that we reduce multiclass classification into.
features_col	Features column name, as a length-one character vector. The column should be single vector column of numeric values. Usually this column is output by <a href="#">ft_r_formula</a> .
label_col	Label column name. The column should be a numeric column. Usually this column is output by <a href="#">ft_r_formula</a> .
prediction_col	Prediction column name.
uid	A character string used to uniquely identify the ML estimator.
...	Optional arguments; see Details.

**Details**

When x is a tbl\_spark and formula (alternatively, response and features) is specified, the function returns a ml\_model object wrapping a ml\_pipeline\_model which contains data pre-processing transformers, the ML predictor, and, for classification models, a post-processing transformer that converts predictions into class labels. For classification, an optional argument predicted\_label\_col (defaults to "predicted\_label") can be used to specify the name of the predicted label column. In addition to the fitted ml\_pipeline\_model, ml\_model objects also contain a ml\_pipeline object where the ML predictor stage is an estimator ready to be fit against data. This is utilized by [ml\\_save](#) with type = "pipeline" to facilitate model refresh workflows.

**Value**

The object returned depends on the class of x.

- spark\_connection: When x is a spark\_connection, the function returns an instance of a ml\_estimator object. The object contains a pointer to a Spark Predictor object and can be used to compose Pipeline objects.
- ml\_pipeline: When x is a ml\_pipeline, the function returns a ml\_pipeline with the predictor appended to the pipeline.
- tbl\_spark: When x is a tbl\_spark, a predictor is constructed then immediately fit with the input tbl\_spark, returning a prediction model.
- tbl\_spark, with formula: specified When formula is specified, the input tbl\_spark is first transformed using a RFormula transformer before being fit by the predictor. The object returned in this case is a ml\_model which is a wrapper of a ml\_pipeline\_model.

**See Also**

See <http://spark.apache.org/docs/latest/ml-classification-regression.html> for more information on the set of supervised learning algorithms.

Other ml algorithms: `ml_aft_survival_regression()`, `ml_decision_tree_classifier()`, `ml_gbt_classifier()`, `ml_generalized_linear_regression()`, `ml_isotonic_regression()`, `ml_linear_regression()`, `ml_linear_svc()`, `ml_logistic_regression()`, `ml_multilayer_perceptron_classifier()`, `ml_naive_bayes()`, `ml_random_forest_classifier()`

---

ml\_pca\_tidiers

*Tidying methods for Spark ML Principal Component Analysis*


---

**Description**

These methods summarize the results of Spark ML models into tidy forms.

**Usage**

```
## S3 method for class 'ml_model_pca'
tidy(x, ...)
```

```
## S3 method for class 'ml_model_pca'
augment(x, newdata = NULL, ...)
```

```
## S3 method for class 'ml_model_pca'
glance(x, ...)
```

**Arguments**

x	a Spark ML model.
...	extra arguments (not used.)
newdata	a <code>tbl_spark</code> of new data to use for prediction.

---

ml\_pipeline

*Spark ML – Pipelines*


---

**Description**

Create Spark ML Pipelines

**Usage**

```
ml_pipeline(x, ..., uid = random_string("pipeline_"))
```

**Arguments**

x	Either a spark_connection or ml_pipeline_stage objects
...	ml_pipeline_stage objects.
uid	A character string used to uniquely identify the ML estimator.

**Value**

When x is a spark\_connection, ml\_pipeline() returns an empty pipeline object. When x is a ml\_pipeline\_stage, ml\_pipeline() returns an ml\_pipeline with the stages set to x and any transformers or estimators given in ....

---

ml\_random\_forest\_classifier  
*Spark ML – Random Forest*

---

**Description**

Perform classification and regression using random forests.

**Usage**

```
ml_random_forest_classifier(
  x,
  formula = NULL,
  num_trees = 20,
  subsampling_rate = 1,
  max_depth = 5,
  min_instances_per_node = 1,
  feature_subset_strategy = "auto",
  impurity = "gini",
  min_info_gain = 0,
  max_bins = 32,
  seed = NULL,
  thresholds = NULL,
  checkpoint_interval = 10,
  cache_node_ids = FALSE,
  max_memory_in_mb = 256,
  features_col = "features",
  label_col = "label",
  prediction_col = "prediction",
  probability_col = "probability",
  raw_prediction_col = "rawPrediction",
  uid = random_string("random_forest_classifier_"),
  ...
)
```

```
ml_random_forest(  
  x,  
  formula = NULL,  
  type = c("auto", "regression", "classification"),  
  features_col = "features",  
  label_col = "label",  
  prediction_col = "prediction",  
  probability_col = "probability",  
  raw_prediction_col = "rawPrediction",  
  feature_subset_strategy = "auto",  
  impurity = "auto",  
  checkpoint_interval = 10,  
  max_bins = 32,  
  max_depth = 5,  
  num_trees = 20,  
  min_info_gain = 0,  
  min_instances_per_node = 1,  
  subsampling_rate = 1,  
  seed = NULL,  
  thresholds = NULL,  
  cache_node_ids = FALSE,  
  max_memory_in_mb = 256,  
  uid = random_string("random_forest_"),  
  response = NULL,  
  features = NULL,  
  ...  
)  
  
ml_random_forest_regressor(  
  x,  
  formula = NULL,  
  num_trees = 20,  
  subsampling_rate = 1,  
  max_depth = 5,  
  min_instances_per_node = 1,  
  feature_subset_strategy = "auto",  
  impurity = "variance",  
  min_info_gain = 0,  
  max_bins = 32,  
  seed = NULL,  
  checkpoint_interval = 10,  
  cache_node_ids = FALSE,  
  max_memory_in_mb = 256,  
  features_col = "features",  
  label_col = "label",  
  prediction_col = "prediction",  
  uid = random_string("random_forest_regressor_"),  
  ...  
)
```

)

**Arguments**

x	A spark_connection, ml_pipeline, or a tbl_spark.
formula	Used when x is a tbl_spark. R formula as a character string or a formula. This is used to transform the input dataframe before fitting, see <a href="#">ft_r_formula</a> for details.
num_trees	Number of trees to train ( $\geq 1$ ). If 1, then no bootstrapping is used. If $> 1$ , then bootstrapping is done.
subsampling_rate	Fraction of the training data used for learning each decision tree, in range (0, 1]. (default = 1.0)
max_depth	Maximum depth of the tree ( $\geq 0$ ); that is, the maximum number of nodes separating any leaves from the root of the tree.
min_instances_per_node	Minimum number of instances each child must have after split.
feature_subset_strategy	The number of features to consider for splits at each tree node. See details for options.
impurity	Criterion used for information gain calculation. Supported: "entropy" and "gini" (default) for classification and "variance" (default) for regression. For ml_decision_tree, setting "auto" will default to the appropriate criterion based on model type.
min_info_gain	Minimum information gain for a split to be considered at a tree node. Should be $\geq 0$ , defaults to 0.
max_bins	The maximum number of bins used for discretizing continuous features and for choosing how to split on features at each node. More bins give higher granularity.
seed	Seed for random numbers.
thresholds	Thresholds in multi-class classification to adjust the probability of predicting each class. Array must have length equal to the number of classes, with values $> 0$ excepting that at most one value may be 0. The class with largest value $p/t$ is predicted, where $p$ is the original probability of that class and $t$ is the class's threshold.
checkpoint_interval	Set checkpoint interval ( $\geq 1$ ) or disable checkpoint (-1). E.g. 10 means that the cache will get checkpointed every 10 iterations, defaults to 10.
cache_node_ids	If FALSE, the algorithm will pass trees to executors to match instances with nodes. If TRUE, the algorithm will cache node IDs for each instance. Caching can speed up training of deeper trees. Defaults to FALSE.
max_memory_in_mb	Maximum memory in MB allocated to histogram aggregation. If too small, then 1 node will be split per iteration, and its aggregates may exceed this size. Defaults to 256.

features_col	Features column name, as a length-one character vector. The column should be single vector column of numeric values. Usually this column is output by <a href="#">ft_r_formula</a> .
label_col	Label column name. The column should be a numeric column. Usually this column is output by <a href="#">ft_r_formula</a> .
prediction_col	Prediction column name.
probability_col	Column name for predicted class conditional probabilities.
raw_prediction_col	Raw prediction (a.k.a. confidence) column name.
uid	A character string used to uniquely identify the ML estimator.
...	Optional arguments; see Details.
type	The type of model to fit. "regression" treats the response as a continuous variable, while "classification" treats the response as a categorical variable. When "auto" is used, the model type is inferred based on the response variable type – if it is a numeric type, then regression is used; classification otherwise.
response	(Deprecated) The name of the response column (as a length-one character vector.)
features	(Deprecated) The name of features (terms) to use for the model fit.

## Details

When `x` is a `tbl_spark` and `formula` (alternatively, `response` and `features`) is specified, the function returns a `ml_model` object wrapping a `ml_pipeline_model` which contains data pre-processing transformers, the ML predictor, and, for classification models, a post-processing transformer that converts predictions into class labels. For classification, an optional argument `predicted_label_col` (defaults to "predicted\_label") can be used to specify the name of the predicted label column. In addition to the fitted `ml_pipeline_model`, `ml_model` objects also contain a `ml_pipeline` object where the ML predictor stage is an estimator ready to be fit against data. This is utilized by [ml\\_save](#) with `type = "pipeline"` to facilitate model refresh workflows.

The supported options for `feature_subset_strategy` are

- "auto": Choose automatically for task: If `num_trees == 1`, set to "all". If `num_trees > 1` (forest), set to "sqrt" for classification and to "onethird" for regression.
- "all": use all features
- "onethird": use 1/3 of the features
- "sqrt": use use `sqrt(number of features)`
- "log2": use `log2(number of features)`
- "n": when `n` is in the range (0, 1.0], use `n * number of features`. When `n` is in the range (1, number of features), use `n` features. (default = "auto")

`ml_random_forest` is a wrapper around `ml_random_forest_regressor.tbl_spark` and `ml_random_forest_classifier` and calls the appropriate method based on model type.



## Value

The object returned depends on the class of x.

- spark\_connection: When x is a spark\_connection, the function returns an instance of a ml\_estimator object. The object contains a pointer to a Spark Predictor object and can be used to compose Pipeline objects.
- ml\_pipeline: When x is a ml\_pipeline, the function returns a ml\_pipeline with the predictor appended to the pipeline.
- tbl\_spark: When x is a tbl\_spark, a predictor is constructed then immediately fit with the input tbl\_spark, returning a prediction model.
- tbl\_spark, with formula: specified When formula is specified, the input tbl\_spark is first transformed using a RFormula transformer before being fit by the predictor. The object returned in this case is a ml\_model which is a wrapper of a ml\_pipeline\_model.

## See Also

See <http://spark.apache.org/docs/latest/ml-classification-regression.html> for more information on the set of supervised learning algorithms.

Other ml algorithms: `ml_aft_survival_regression()`, `ml_decision_tree_classifier()`, `ml_gbt_classifier()`, `ml_generalized_linear_regression()`, `ml_isotonic_regression()`, `ml_linear_regression()`, `ml_linear_svc()`, `ml_logistic_regression()`, `ml_multilayer_perceptron_classifier()`, `ml_naive_bayes()`, `ml_one_vs_rest()`

## Examples

```
## Not run:
sc <- spark_connect(master = "local")
iris_tbl <- sdf_copy_to(sc, iris, name = "iris_tbl", overwrite = TRUE)

partitions <- iris_tbl %>%
  sdf_random_split(training = 0.7, test = 0.3, seed = 1111)

iris_training <- partitions$training
iris_test <- partitions$test

rf_model <- iris_training %>%
  ml_random_forest(Species ~ ., type = "classification")

pred <- ml_predict(rf_model, iris_test)

ml_multiclass_classification_evaluator(pred)

## End(Not run)
```

---

ml_stage	<i>Spark ML – Pipeline stage extraction</i>
----------	---------------------------------------------

---

**Description**

Extraction of stages from a Pipeline or PipelineModel object.

**Usage**

```
ml_stage(x, stage)
```

```
ml_stages(x, stages = NULL)
```

**Arguments**

x	A ml_pipeline or a ml_pipeline_model object
stage	The UID of a stage in the pipeline.
stages	The UIDs of stages in the pipeline as a character vector.

**Value**

For ml\_stage(): The stage specified.

For ml\_stages(): A list of stages. If stages is not set, the function returns all stages of the pipeline in a list.

---

ml_summary	<i>Spark ML – Extraction of summary metrics</i>
------------	-------------------------------------------------

---

**Description**

Extracts a metric from the summary object of a Spark ML model.

**Usage**

```
ml_summary(x, metric = NULL, allow_null = FALSE)
```

**Arguments**

x	A Spark ML model that has a summary.
metric	The name of the metric to extract. If not set, returns the summary object.
allow_null	Whether null results are allowed when the metric is not found in the summary.

---

`ml_survival_regression_tidiers`*Tidying methods for Spark ML Survival Regression*

---

**Description**

These methods summarize the results of Spark ML models into tidy forms.

**Usage**

```
## S3 method for class 'ml_model_aft_survival_regression'  
tidy(x, ...)
```

```
## S3 method for class 'ml_model_aft_survival_regression'  
augment(x, newdata = NULL, ...)
```

```
## S3 method for class 'ml_model_aft_survival_regression'  
glance(x, ...)
```

**Arguments**

<code>x</code>	a Spark ML model.
<code>...</code>	extra arguments (not used.)
<code>newdata</code>	a <code>tbl_spark</code> of new data to use for prediction.

---

`ml_tree_tidiers`*Tidying methods for Spark ML tree models*

---

**Description**

These methods summarize the results of Spark ML models into tidy forms.

**Usage**

```
## S3 method for class 'ml_model_decision_tree_classification'  
tidy(x, ...)
```

```
## S3 method for class 'ml_model_decision_tree_regression'  
tidy(x, ...)
```

```
## S3 method for class 'ml_model_decision_tree_classification'  
augment(x, newdata = NULL, ...)
```

```
## S3 method for class 'ml_model_decision_tree_regression'  
augment(x, newdata = NULL, ...)
```

```
## S3 method for class 'ml_model_decision_tree_classification'  
glance(x, ...)  
  
## S3 method for class 'ml_model_decision_tree_regression'  
glance(x, ...)  
  
## S3 method for class 'ml_model_random_forest_classification'  
tidy(x, ...)  
  
## S3 method for class 'ml_model_random_forest_regression'  
tidy(x, ...)  
  
## S3 method for class 'ml_model_random_forest_classification'  
augment(x, newdata = NULL, ...)  
  
## S3 method for class 'ml_model_random_forest_regression'  
augment(x, newdata = NULL, ...)  
  
## S3 method for class 'ml_model_random_forest_classification'  
glance(x, ...)  
  
## S3 method for class 'ml_model_random_forest_regression'  
glance(x, ...)  
  
## S3 method for class 'ml_model_gbt_classification'  
tidy(x, ...)  
  
## S3 method for class 'ml_model_gbt_regression'  
tidy(x, ...)  
  
## S3 method for class 'ml_model_gbt_classification'  
augment(x, newdata = NULL, ...)  
  
## S3 method for class 'ml_model_gbt_regression'  
augment(x, newdata = NULL, ...)  
  
## S3 method for class 'ml_model_gbt_classification'  
glance(x, ...)  
  
## S3 method for class 'ml_model_gbt_regression'  
glance(x, ...)
```

### Arguments

x	a Spark ML model.
...	extra arguments (not used.)
newdata	a tbl_spark of new data to use for prediction.

---

`ml_uid`*Spark ML – UID*

---

**Description**

Extracts the UID of an ML object.

**Usage**

```
ml_uid(x)
```

**Arguments**

`x` A Spark ML object

---

`ml_unsupervised_tidiers`*Tidying methods for Spark ML unsupervised models*

---

**Description**

These methods summarize the results of Spark ML models into tidy forms.

**Usage**

```
## S3 method for class 'ml_model_kmeans'  
tidy(x, ...)
```

```
## S3 method for class 'ml_model_kmeans'  
augment(x, newdata = NULL, ...)
```

```
## S3 method for class 'ml_model_kmeans'  
glance(x, ...)
```

```
## S3 method for class 'ml_model_bisecting_kmeans'  
tidy(x, ...)
```

```
## S3 method for class 'ml_model_bisecting_kmeans'  
augment(x, newdata = NULL, ...)
```

```
## S3 method for class 'ml_model_bisecting_kmeans'  
glance(x, ...)
```

```
## S3 method for class 'ml_model_gaussian_mixture'  
tidy(x, ...)
```

```
## S3 method for class 'ml_model_gaussian_mixture'
augment(x, newdata = NULL, ...)

## S3 method for class 'ml_model_gaussian_mixture'
glance(x, ...)
```

### Arguments

x	a Spark ML model.
...	extra arguments (not used.)
newdata	a tbl_spark of new data to use for prediction.

---

na.replace	<i>Replace Missing Values in Objects</i>
------------	------------------------------------------

---

### Description

This S3 generic provides an interface for replacing [NA](#) values within an object.

### Usage

```
na.replace(object, ...)
```

### Arguments

object	An R object.
...	Arguments passed along to implementing methods.

---

nest	<i>Nest</i>
------	-------------

---

### Description

See [nest](#) for more details.

---

pivot_longer	<i>Pivot longer</i>
--------------	---------------------

---

### Description

See [pivot\\_longer](#) for more details.

---

pivot_wider	<i>Pivot wider</i>
-------------	--------------------

---

**Description**

See [pivot\\_wider](#) for more details.

---

random_string	<i>Random string generation</i>
---------------	---------------------------------

---

**Description**

Generate a random string with a given prefix.

**Usage**

```
random_string(prefix = "table")
```

**Arguments**

prefix	A length-one character vector.
--------	--------------------------------

---

reactiveSpark	<i>Reactive spark reader</i>
---------------	------------------------------

---

**Description**

Given a spark object, returns a reactive data source for the contents of the spark object. This function is most useful to read Spark streams.

**Usage**

```
reactiveSpark(x, intervalMillis = 1000, session = NULL)
```

**Arguments**

x	An object coercable to a Spark DataFrame.
intervalMillis	Approximate number of milliseconds to wait to retrieve updated data frame. This can be a numeric value, or a function that returns a numeric value.
session	The user session to associate this file reader with, or NULL if none. If non-null, the reader will automatically stop when the session ends.

---

registerDoSpark	<i>Register a Parallel Backend</i>
-----------------	------------------------------------

---

**Description**

Registers a parallel backend using the foreach package.

**Usage**

```
registerDoSpark(spark_conn, parallelism = NULL, ...)
```

**Arguments**

spark_conn	Spark connection to use
parallelism	Level of parallelism to use for task execution (if unspecified, then it will take the value of 'SparkContext.defaultParallelism()' which by default is the number of cores available to the 'sparklyr' application)
...	additional options for sparklyr parallel backend (currently only the only valid option is nocompile = T, F)

**Value**

None

**Examples**

```
## Not run:

sc <- spark_connect(master = "local")
registerDoSpark(sc, nocompile = FALSE)

## End(Not run)
```

---

register_extension	<i>Register a Package that Implements a Spark Extension</i>
--------------------	-------------------------------------------------------------

---

**Description**

Registering an extension package will result in the package being automatically scanned for spark dependencies when a connection to Spark is created.

**Usage**

```
register_extension(package)

registered_extensions()
```



**Arguments**

package            The package(s) to register.

**Note**

Packages should typically register their extensions in their `.onLoad` hook – this ensures that their extensions are registered when their namespaces are loaded.

---

right_join	<i>Right join</i>
------------	-------------------

---

**Description**

See [right\\_join](#) for more details.

---

sdf-saveload	<i>Save / Load a Spark DataFrame</i>
--------------	--------------------------------------

---

**Description**

Routines for saving and loading Spark DataFrames.

**Usage**

```
sdf_save_table(x, name, overwrite = FALSE, append = FALSE)
```

```
sdf_load_table(sc, name)
```

```
sdf_save_parquet(x, path, overwrite = FALSE, append = FALSE)
```

```
sdf_load_parquet(sc, path)
```

**Arguments**

x                    A `spark_connection`, `ml_pipeline`, or a `tbl_spark`.

name                The table name to assign to the saved Spark DataFrame.

overwrite          Boolean; overwrite a pre-existing table of the same name?

append             Boolean; append to a pre-existing table of the same name?

sc                  A `spark_connection` object.

path                The path where the Spark DataFrame should be saved.

---

sdf-transform-methods *Spark ML – Transform, fit, and predict methods (sdf\_ interface)*

---

### Description

Deprecated methods for transformation, fit, and prediction. These are mirrors of the corresponding [ml-transform-methods](#).

### Usage

```
sdf_predict(x, model, ...)
sdf_transform(x, transformer, ...)
sdf_fit(x, estimator, ...)
sdf_fit_and_transform(x, estimator, ...)
```

### Arguments

x	A tbl_spark.
model	A ml_transformer or a ml_model object.
...	Optional arguments passed to the corresponding ml_ methods.
transformer	A ml_transformer object.
estimator	A ml_estimator object.

### Value

sdf\_predict(), sdf\_transform(), and sdf\_fit\_and\_transform() return a transformed dataframe whereas sdf\_fit() returns a ml\_transformer.

---

sdf\_along *Create DataFrame for along Object*

---

### Description

Creates a DataFrame along the given object.

### Usage

```
sdf_along(sc, along, repartition = NULL, type = c("integer", "integer64"))
```

**Arguments**

sc	The associated Spark connection.
along	Takes the length from the length of this argument.
repartition	The number of partitions to use when distributing the data across the Spark cluster.
type	The data type to use for the index, either "integer" or "integer64".

sdf\_bind

*Bind multiple Spark DataFrames by row and column***Description**

sdf\_bind\_rows() and sdf\_bind\_cols() are implementation of the common pattern of do.call(rbind,sdfs) or do.call(cbind,sdfs) for binding many Spark DataFrames into one.

**Usage**

```
sdf_bind_rows(..., id = NULL)
```

```
sdf_bind_cols(...)
```

**Arguments**

...	Spark tbls to combine. Each argument can either be a Spark DataFrame or a list of Spark DataFrames When row-binding, columns are matched by name, and any missing columns with be filled with NA. When column-binding, rows are matched by position, so all data frames must have the same number of rows.
id	Data frame identifier. When id is supplied, a new column of identifiers is created to link each row to its original Spark DataFrame. The labels are taken from the named arguments to sdf_bind_rows(). When a list of Spark DataFrames is supplied, the labels are taken from the names of the list. If no names are found a numeric sequence is used instead.

**Details**

The output of sdf\_bind\_rows() will contain a column if that column appears in any of the inputs.

**Value**

sdf\_bind\_rows() and sdf\_bind\_cols() return tbl\_spark

---

sdf_broadcast	<i>Broadcast hint</i>
---------------	-----------------------

---

**Description**

Used to force broadcast hash joins.

**Usage**

```
sdf_broadcast(x)
```

**Arguments**

x	A spark_connection, ml_pipeline, or a tbl_spark.
---	--------------------------------------------------

---

sdf_checkpoint	<i>Checkpoint a Spark DataFrame</i>
----------------	-------------------------------------

---

**Description**

Checkpoint a Spark DataFrame

**Usage**

```
sdf_checkpoint(x, eager = TRUE)
```

**Arguments**

x	an object coercible to a Spark DataFrame
eager	whether to truncate the lineage of the DataFrame

---

sdf_coalesce	<i>Coalesces a Spark DataFrame</i>
--------------	------------------------------------

---

**Description**

Coalesces a Spark DataFrame

**Usage**

```
sdf_coalesce(x, partitions)
```

**Arguments**

x	A spark_connection, ml_pipeline, or a tbl_spark.
partitions	number of partitions

---

sdf_collect	<i>Collect a Spark DataFrame into R.</i>
-------------	------------------------------------------

---

**Description**

Collects a Spark dataframe into R.

**Usage**

```
sdf_collect(object, impl = c("row-wise", "row-wise-iter", "column-wise"), ...)
```

**Arguments**

object	Spark dataframe to collect
impl	Which implementation to use while collecting Spark dataframe - row-wise: fetch the entire dataframe into memory and then process it row-by-row - row-wise-iter: iterate through the dataframe using RDD local iterator, processing one row at a time (hence reducing memory footprint) - column-wise: fetch the entire dataframe into memory and then process it column-by-column NOTE: (1) this will not apply to streaming or arrow use cases (2) this parameter will only affect implementation detail, and will not affect result of 'sdf_collect', and should only be set if performance profiling indicates any particular choice will be significantly better than the default choice ("row-wise")
...	Additional options.

---

sdf_copy_to	<i>Copy an Object into Spark</i>
-------------	----------------------------------

---

**Description**

Copy an object into Spark, and return an R object wrapping the copied object (typically, a Spark DataFrame).

**Usage**

```
sdf_copy_to(sc, x, name, memory, repartition, overwrite, struct_columns, ...)
```

```
sdf_import(x, sc, name, memory, repartition, overwrite, struct_columns, ...)
```

**Arguments**

sc	The associated Spark connection.
x	An R object from which a Spark DataFrame can be generated.
name	The name to assign to the copied table in Spark.
memory	Boolean; should the table be cached into memory?
repartition	The number of partitions to use when distributing the table across the Spark cluster. The default (0) can be used to avoid partitioning.
overwrite	Boolean; overwrite a pre-existing table with the name name if one already exists?
struct_columns	(only supported with Spark 2.4.0 or higher) A list of columns from the source data frame that should be converted to Spark SQL StructType columns. The source columns can contain either json strings or nested lists. All rows within each source column should have identical schemas (because otherwise the conversion result will contain unexpected null values or missing values as Spark currently does not support schema discovery on individual rows within a struct column).
...	Optional arguments, passed to implementing methods.

**Advanced Usage**

sdf\_copy\_to is an S3 generic that, by default, dispatches to sdf\_import. Package authors that would like to implement sdf\_copy\_to for a custom object type can accomplish this by implementing the associated method on sdf\_import.

**See Also**

Other Spark data frames: [sdf\\_random\\_split\(\)](#), [sdf\\_register\(\)](#), [sdf\\_sample\(\)](#), [sdf\\_sort\(\)](#), [sdf\\_weighted\\_sample\(\)](#)

**Examples**

```
## Not run:
sc <- spark_connect(master = "spark://HOST:PORT")
sdf_copy_to(sc, iris)

## End(Not run)
```

---

sdf\_crosstab

*Cross Tabulation*


---

**Description**

Builds a contingency table at each combination of factor levels.

**Usage**

```
sdf_crosstab(x, col1, col2)
```

**Arguments**

x	A Spark DataFrame
col1	The name of the first column. Distinct items will make the first item of each row.
col2	The name of the second column. Distinct items will make the column names of the DataFrame.

**Value**

A DataFrame containing the contingency table.

---

sdf_debug_string	<i>Debug Info for Spark DataFrame</i>
------------------	---------------------------------------

---

**Description**

Prints plan of execution to generate x. This plan will, among other things, show the number of partitions in parenthesis at the far left and indicate stages using indentation.

**Usage**

```
sdf_debug_string(x, print = TRUE)
```

**Arguments**

x	An R object wrapping, or containing, a Spark DataFrame.
print	Print debug information?

---

sdf_describe	<i>Compute summary statistics for columns of a data frame</i>
--------------	---------------------------------------------------------------

---

**Description**

Compute summary statistics for columns of a data frame

**Usage**

```
sdf_describe(x, cols = colnames(x))
```

**Arguments**

x	An object coercible to a Spark DataFrame
cols	Columns to compute statistics for, given as a character vector

---

sdf_dim	<i>Support for Dimension Operations</i>
---------	-----------------------------------------

---

**Description**

sdf\_dim(), sdf\_nrow() and sdf\_ncol() provide similar functionality to dim(), nrow() and ncol().

**Usage**

```
sdf_dim(x)
```

```
sdf_nrow(x)
```

```
sdf_ncol(x)
```

**Arguments**

x                    An object (usually a spark\_tbl).

---

sdf_drop_duplicates	<i>Remove duplicates from a Spark DataFrame</i>
---------------------	-------------------------------------------------

---

**Description**

Remove duplicates from a Spark DataFrame

**Usage**

```
sdf_drop_duplicates(x, cols = NULL)
```

**Arguments**

x                    An object coercible to a Spark DataFrame

cols                Subset of Columns to consider, given as a character vector



---

sdf_expand_grid	<i>Create a Spark dataframe containing all combinations of inputs</i>
-----------------	-----------------------------------------------------------------------

---

## Description

Given one or more R vectors/factors or single-column Spark dataframes, perform an `expand.grid` operation on all of them and store the result in a Spark dataframe

## Usage

```
sdf_expand_grid(  
  sc,  
  ...,  
  broadcast_vars = NULL,  
  memory = TRUE,  
  repartition = NULL,  
  partition_by = NULL  
)
```

## Arguments

<code>sc</code>	The associated Spark connection.
<code>...</code>	Each input variable can be either a R vector/factor or a Spark dataframe. Unnamed inputs will assume the default names of 'Var1', 'Var2', etc in the result, similar to what 'expand.grid' does for unnamed inputs.
<code>broadcast_vars</code>	Indicates which input(s) should be broadcasted to all nodes of the Spark cluster during the join process (default: none).
<code>memory</code>	Boolean; whether the resulting Spark dataframe should be cached into memory (default: TRUE)
<code>repartition</code>	Number of partitions the resulting Spark dataframe should have
<code>partition_by</code>	Vector of column names used for partitioning the resulting Spark dataframe, only supported for Spark 2.0+

## Examples

```
## Not run:  
sc <- spark_connect(master = "local")  
grid_sdf <- sdf_expand_grid(sc, seq(5), rnorm(10), letters)  
  
## End(Not run)
```

---

sdf_from_avro	<i>Convert column(s) from avro format</i>
---------------	-------------------------------------------

---

**Description**

Convert column(s) from avro format

**Usage**

```
sdf_from_avro(x, cols)
```

**Arguments**

x	An object coercible to a Spark DataFrame
cols	Named list of columns to transform from Avro format plus a valid Avro schema string for each column, where column names are keys and column schema strings are values (e.g., c(example_primitive_col = "string", example_complex_col = "{ \"type\": \"record\", \"name\": \"person\", \"fields\": [ { \"name\": \"person_name\", \"

---

sdf_is_streaming	<i>Spark DataFrame is Streaming</i>
------------------	-------------------------------------

---

**Description**

Is the given Spark DataFrame a streaming data?

**Usage**

```
sdf_is_streaming(x)
```

**Arguments**

x	A spark_connection, ml_pipeline, or a tbl_spark.
---	--------------------------------------------------

---

sdf_last_index	Returns the last index of a Spark DataFrame
----------------	---------------------------------------------

---

### Description

Returns the last index of a Spark DataFrame. The Spark `mapPartitionsWithIndex` function is used to iterate through the last nonempty partition of the RDD to find the last record.

### Usage

```
sdf_last_index(x, id = "id")
```

### Arguments

x	A spark_connection, ml_pipeline, or a tbl_spark.
id	The name of the index column.

---

sdf_len	Create DataFrame for Length
---------	-----------------------------

---

### Description

Creates a DataFrame for the given length.

### Usage

```
sdf_len(sc, length, repartition = NULL, type = c("integer", "integer64"))
```

### Arguments

sc	The associated Spark connection.
length	The desired length of the sequence.
repartition	The number of partitions to use when distributing the data across the Spark cluster.
type	The data type to use for the index, either "integer" or "integer64".

---

sdf\_num\_partitions      *Gets number of partitions of a Spark DataFrame*

---

**Description**

Gets number of partitions of a Spark DataFrame

**Usage**

```
sdf_num_partitions(x)
```

**Arguments**

x                      A spark\_connection, ml\_pipeline, or a tbl\_spark.

---

sdf\_partition\_sizes      *Compute the number of records within each partition of a Spark DataFrame*

---

**Description**

Compute the number of records within each partition of a Spark DataFrame

**Usage**

```
sdf_partition_sizes(x)
```

**Arguments**

x                      A spark\_connection, ml\_pipeline, or a tbl\_spark.

**Examples**

```
## Not run:
library(sparklyr)
sc <- spark_connect(master = "spark://HOST:PORT")
example_sdf <- sdf_len(sc, 100L, repartition = 10L)
example_sdf %>% sdf_partition_sizes() %>% print()

## End(Not run)
```

---

sdf_persist	<i>Persist a Spark DataFrame</i>
-------------	----------------------------------

---

### Description

Persist a Spark DataFrame, forcing any pending computations and (optionally) serializing the results to disk.

### Usage

```
sdf_persist(x, storage.level = "MEMORY_AND_DISK")
```

### Arguments

x	A spark_connection, ml_pipeline, or a tbl_spark.
storage.level	The storage level to be used. Please view the <a href="#">Spark Documentation</a> for information on what storage levels are accepted.

### Details

Spark DataFrames invoke their operations lazily – pending operations are deferred until their results are actually needed. Persisting a Spark DataFrame effectively ‘forces’ any pending computations, and then persists the generated Spark DataFrame as requested (to memory, to disk, or otherwise).

Users of Spark should be careful to persist the results of any computations which are non-deterministic – otherwise, one might see that the values within a column seem to ‘change’ as new operations are performed on that data set.

---

sdf_pivot	<i>Pivot a Spark DataFrame</i>
-----------	--------------------------------

---

### Description

Construct a pivot table over a Spark Dataframe, using a syntax similar to that from `reshape2::dcast`.

### Usage

```
sdf_pivot(x, formula, fun.aggregate = "count")
```

**Arguments**

x	A spark_connection, ml_pipeline, or a tbl_spark.
formula	A two-sided R formula of the form $x_1 + x_2 + \dots \sim y_1$ . The left-hand side of the formula indicates which variables are used for grouping, and the right-hand side indicates which variable is used for pivoting. Currently, only a single pivot column is supported.
fun.aggregate	How should the grouped dataset be aggregated? Can be a length-one character vector, giving the name of a Spark aggregation function to be called; a named R list mapping column names to an aggregation method, or an R function that is invoked on the grouped dataset.

**Examples**

```
## Not run:
library(sparklyr)
library(dplyr)

sc <- spark_connect(master = "local")
iris_tbl <- sdf_copy_to(sc, iris, name = "iris_tbl", overwrite = TRUE)

# aggregating by mean
iris_tbl %>%
  mutate(Petal_Width = ifelse(Petal_Width > 1.5, "High", "Low")) %>%
  sdf_pivot(Petal_Width ~ Species,
    fun.aggregate = list(Petal_Length = "mean")
  )

# aggregating all observations in a list
iris_tbl %>%
  mutate(Petal_Width = ifelse(Petal_Width > 1.5, "High", "Low")) %>%
  sdf_pivot(Petal_Width ~ Species,
    fun.aggregate = list(Petal_Length = "collect_list")
  )

## End(Not run)
```

---

sdf\_project

*Project features onto principal components*


---

**Description**

Project features onto principal components

**Usage**

```
sdf_project(
  object,
  newdata,
  features = dimnames(object$pc)[[1]],
  feature_prefix = NULL,
  ...
)
```

**Arguments**

object	A Spark PCA model object
newdata	An object coercible to a Spark DataFrame
features	A vector of names of columns to be projected
feature_prefix	The prefix used in naming the output features
...	Optional arguments; currently unused.

**Transforming Spark DataFrames**

The family of functions prefixed with `sdf_` generally access the Scala Spark DataFrame API directly, as opposed to the `dplyr` interface which uses Spark SQL. These functions will 'force' any pending SQL in a `dplyr` pipeline, such that the resulting `tbl_spark` object returned will no longer have the attached 'lazy' SQL operations. Note that the underlying Spark DataFrame *does* execute its operations lazily, so that even though the pending set of operations (currently) are not exposed at the R level, these operations will only be executed when you explicitly `collect()` the table.

---

sdf\_quantile

---

*Compute (Approximate) Quantiles with a Spark DataFrame*


---

**Description**

Given a numeric column within a Spark DataFrame, compute approximate quantiles (to some relative error).

**Usage**

```
sdf_quantile(
  x,
  column,
  probabilities = c(0, 0.25, 0.5, 0.75, 1),
  relative.error = 1e-05
)
```

**Arguments**

x	A spark_connection, ml_pipeline, or a tbl_spark.
column	The column(s) for which quantiles should be computed. Multiple columns are only supported in Spark 2.0+.
probabilities	A numeric vector of probabilities, for which quantiles should be computed.
relative.error	The relative error – lower values imply more precision in the computed quantiles.

---

sdf\_random\_split      *Partition a Spark Dataframe*

---

**Description**

Partition a Spark DataFrame into multiple groups. This routine is useful for splitting a DataFrame into, for example, training and test datasets.

**Usage**

```
sdf_random_split(
  x,
  ...,
  weights = NULL,
  seed = sample(.Machine$integer.max, 1)
)

sdf_partition(x, ..., weights = NULL, seed = sample(.Machine$integer.max, 1))
```

**Arguments**

x	An object coercable to a Spark DataFrame.
...	Named parameters, mapping table names to weights. The weights will be normalized such that they sum to 1.
weights	An alternate mechanism for supplying weights – when specified, this takes precedence over the ... arguments.
seed	Random seed to use for randomly partitioning the dataset. Set this if you want your partitioning to be reproducible on repeated runs.

**Details**

The sampling weights define the probability that a particular observation will be assigned to a particular partition, not the resulting size of the partition. This implies that partitioning a DataFrame with, for example,

```
sdf_random_split(x, training = 0.5, test = 0.5)
```

is not guaranteed to produce training and test partitions of equal size.



**Value**

An R list of `tbl_sparks`.

**Transforming Spark DataFrames**

The family of functions prefixed with `sdf_` generally access the Scala Spark DataFrame API directly, as opposed to the `dplyr` interface which uses Spark SQL. These functions will 'force' any pending SQL in a `dplyr` pipeline, such that the resulting `tbl_spark` object returned will no longer have the attached 'lazy' SQL operations. Note that the underlying Spark DataFrame *does* execute its operations lazily, so that even though the pending set of operations (currently) are not exposed at the R level, these operations will only be executed when you explicitly `collect()` the table.

**See Also**

Other Spark data frames: `sdf_copy_to()`, `sdf_register()`, `sdf_sample()`, `sdf_sort()`, `sdf_weighted_sample()`

**Examples**

```
## Not run:
# randomly partition data into a 'training' and 'test'
# dataset, with 60% of the observations assigned to the
# 'training' dataset, and 40% assigned to the 'test' dataset
data(diamonds, package = "ggplot2")
diamonds_tbl <- copy_to(sc, diamonds, "diamonds")
partitions <- diamonds_tbl %>%
  sdf_random_split(training = 0.6, test = 0.4)
print(partitions)

# alternate way of specifying weights
weights <- c(training = 0.6, test = 0.4)
diamonds_tbl %>% sdf_random_split(weights = weights)

## End(Not run)
```

---

`sdf_read_column`*Read a Column from a Spark DataFrame*

---

**Description**

Read a single column from a Spark DataFrame, and return the contents of that column back to R.

**Usage**

```
sdf_read_column(x, column)
```

**Arguments**

`x` A `spark_connection`, `ml_pipeline`, or a `tbl_spark`.  
`column` The name of a column within `x`.

**Details**

It is expected for this operation to preserve row order.

---

sdf_register	<i>Register a Spark DataFrame</i>
--------------	-----------------------------------

---

**Description**

Registers a Spark DataFrame (giving it a table name for the Spark SQL context), and returns a `tbl_spark`.

**Usage**

```
sdf_register(x, name = NULL)
```

**Arguments**

<code>x</code>	A Spark DataFrame.
<code>name</code>	A name to assign this table.

**Transforming Spark DataFrames**

The family of functions prefixed with `sdf_` generally access the Scala Spark DataFrame API directly, as opposed to the `dplyr` interface which uses Spark SQL. These functions will 'force' any pending SQL in a `dplyr` pipeline, such that the resulting `tbl_spark` object returned will no longer have the attached 'lazy' SQL operations. Note that the underlying Spark DataFrame *does* execute its operations lazily, so that even though the pending set of operations (currently) are not exposed at the R level, these operations will only be executed when you explicitly `collect()` the table.

**See Also**

Other Spark data frames: [sdf\\_copy\\_to\(\)](#), [sdf\\_random\\_split\(\)](#), [sdf\\_sample\(\)](#), [sdf\\_sort\(\)](#), [sdf\\_weighted\\_sample\(\)](#)

---

sdf_repartition	<i>Repartition a Spark DataFrame</i>
-----------------	--------------------------------------

---

**Description**

Repartition a Spark DataFrame

**Usage**

```
sdf_repartition(x, partitions = NULL, partition_by = NULL)
```

**Arguments**

x	A spark_connection, ml_pipeline, or a tbl_spark.
partitions	number of partitions
partition_by	vector of column names used for partitioning, only supported for Spark 2.0+

---

```
sdf_residuals.ml_model_generalized_linear_regression
```

*Model Residuals*

---

**Description**

This generic method returns a Spark DataFrame with model residuals added as a column to the model training data.

**Usage**

```
## S3 method for class 'ml_model_generalized_linear_regression'
sdf_residuals(
  object,
  type = c("deviance", "pearson", "working", "response"),
  ...
)

## S3 method for class 'ml_model_linear_regression'
sdf_residuals(object, ...)

sdf_residuals(object, ...)
```

**Arguments**

object	Spark ML model object.
type	type of residuals which should be returned.
...	additional arguments

---

```
sdf_sample
```

*Randomly Sample Rows from a Spark DataFrame*

---

**Description**

Draw a random sample of rows (with or without replacement) from a Spark DataFrame.

**Usage**

```
sdf_sample(x, fraction = 1, replacement = TRUE, seed = NULL)
```

**Arguments**

x	An object coercable to a Spark DataFrame.
fraction	The fraction to sample.
replacement	Boolean; sample with replacement?
seed	An (optional) integer seed.

**Transforming Spark DataFrames**

The family of functions prefixed with `sdf_` generally access the Scala Spark DataFrame API directly, as opposed to the `dplyr` interface which uses Spark SQL. These functions will 'force' any pending SQL in a `dplyr` pipeline, such that the resulting `tbl_spark` object returned will no longer have the attached 'lazy' SQL operations. Note that the underlying Spark DataFrame *does* execute its operations lazily, so that even though the pending set of operations (currently) are not exposed at the R level, these operations will only be executed when you explicitly `collect()` the table.

**See Also**

Other Spark data frames: [sdf\\_copy\\_to\(\)](#), [sdf\\_random\\_split\(\)](#), [sdf\\_register\(\)](#), [sdf\\_sort\(\)](#), [sdf\\_weighted\\_sample\(\)](#)

---

sdf\_schema

*Read the Schema of a Spark DataFrame*


---

**Description**

Read the schema of a Spark DataFrame.

**Usage**

```
sdf_schema(x, expand_nested_cols = FALSE)
```

**Arguments**

x	A <code>spark_connection</code> , <code>ml_pipeline</code> , or a <code>tbl_spark</code> .
expand_nested_cols	Whether to expand columns containing nested array of structs (which are usually created by <code>tidyr::nest</code> on a Spark data frame)

**Details**

The type column returned gives the string representation of the underlying Spark type for that column; for example, a vector of numeric values would be returned with the type "DoubleType". Please see the [Spark Scala API Documentation](#) for information on what types are available and exposed by Spark.

**Value**

An R list, with each list element describing the name and type of a column.

---

sdf\_separate\_column     *Separate a Vector Column into Scalar Columns*

---

**Description**

Given a vector column in a Spark DataFrame, split that into *n* separate columns, each column made up of the different elements in the column column.

**Usage**

```
sdf_separate_column(x, column, into = NULL)
```

**Arguments**

<code>x</code>	A spark_connection, ml_pipeline, or a tbl_spark.
<code>column</code>	The name of a (vector-typed) column.
<code>into</code>	A specification of the columns that should be generated from column. This can either be a vector of column names, or an R list mapping column names to the (1-based) index at which a particular vector element should be extracted.

---

sdf\_seq     *Create DataFrame for Range*

---

**Description**

Creates a DataFrame for the given range

**Usage**

```
sdf_seq(
  sc,
  from = 1L,
  to = 1L,
  by = 1L,
  repartition = NULL,
  type = c("integer", "integer64")
)
```

**Arguments**

<code>sc</code>	The associated Spark connection.
<code>from, to</code>	The start and end to use as a range
<code>by</code>	The increment of the sequence.
<code>repartition</code>	The number of partitions to use when distributing the data across the Spark cluster. Defaults to the minimum number of partitions.
<code>type</code>	The data type to use for the index, either "integer" or "integer64".

---

sdf_sort	<i>Sort a Spark DataFrame</i>
----------	-------------------------------

---

**Description**

Sort a Spark DataFrame by one or more columns, with each column sorted in ascending order.

**Usage**

```
sdf_sort(x, columns)
```

**Arguments**

x	An object coercable to a Spark DataFrame.
columns	The column(s) to sort by.

**Transforming Spark DataFrames**

The family of functions prefixed with `sdf_` generally access the Scala Spark DataFrame API directly, as opposed to the `dplyr` interface which uses Spark SQL. These functions will 'force' any pending SQL in a `dplyr` pipeline, such that the resulting `tbl_spark` object returned will no longer have the attached 'lazy' SQL operations. Note that the underlying Spark DataFrame *does* execute its operations lazily, so that even though the pending set of operations (currently) are not exposed at the R level, these operations will only be executed when you explicitly `collect()` the table.

**See Also**

Other Spark data frames: [sdf\\_copy\\_to\(\)](#), [sdf\\_random\\_split\(\)](#), [sdf\\_register\(\)](#), [sdf\\_sample\(\)](#), [sdf\\_weighted\\_sample\(\)](#)

---

sdf_sql	<i>Spark DataFrame from SQL</i>
---------	---------------------------------

---

**Description**

Defines a Spark DataFrame from a SQL query, useful to create Spark DataFrames without collecting the results immediately.

**Usage**

```
sdf_sql(sc, sql)
```

**Arguments**

sc	A <code>spark_connection</code> .
sql	a 'SQL' query used to generate a Spark DataFrame.

---

sdf_to_avro	<i>Convert column(s) to avro format</i>
-------------	-----------------------------------------

---

**Description**

Convert column(s) to avro format

**Usage**

```
sdf_to_avro(x, cols = colnames(x))
```

**Arguments**

x	An object coercible to a Spark DataFrame
cols	Subset of Columns to convert into avro format

---

sdf_unnest_longer	<i>Unnest longer</i>
-------------------	----------------------

---

**Description**

Expand a struct column or an array column within a Spark dataframe into one or more rows, similar what to `tidyr::unnest_longer` does to an R dataframe. An index column, if included, will be 1-based if 'col' is an array column.

**Usage**

```
sdf_unnest_longer(
  data,
  col,
  values_to = NULL,
  indices_to = NULL,
  include_indices = NULL,
  names_repair = "check_unique",
  ptype = list(),
  transform = list()
)
```

**Arguments**

data	The Spark dataframe to be unnested
col	The struct column to extract components from
values_to	Name of column to store vector values. Defaults to 'col'.
indices_to	A string giving the name of column which will contain the inner names or position (if not named) of the values. Defaults to 'col' with '_id' suffix

include_indices	Whether to include an index column. An index column will be included by default if 'col' is a struct column. It will also be included if 'indices_to' is not 'NULL'.
names_repair	Strategy for fixing duplicate column names (the semantic will be exactly identical to that of '.name_repair' option in <a href="#">tibble</a> )
ptype	Optionally, supply an R data frame prototype for the output. Each column of the unnested result will be casted based on the Spark equivalent of the type of the column with the same name within 'ptype', e.g., if 'ptype' has a column 'x' of type 'character', then column 'x' of the unnested result will be casted from its original SQL type to StringType.
transform	Optionally, a named list of transformation functions applied

### Examples

```
## Not run:
library(sparklyr)
sc <- spark_connect(master = "local", version = "2.4.0")

# unnesting a struct column
sdf <- copy_to(
  sc,
  tibble::tibble(
    x = 1:3,
    y = list(list(a = 1, b = 2), list(a = 3, b = 4), list(a = 5, b = 6))
  )
)

unnested <- sdf %>% sdf_unnest_longer(y, indices_to = "attr")

# unnesting an array column
sdf <- copy_to(
  sc,
  tibble::tibble(
    x = 1:3,
    y = list(1:10, 1:5, 1:2)
  )
)

unnested <- sdf %>% sdf_unnest_longer(y, indices_to = "array_idx")

## End(Not run)
```



**Description**

Flatten a struct column within a Spark dataframe into one or more columns, similar what to `tidyr::unnest_wider` does to an R dataframe

**Usage**

```
sdf_unnest_wider(
  data,
  col,
  names_sep = NULL,
  names_repair = "check_unique",
  ptype = list(),
  transform = list()
)
```

**Arguments**

<code>data</code>	The Spark dataframe to be unnested
<code>col</code>	The struct column to extract components from
<code>names_sep</code>	If 'NULL', the default, the names will be left as is. If a string, the inner and outer names will be pasted together using 'names_sep' as the delimiter.
<code>names_repair</code>	Strategy for fixing duplicate column names (the semantic will be exactly identical to that of 'name_repair' option in <a href="#">tibble</a> )
<code>ptype</code>	Optionally, supply an R data frame prototype for the output. Each column of the unnested result will be casted based on the Spark equivalent of the type of the column with the same name within 'ptype', e.g., if 'ptype' has a column 'x' of type 'character', then column 'x' of the unnested result will be casted from its original SQL type to StringType.
<code>transform</code>	Optionally, a named list of transformation functions applied to each component (e.g., <code>list('x = as.character')</code> to cast column 'x' to String).

**Examples**

```
## Not run:
library(sparklyr)
sc <- spark_connect(master = "local", version = "2.4.0")

sdf <- copy_to(
  sc,
  tibble::tibble(
    x = 1:3,
    y = list(list(a = 1, b = 2), list(a = 3, b = 4), list(a = 5, b = 6))
  )
)

# flatten struct column 'y' into two separate columns 'y_a' and 'y_b'
unnested <- sdf %>% sdf_unnest_wider(y, names_sep = "_")
```

```
## End(Not run)
```

---

sdf\_weighted\_sample    *Perform Weighted Random Sampling on a Spark DataFrame*

---

### Description

Draw a random sample of rows (with or without replacement) from a Spark DataFrame. If the sampling is done without replacement, then it will be conceptually equivalent to an iterative process such that in each step the probability of adding a row to the sample set is equal to its weight divided by summation of weights of all rows that are not in the sample set yet in that step.

### Usage

```
sdf_weighted_sample(x, weight_col, k, replacement = TRUE, seed = NULL)
```

### Arguments

x	An object coercable to a Spark DataFrame.
weight_col	Name of the weight column
k	Sample set size
replacement	Whether to sample with replacement
seed	An (optional) integer seed

### Transforming Spark DataFrames

The family of functions prefixed with `sdf_` generally access the Scala Spark DataFrame API directly, as opposed to the `dplyr` interface which uses Spark SQL. These functions will 'force' any pending SQL in a `dplyr` pipeline, such that the resulting `tbl_spark` object returned will no longer have the attached 'lazy' SQL operations. Note that the underlying Spark DataFrame *does* execute its operations lazily, so that even though the pending set of operations (currently) are not exposed at the R level, these operations will only be executed when you explicitly `collect()` the table.

### See Also

Other Spark data frames: [sdf\\_copy\\_to\(\)](#), [sdf\\_random\\_split\(\)](#), [sdf\\_register\(\)](#), [sdf\\_sample\(\)](#), [sdf\\_sort\(\)](#)

---

`sdf_with_sequential_id`*Add a Sequential ID Column to a Spark DataFrame*

---

**Description**

Add a sequential ID column to a Spark DataFrame. The Spark `zipWithIndex` function is used to produce these. This differs from `sdf_with_unique_id` in that the IDs generated are independent of partitioning.

**Usage**

```
sdf_with_sequential_id(x, id = "id", from = 1L)
```

**Arguments**

<code>x</code>	A <code>spark_connection</code> , <code>ml_pipeline</code> , or a <code>tbl_spark</code> .
<code>id</code>	The name of the column to host the generated IDs.
<code>from</code>	The starting value of the id column

---

`sdf_with_unique_id`*Add a Unique ID Column to a Spark DataFrame*

---

**Description**

Add a unique ID column to a Spark DataFrame. The Spark `monotonicallyIncreasingId` function is used to produce these and is guaranteed to produce unique, monotonically increasing ids; however, there is no guarantee that these IDs will be sequential. The table is persisted immediately after the column is generated, to ensure that the column is stable – otherwise, it can differ across new computations.

**Usage**

```
sdf_with_unique_id(x, id = "id")
```

**Arguments**

<code>x</code>	A <code>spark_connection</code> , <code>ml_pipeline</code> , or a <code>tbl_spark</code> .
<code>id</code>	The name of the column to host the generated IDs.

---

separate	<i>Separate</i>
----------	-----------------

---

### Description

See [separate](#) for more details.

---

spark-api	<i>Access the Spark API</i>
-----------	-----------------------------

---

### Description

Access the commonly-used Spark objects associated with a Spark instance. These objects provide access to different facets of the Spark API.

### Usage

```
spark_context(sc)
```

```
java_context(sc)
```

```
hive_context(sc)
```

```
spark_session(sc)
```

### Arguments

sc	A spark_connection.
----	---------------------

### Details

The [Scala API documentation](#) is useful for discovering what methods are available for each of these objects. Use [invoke](#) to call methods on these objects.

### Spark Context

The main entry point for Spark functionality. The **Spark Context** represents the connection to a Spark cluster, and can be used to create RDDs, accumulators and broadcast variables on that cluster.

### Java Spark Context

A Java-friendly version of the aforementioned **Spark Context**.

## Hive Context

An instance of the Spark SQL execution engine that integrates with data stored in Hive. Configuration for Hive is read from `hive-site.xml` on the classpath.

Starting with Spark  $\geq$  2.0.0, the **Hive Context** class has been deprecated – it is superceded by the **Spark Session** class, and `hive_context` will return a **Spark Session** object instead. Note that both classes share a SQL interface, and therefore one can invoke SQL through these objects.

## Spark Session

Available since Spark 2.0.0, the **Spark Session** unifies the **Spark Context** and **Hive Context** classes into a single interface. Its use is recommended over the older APIs for code targeting Spark 2.0.0 and above.

---

spark-connections	<i>Manage Spark Connections</i>
-------------------	---------------------------------

---

## Description

These routines allow you to manage your connections to Spark.

## Usage

```
spark_connect(  
  master,  
  spark_home = Sys.getenv("SPARK_HOME"),  
  method = c("shell", "livy", "databricks", "test", "qubole"),  
  app_name = "sparklyr",  
  version = NULL,  
  config = spark_config(),  
  extensions = sparklyr::registered_extensions(),  
  packages = NULL,  
  scala_version = NULL,  
  ...  
)  
  
spark_connection_is_open(sc)  
  
spark_disconnect(sc, ...)  
  
spark_disconnect_all()  
  
spark_submit(  
  master,  
  file,  
  spark_home = Sys.getenv("SPARK_HOME"),  
  app_name = "sparklyr",
```

```

    version = NULL,
    config = spark_config(),
    extensions = sparklyr::registered_extensions(),
    scala_version = NULL,
    ...
  )

```

## Arguments

master	Spark cluster url to connect to. Use "local" to connect to a local instance of Spark installed via <a href="#">spark_install</a> .
spark_home	The path to a Spark installation. Defaults to the path provided by the SPARK_HOME environment variable. If SPARK_HOME is defined, it will always be used unless the version parameter is specified to force the use of a locally installed version.
method	The method used to connect to Spark. Default connection method is "shell" to connect using spark-submit, use "livy" to perform remote connections using HTTP, or "databricks" when using a Databricks clusters.
app_name	The application name to be used while running in the Spark cluster.
version	The version of Spark to use. Required for "local" Spark connections, optional otherwise.
config	Custom configuration for the generated Spark connection. See <a href="#">spark_config</a> for details.
extensions	Extension R packages to enable for this connection. By default, all packages enabled through the use of <a href="#">sparklyr::register_extension</a> will be passed here.
packages	A list of Spark packages to load. For example, "delta" or "kafka" to enable Delta Lake or Kafka. Also supports full versions like "io.delta:delta-core_2.11:0.4.0". This is similar to adding packages into the sparklyr.shell.packages configuration option. Notice that the version parameter is used to choose the correct package, otherwise assumes the latest version is being used.
scala_version	Load the sparklyr jar file that is built with the version of Scala specified (this currently only makes sense for Spark 2.4, where sparklyr will by default assume Spark 2.4 on current host is built with Scala 2.11, and therefore 'scala_version = '2.12'' is needed if sparklyr is connecting to Spark 2.4 built with Scala 2.12)
...	Optional arguments; currently unused.
sc	A spark_connection.
file	Path to R source file to submit for batch execution.

## Details

By default, when using method = "livy", jars are downloaded from GitHub. But an alternative path (local to Livy server or on HDFS or HTTP(s)) to sparklyr JAR can also be specified through the sparklyr.livy.jar setting.

**Examples**

```
sc <- spark_connect(master = "spark://HOST:PORT")
connection_is_open(sc)

spark_disconnect(sc)
```

spark\_apply

*Apply an R Function in Spark***Description**

Applies an R function to a Spark object (typically, a Spark DataFrame).

**Usage**

```
spark_apply(
  x,
  f,
  columns = NULL,
  memory = !is.null(name),
  group_by = NULL,
  packages = NULL,
  context = NULL,
  name = NULL,
  barrier = NULL,
  fetch_result_as_sdf = TRUE,
  partition_index_param = "",
  ...
)
```

**Arguments**

- |         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| x       | An object (usually a spark_tbl) coercable to a Spark DataFrame.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| f       | A function that transforms a data frame partition into a data frame. The function f has signature <code>f(df, context, group1, group2, ...)</code> where df is a data frame with the data to be processed, context is an optional object passed as the context parameter and group1 to groupN contain the values of the group_by values. When group_by is not specified, f takes only one argument.<br>Can also be an rlang anonymous function. For example, as <code>~ .x + 1</code> to define an expression that adds one to the given .x data frame. |
| columns | A vector of column names or a named vector of column types for the transformed object. When not specified, a sample of 10 rows is taken to infer out the output columns automatically, to avoid this performance penalty, specify the column types. The sample size is configurable using the <code>sparklyr.apply.schema.infer</code> configuration option.                                                                                                                                                                                            |

memory	Boolean; should the table be cached into memory?
group_by	Column name used to group by data frame partitions.
packages	<p>Boolean to distribute <code>.libPaths()</code> packages to each node, a list of packages to distribute, or a package bundle created with <code>spark_apply_bundle()</code>.</p> <p>Defaults to TRUE or the <code>sparklyr.apply.packages</code> value set in <code>spark_config()</code>.</p> <p>For clusters using Yarn cluster mode, packages can point to a package bundle created using <code>spark_apply_bundle()</code> and made available as a Spark file using <code>config\$sparklyr.shell.files</code>. For clusters using Livy, packages can be manually installed on the driver node.</p> <p>For offline clusters where <code>available.packages()</code> is not available, manually download the packages database from <a href="https://cran.r-project.org/web/packages/packages.rds">https://cran.r-project.org/web/packages/packages.rds</a> and set <code>Sys.setenv(sparklyr.apply.packagesdb = "&lt;path1-to-rds&gt;")</code>. Otherwise, all packages will be used by default.</p> <p>For clusters where R packages already installed in every worker node, the <code>spark.r.libpaths</code> config entry can be set in <code>spark_config()</code> to the local packages library. To specify multiple paths collapse them (without spaces) with a comma delimiter (e.g., <code>"/lib/path/one,/lib/path/two"</code>).</p>
context	Optional object to be serialized and passed back to <code>f()</code> .
name	Optional table name while registering the resulting data frame.
barrier	Optional to support Barrier Execution Mode in the scheduler.
fetch_result_as_sdf	<p>Whether to return the transformed results in a Spark Dataframe (defaults to TRUE). When set to FALSE, results will be returned as a list of R objects instead.</p> <p>NOTE: <code>fetch_result_as_sdf</code> must be set to FALSE when the transformation function being applied is returning R objects that cannot be stored in a Spark Dataframe (e.g., complex numbers or any other R data type that does not have an equivalent representation among Spark SQL data types).</p>
partition_index_param	<p>Optional if non-empty, then <code>f</code> also receives the index of the partition being processed as a named argument with this name, in addition to all positional argument(s) it will receive</p> <p>NOTE: when <code>fetch_result_as_sdf</code> is set to FALSE, object returned from the transformation function also must be serializable by the <code>base::serialize</code> function in R.</p>
...	Optional arguments; currently unused.

## Configuration

`spark_config()` settings can be specified to change the workers environment.

For instance, to set additional environment variables to each worker node use the `sparklyr.apply.env.*config`, to launch workers without `--vanilla` use `sparklyr.apply.options.vanilla` set to FALSE, to run a custom script before launching Rscript use `sparklyr.apply.options.rscript.before`.



**Examples**

```
## Not run:

library(sparklyr)
sc <- spark_connect(master = "local[3]")

# creates an Spark data frame with 10 elements then multiply times 10 in R
sdf_len(sc, 10) %>% spark_apply(function(df) df * 10)

# using barrier mode
sdf_len(sc, 3, repartition = 3) %>%
  spark_apply(nrow, barrier = TRUE, columns = c(id = "integer")) %>%
  collect()

## End(Not run)
```

---

spark\_apply\_bundle      *Create Bundle for Spark Apply*

---

**Description**

Creates a bundle of packages for spark\_apply().

**Usage**

```
spark_apply_bundle(packages = TRUE, base_path = getwd(), session_id = NULL)
```

**Arguments**

packages	List of packages to pack or TRUE to pack all.
base_path	Base path used to store the resulting bundle.
session_id	An optional ID string to include in the bundle file name to allow the bundle to be session-specific

---

spark\_apply\_log      *Log Writer for Spark Apply*

---

**Description**

Writes data to log under spark\_apply().

**Usage**

```
spark_apply_log(..., level = "INFO")
```

**Arguments**

... Arguments to write to log.  
 level Severity level for this entry; recommended values: INFO, ERROR or WARN.

---

spark\_compilation\_spec

*Define a Spark Compilation Specification*

---

**Description**

For use with [compile\\_package\\_jars](#). The Spark compilation specification is used when compiling Spark extension Java Archives, and defines which versions of Spark, as well as which versions of Scala, should be used for compilation.

**Usage**

```
spark_compilation_spec(
  spark_version = NULL,
  spark_home = NULL,
  scalac_path = NULL,
  scala_filter = NULL,
  jar_name = NULL,
  jar_path = NULL,
  jar_dep = NULL,
  embedded_srcs = "embedded_sources.R"
)
```

**Arguments**

spark\_version The Spark version to build against. This can be left unset if the path to a suitable Spark home is supplied.

spark\_home The path to a Spark home installation. This can be left unset if spark\_version is supplied; in such a case, sparklyr will attempt to discover the associated Spark installation using [spark\\_home\\_dir](#).

scalac\_path The path to the scalac compiler to be used during compilation of your Spark extension. Note that you should ensure the version of scalac selected matches the version of scalac used with the version of Spark you are compiling against.

scala\_filter An optional R function that can be used to filter which scala files are used during compilation. This can be useful if you have auxiliary files that should only be included with certain versions of Spark.

jar\_name The name to be assigned to the generated jar.

jar\_path The path to the jar tool to be used during compilation of your Spark extension.

jar\_dep An optional list of additional jar dependencies.

embedded\_srcs Embedded source file(s) under <R package root>/java to be included in the root of the resulting jar file as resources

**Details**

Most Spark extensions won't need to define their own compilation specification, and can instead rely on the default behavior of `compile_package_jars`.

---

spark_config	<i>Read Spark Configuration</i>
--------------	---------------------------------

---

**Description**

Read Spark Configuration

**Usage**

```
spark_config(file = "config.yml", use_default = TRUE)
```

**Arguments**

file	Name of the configuration file
use_default	TRUE to use the built-in defaults provided in this package

**Details**

Read Spark configuration using the [config](#) package.

**Value**

Named list with configuration data

---

spark_config_kubernetes	<i>Kubernetes Configuration</i>
-------------------------	---------------------------------

---

**Description**

Convenience function to initialize a Kubernetes configuration instead of `spark_config()`, exposes common properties to set in Kubernetes clusters.

**Usage**

```

spark_config_kubernetes(
  master,
  version = "2.3.2",
  image = "spark:sparklyr",
  driver = random_string("sparklyr-"),
  account = "spark",
  jars = "local:///opt/sparklyr",
  forward = TRUE,
  executors = NULL,
  conf = NULL,
  timeout = 120,
  ports = c(8880, 8881, 4040),
  fix_config = identical(.Platform$OS.type, "windows"),
  ...
)

```

**Arguments**

master	Kubernetes url to connect to, found by running <code>kubectl cluster-info</code> .
version	The version of Spark being used.
image	Container image to use to launch Spark and sparklyr. Also known as <code>spark.kubernetes.container.image</code> .
driver	Name of the driver pod. If not set, the driver pod name is set to "sparklyr" suffixed by id to avoid name conflicts. Also known as <code>spark.kubernetes.driver.pod.name</code> .
account	Service account that is used when running the driver pod. The driver pod uses this service account when requesting executor pods from the API server. Also known as <code>spark.kubernetes.authenticate.driver.serviceAccountName</code> .
jars	Path to the sparklyr jars; either, a local path inside the container image with the sparklyr jars copied when the image was created or, a path accessible by the container where the sparklyr jars were copied. You can find a path to the sparklyr jars by running <code>system.file("java/", package = "sparklyr")</code> .
forward	Should ports used in sparklyr be forwarded automatically through Kubernetes? Default to TRUE which runs <code>kubectl port-forward</code> and <code>pkill kubectl</code> on disconnection.
executors	Number of executors to request while connecting.
conf	A named list of additional entries to add to <code>sparklyr.shell.conf</code> .
timeout	Total seconds to wait before giving up on connection.
ports	Ports to forward using <code>kubectl</code> .
fix_config	Should the <code>spark-defaults.conf</code> get fixed? TRUE for Windows.
...	Additional parameters, currently not in use.

---

spark\_config\_packages *Creates Spark Configuration*

---

**Description**

Creates Spark Configuration

**Usage**

```
spark_config_packages(config, packages, version, scala_version = NULL, ...)
```

**Arguments**

config	The Spark configuration object.
packages	A list of named packages or versioned packages to add.
version	The version of Spark being used.
scala_version	Acceptable Scala version of packages to be loaded
...	Additional configurations

---

spark\_config\_settings *Retrieve Available Settings*

---

**Description**

Retrieves available sparklyr settings that can be used in configuration files or spark\_config().

**Usage**

```
spark_config_settings()
```

---

spark\_connection *Retrieve the Spark Connection Associated with an R Object*

---

**Description**

Retrieve the spark\_connection associated with an R object.

**Usage**

```
spark_connection(x, ...)
```

**Arguments**

x	An R object from which a spark_connection can be obtained.
...	Optional arguments; currently unused.

---

spark\_connection-class

*spark\_connection class*

---

### Description

spark\_connection class

---

spark\_connection\_find *Find Spark Connection*

---

### Description

Finds an active spark connection in the environment given the connection parameters.

### Usage

```
spark_connection_find(master = NULL, app_name = NULL, method = NULL)
```

### Arguments

master	The Spark master parameter.
app_name	The Spark application name.
method	The method used to connect to Spark.

---

spark\_context\_config *Runtime configuration interface for the Spark Context.*

---

### Description

Retrieves the runtime configuration interface for the Spark Context.

### Usage

```
spark_context_config(sc)
```

### Arguments

sc	A spark_connection.
----	---------------------

---

spark_dataframe	<i>Retrieve a Spark DataFrame</i>
-----------------	-----------------------------------

---

**Description**

This S3 generic is used to access a Spark DataFrame object (as a Java object reference) from an R object.

**Usage**

```
spark_dataframe(x, ...)
```

**Arguments**

x	An R object wrapping, or containing, a Spark DataFrame.
...	Optional arguments; currently unused.

**Value**

A [spark\\_jobj](#) representing a Java object reference to a Spark DataFrame.

---

spark_default_compilation_spec	<i>Default Compilation Specification for Spark Extensions</i>
--------------------------------	---------------------------------------------------------------

---

**Description**

This is the default compilation specification used for Spark extensions, when used with [compile\\_package\\_jars](#).

**Usage**

```
spark_default_compilation_spec(
  pkg = infer_active_package_name(),
  locations = NULL
)
```

**Arguments**

pkg	The package containing Spark extensions to be compiled.
locations	Additional locations to scan. By default, the directories <code>/opt/scala</code> and <code>/usr/local/scala</code> will be scanned.

---

spark_dependency	<i>Define a Spark dependency</i>
------------------	----------------------------------

---

**Description**

Define a Spark dependency consisting of a set of custom JARs and Spark packages.

**Usage**

```
spark_dependency(
  jars = NULL,
  packages = NULL,
  initializer = NULL,
  catalog = NULL,
  repositories = NULL,
  ...
)
```

**Arguments**

jars	Character vector of full paths to JAR files.
packages	Character vector of Spark packages names.
initializer	Optional callback function called when initializing a connection.
catalog	Optional location where extension JAR files can be downloaded for Livy.
repositories	Character vector of Spark package repositories.
...	Additional optional arguments.

**Value**

An object of type 'spark\_dependency'

---

spark_dependency_fallback	<i>Fallback to Spark Dependency</i>
---------------------------	-------------------------------------

---

**Description**

Helper function to assist falling back to previous Spark versions.

**Usage**

```
spark_dependency_fallback(spark_version, supported_versions)
```



**Arguments**

spark\_version The Spark version being requested in spark\_dependencies.  
 supported\_versions The Spark versions that are supported by this extension.

**Value**

A Spark version to use.

---

spark_extension	<i>Create Spark Extension</i>
-----------------	-------------------------------

---

**Description**

Creates an R package ready to be used as an Spark extension.

**Usage**

```
spark_extension(path)
```

**Arguments**

path Location where the extension will be created.

---

spark_home_set	<i>Set the SPARK_HOME environment variable</i>
----------------	------------------------------------------------

---

**Description**

Set the SPARK\_HOME environment variable. This slightly speeds up some operations, including the connection time.

**Usage**

```
spark_home_set(path = NULL, ...)
```

**Arguments**

path A string containing the path to the installation location of Spark. If NULL, the path to the most latest Spark/Hadoop versions is used.  
 ... Additional parameters not currently used.

**Value**

The function is mostly invoked for the side-effect of setting the SPARK\_HOME environment variable. It also returns TRUE if the environment was successfully set, and FALSE otherwise.

**Examples**

```
## Not run:
# Not run due to side-effects
spark_home_set()

## End(Not run)
```

---

spark_jobj	<i>Retrieve a Spark JVM Object Reference</i>
------------	----------------------------------------------

---

**Description**

This S3 generic is used for accessing the underlying Java Virtual Machine (JVM) Spark objects associated with R objects. These objects act as references to Spark objects living in the JVM. Methods on these objects can be called with the [invoke](#) family of functions.

**Usage**

```
spark_jobj(x, ...)
```

**Arguments**

x	An R object containing, or wrapping, a spark_jobj.
...	Optional arguments; currently unused.

**See Also**

[invoke](#), for calling methods on Java object references.

---

spark_jobj-class	<i>spark_jobj class</i>
------------------	-------------------------

---

**Description**

spark\_jobj class

---

spark_load_table	<i>Reads from a Spark Table into a Spark DataFrame.</i>
------------------	---------------------------------------------------------

---

### Description

Reads from a Spark Table into a Spark DataFrame.

### Usage

```
spark_load_table(  
  sc,  
  name,  
  path,  
  options = list(),  
  repartition = 0,  
  memory = TRUE,  
  overwrite = TRUE  
)
```

### Arguments

sc	A spark_connection.
name	The name to assign to the newly generated table.
path	The path to the file. Needs to be accessible from the cluster. Supports the "hdfs://", "s3a://" and "file://" protocols.
options	A list of strings with additional options. See <a href="http://spark.apache.org/docs/latest/sql-programming-guide.html#configuration">http://spark.apache.org/docs/latest/sql-programming-guide.html#configuration</a> .
repartition	The number of partitions used to distribute the generated table. Use 0 (the default) to avoid partitioning.
memory	Boolean; should the data be loaded eagerly into memory? (That is, should the table be cached?)
overwrite	Boolean; overwrite the table with the given name if it already exists?

### See Also

Other Spark serialization routines: [spark\\_read\\_avro\(\)](#), [spark\\_read\\_csv\(\)](#), [spark\\_read\\_delta\(\)](#), [spark\\_read\\_jdbc\(\)](#), [spark\\_read\\_json\(\)](#), [spark\\_read\\_libsvm\(\)](#), [spark\\_read\\_orc\(\)](#), [spark\\_read\\_parquet\(\)](#), [spark\\_read\\_source\(\)](#), [spark\\_read\\_table\(\)](#), [spark\\_read\\_text\(\)](#), [spark\\_read\(\)](#), [spark\\_save\\_table\(\)](#), [spark\\_write\\_avro\(\)](#), [spark\\_write\\_csv\(\)](#), [spark\\_write\\_delta\(\)](#), [spark\\_write\\_jdbc\(\)](#), [spark\\_write\\_json\(\)](#), [spark\\_write\\_orc\(\)](#), [spark\\_write\\_parquet\(\)](#), [spark\\_write\\_source\(\)](#), [spark\\_write\\_table\(\)](#), [spark\\_write\\_text\(\)](#)

---

spark_log	<i>View Entries in the Spark Log</i>
-----------	--------------------------------------

---

**Description**

View the most recent entries in the Spark log. This can be useful when inspecting output / errors produced by Spark during the invocation of various commands.

**Usage**

```
spark_log(sc, n = 100, filter = NULL, ...)
```

**Arguments**

sc	A spark_connection.
n	The max number of log entries to retrieve. Use NULL to retrieve all entries within the log.
filter	Character string to filter log entries.
...	Optional arguments; currently unused.

---

spark_read	<i>Read file(s) into a Spark DataFrame using a custom reader</i>
------------	------------------------------------------------------------------

---

**Description**

Run a custom R function on Spark workers to ingest data from one or more files into a Spark DataFrame, assuming all files follow the same schema.

**Usage**

```
spark_read(sc, paths, reader, columns, packages = TRUE, ...)
```

**Arguments**

sc	A spark_connection.
paths	A character vector of one or more file URIs (e.g., c("hdfs://localhost:9000/file.txt", "hdfs://localhost:9000/file2.txt"))
reader	A self-contained R function that takes a single file URI as argument and returns the data read from that file as a data frame.
columns	a named list of column names and column types of the resulting data frame (e.g., list(column_1 = "integer", column_2 = "character")), or a list of column names only if column types should be inferred from the data (e.g., list("column_1", "column_2")), or NULL if column types should be inferred and resulting data frame can have arbitrary column names
packages	A list of R packages to distribute to Spark workers
...	Optional arguments; currently unused.

**See Also**

Other Spark serialization routines: `spark_load_table()`, `spark_read_avro()`, `spark_read_csv()`, `spark_read_delta()`, `spark_read_jdbc()`, `spark_read_json()`, `spark_read_libsvm()`, `spark_read_orc()`, `spark_read_parquet()`, `spark_read_source()`, `spark_read_table()`, `spark_read_text()`, `spark_save_table()`, `spark_write_avro()`, `spark_write_csv()`, `spark_write_delta()`, `spark_write_jdbc()`, `spark_write_json()`, `spark_write_orc()`, `spark_write_parquet()`, `spark_write_source()`, `spark_write_table()`, `spark_write_text()`

**Examples**

```
## Not run:

library(sparklyr)
sc <- spark_connect(
  master = "yarn",
  spark_home = "~/spark/spark-2.4.5-bin-hadoop2.7"
)

# This is a contrived example to show reader tasks will be distributed across
# all Spark worker nodes
spark_read(
  sc,
  rep("/dev/null", 10),
  reader = function(path) system("hostname", intern = TRUE),
  columns = c(hostname = "string")
) %>% sdf_collect()

## End(Not run)
```

---

spark\_read\_avro

*Read Apache Avro data into a Spark DataFrame.*


---

**Description**

Read Apache Avro data into a Spark DataFrame. Notice this functionality requires the Spark connection `sc` to be instantiated with either an explicitly specified Spark version (i.e., `spark_connect(..., version = <version>, packages = c("avro", <other package(s)>), ...)`) or a specific version of Spark avro package to use (e.g., `spark_connect(..., packages = c("org.apache.spark:spark-avro_2.12:3.0.0", <other package(s)>), ...)`).

**Usage**

```
spark_read_avro(
  sc,
  name = NULL,
  path = name,
  avro_schema = NULL,
```

```

    ignore_extension = TRUE,
    repartition = 0,
    memory = TRUE,
    overwrite = TRUE
  )

```

### Arguments

sc	A spark_connection.
name	The name to assign to the newly generated table.
path	The path to the file. Needs to be accessible from the cluster. Supports the "hdfs://", "s3a://" and "file://" protocols.
avro_schema	Optional Avro schema in JSON format
ignore_extension	If enabled, all files with and without .avro extension are loaded (default: TRUE)
repartition	The number of partitions used to distribute the generated table. Use 0 (the default) to avoid partitioning.
memory	Boolean; should the data be loaded eagerly into memory? (That is, should the table be cached?)
overwrite	Boolean; overwrite the table with the given name if it already exists?

### See Also

Other Spark serialization routines: [spark\\_load\\_table\(\)](#), [spark\\_read\\_csv\(\)](#), [spark\\_read\\_delta\(\)](#), [spark\\_read\\_jdbc\(\)](#), [spark\\_read\\_json\(\)](#), [spark\\_read\\_libsvm\(\)](#), [spark\\_read\\_orc\(\)](#), [spark\\_read\\_parquet\(\)](#), [spark\\_read\\_source\(\)](#), [spark\\_read\\_table\(\)](#), [spark\\_read\\_text\(\)](#), [spark\\_read\(\)](#), [spark\\_save\\_table\(\)](#), [spark\\_write\\_avro\(\)](#), [spark\\_write\\_csv\(\)](#), [spark\\_write\\_delta\(\)](#), [spark\\_write\\_jdbc\(\)](#), [spark\\_write\\_json\(\)](#), [spark\\_write\\_orc\(\)](#), [spark\\_write\\_parquet\(\)](#), [spark\\_write\\_source\(\)](#), [spark\\_write\\_table\(\)](#), [spark\\_write\\_text\(\)](#)

---

 spark\_read\_csv

*Read a CSV file into a Spark DataFrame*


---

### Description

Read a tabular data file into a Spark DataFrame.

### Usage

```

spark_read_csv(
  sc,
  name = NULL,
  path = name,
  header = TRUE,
  columns = NULL,

```

```

infer_schema = is.null(columns),
delimiter = ",",
quote = "\"",
escape = "\\ ",
charset = "UTF-8",
null_value = NULL,
options = list(),
repartition = 0,
memory = TRUE,
overwrite = TRUE,
...
)

```

### Arguments

sc	A spark_connection.
name	The name to assign to the newly generated table.
path	The path to the file. Needs to be accessible from the cluster. Supports the "hdfs://", "s3a://" and "file://" protocols.
header	Boolean; should the first row of data be used as a header? Defaults to TRUE.
columns	A vector of column names or a named vector of column types. If specified, the elements can be "binary" for BinaryType, "boolean" for BooleanType, "byte" for ByteType, "integer" for IntegerType, "integer64" for LongType, "double" for DoubleType, "character" for StringType, "timestamp" for TimestampType and "date" for DateType.
infer_schema	Boolean; should column types be automatically inferred? Requires one extra pass over the data. Defaults to is.null(columns).
delimiter	The character used to delimit each column. Defaults to ','.
quote	The character used as a quote. Defaults to '"'.
escape	The character used to escape other characters. Defaults to '\\ '.
charset	The character set. Defaults to "UTF-8".
null_value	The character to use for null, or missing, values. Defaults to NULL.
options	A list of strings with additional options.
repartition	The number of partitions used to distribute the generated table. Use 0 (the default) to avoid partitioning.
memory	Boolean; should the data be loaded eagerly into memory? (That is, should the table be cached?)
overwrite	Boolean; overwrite the table with the given name if it already exists?
...	Optional arguments; currently unused.

### Details

You can read data from HDFS (hdfs://), S3 (s3a://), as well as the local file system (file://).

If you are reading from a secure S3 bucket be sure to set the following in your spark-defaults.conf spark.hadoop.fs.s3a.access.key, spark.hadoop.fs.s3a.secret.key or any of the methods outlined in the aws-sdk documentation [Working with AWS credentials](#) In order to work with the newer s3a:// protocol also set the values for spark.hadoop.fs.s3a.impl and spark.hadoop.fs.s3a.endpoint . In addition, to support v4 of the S3 api be sure to pass the -Dcom.amazonaws.services.s3.enableV4 driver options for the config key spark.driver.extraJavaOptions For instructions on how to configure s3n:// check the hadoop documentation: [s3n authentication properties](#)

When header is FALSE, the column names are generated with a V prefix; e.g. V1, V2, . . .

### See Also

Other Spark serialization routines: [spark\\_load\\_table\(\)](#), [spark\\_read\\_avro\(\)](#), [spark\\_read\\_delta\(\)](#), [spark\\_read\\_jdbc\(\)](#), [spark\\_read\\_json\(\)](#), [spark\\_read\\_libsvm\(\)](#), [spark\\_read\\_orc\(\)](#), [spark\\_read\\_parquet\(\)](#), [spark\\_read\\_source\(\)](#), [spark\\_read\\_table\(\)](#), [spark\\_read\\_text\(\)](#), [spark\\_read\(\)](#), [spark\\_save\\_table\(\)](#), [spark\\_write\\_avro\(\)](#), [spark\\_write\\_csv\(\)](#), [spark\\_write\\_delta\(\)](#), [spark\\_write\\_jdbc\(\)](#), [spark\\_write\\_json\(\)](#), [spark\\_write\\_orc\(\)](#), [spark\\_write\\_parquet\(\)](#), [spark\\_write\\_source\(\)](#), [spark\\_write\\_table\(\)](#), [spark\\_write\\_text\(\)](#)

---

spark_read_delta	<i>Read from Delta Lake into a Spark DataFrame.</i>
------------------	-----------------------------------------------------

---

### Description

Read from Delta Lake into a Spark DataFrame.

### Usage

```
spark_read_delta(
  sc,
  path,
  name = NULL,
  version = NULL,
  timestamp = NULL,
  options = list(),
  repartition = 0,
  memory = TRUE,
  overwrite = TRUE,
  ...
)
```

### Arguments

sc	A spark_connection.
path	The path to the file. Needs to be accessible from the cluster. Supports the "hdfs://", "s3a://" and "file://" protocols.
name	The name to assign to the newly generated table.



version	The version of the delta table to read.
timestamp	The timestamp of the delta table to read. For example, "2019-01-01" or "2019-01-01'T'00:00:00.000".
options	A list of strings with additional options.
repartition	The number of partitions used to distribute the generated table. Use 0 (the default) to avoid partitioning.
memory	Boolean; should the data be loaded eagerly into memory? (That is, should the table be cached?)
overwrite	Boolean; overwrite the table with the given name if it already exists?
...	Optional arguments; currently unused.

**See Also**

Other Spark serialization routines: [spark\\_load\\_table\(\)](#), [spark\\_read\\_avro\(\)](#), [spark\\_read\\_csv\(\)](#), [spark\\_read\\_jdbc\(\)](#), [spark\\_read\\_json\(\)](#), [spark\\_read\\_libsvm\(\)](#), [spark\\_read\\_orc\(\)](#), [spark\\_read\\_parquet\(\)](#), [spark\\_read\\_source\(\)](#), [spark\\_read\\_table\(\)](#), [spark\\_read\\_text\(\)](#), [spark\\_read\(\)](#), [spark\\_save\\_table\(\)](#), [spark\\_write\\_avro\(\)](#), [spark\\_write\\_csv\(\)](#), [spark\\_write\\_delta\(\)](#), [spark\\_write\\_jdbc\(\)](#), [spark\\_write\\_json\(\)](#), [spark\\_write\\_orc\(\)](#), [spark\\_write\\_parquet\(\)](#), [spark\\_write\\_source\(\)](#), [spark\\_write\\_table\(\)](#), [spark\\_write\\_text\(\)](#)

---

spark_read_jdbc	<i>Read from JDBC connection into a Spark DataFrame.</i>
-----------------	----------------------------------------------------------

---

**Description**

Read from JDBC connection into a Spark DataFrame.

**Usage**

```
spark_read_jdbc(
  sc,
  name,
  options = list(),
  repartition = 0,
  memory = TRUE,
  overwrite = TRUE,
  columns = NULL,
  ...
)
```

**Arguments**

sc	A spark_connection.
name	The name to assign to the newly generated table.
options	A list of strings with additional options. See <a href="http://spark.apache.org/docs/latest/sql-programming-guide.html#configuration">http://spark.apache.org/docs/latest/sql-programming-guide.html#configuration</a> .

repartition	The number of partitions used to distribute the generated table. Use 0 (the default) to avoid partitioning.
memory	Boolean; should the data be loaded eagerly into memory? (That is, should the table be cached?)
overwrite	Boolean; overwrite the table with the given name if it already exists?
columns	A vector of column names or a named vector of column types. If specified, the elements can be "binary" for BinaryType, "boolean" for BooleanType, "byte" for ByteType, "integer" for IntegerType, "integer64" for LongType, "double" for DoubleType, "character" for StringType, "timestamp" for TimestampType and "date" for DateType.
...	Optional arguments; currently unused.

### See Also

Other Spark serialization routines: [spark\\_load\\_table\(\)](#), [spark\\_read\\_avro\(\)](#), [spark\\_read\\_csv\(\)](#), [spark\\_read\\_delta\(\)](#), [spark\\_read\\_json\(\)](#), [spark\\_read\\_libsvm\(\)](#), [spark\\_read\\_orc\(\)](#), [spark\\_read\\_parquet\(\)](#), [spark\\_read\\_source\(\)](#), [spark\\_read\\_table\(\)](#), [spark\\_read\\_text\(\)](#), [spark\\_read\(\)](#), [spark\\_save\\_table\(\)](#), [spark\\_write\\_avro\(\)](#), [spark\\_write\\_csv\(\)](#), [spark\\_write\\_delta\(\)](#), [spark\\_write\\_jdbc\(\)](#), [spark\\_write\\_json\(\)](#), [spark\\_write\\_orc\(\)](#), [spark\\_write\\_parquet\(\)](#), [spark\\_write\\_source\(\)](#), [spark\\_write\\_table\(\)](#), [spark\\_write\\_text\(\)](#)

---

spark\_read\_json

*Read a JSON file into a Spark DataFrame*

---

### Description

Read a table serialized in the **JavaScript Object Notation** format into a Spark DataFrame.

### Usage

```
spark_read_json(
  sc,
  name = NULL,
  path = name,
  options = list(),
  repartition = 0,
  memory = TRUE,
  overwrite = TRUE,
  columns = NULL,
  ...
)
```

**Arguments**

sc	A spark_connection.
name	The name to assign to the newly generated table.
path	The path to the file. Needs to be accessible from the cluster. Supports the "hdfs://", "s3a://" and "file://" protocols.
options	A list of strings with additional options.
repartition	The number of partitions used to distribute the generated table. Use 0 (the default) to avoid partitioning.
memory	Boolean; should the data be loaded eagerly into memory? (That is, should the table be cached?)
overwrite	Boolean; overwrite the table with the given name if it already exists?
columns	A vector of column names or a named vector of column types. If specified, the elements can be "binary" for BinaryType, "boolean" for BooleanType, "byte" for ByteType, "integer" for IntegerType, "integer64" for LongType, "double" for DoubleType, "character" for StringType, "timestamp" for TimestampType and "date" for DateType.
...	Optional arguments; currently unused.

**Details**

You can read data from HDFS (hdfs://), S3 (s3a://), as well as the local file system (file://).

If you are reading from a secure S3 bucket be sure to set the following in your spark-defaults.conf spark.hadoop.fs.s3a.access.key, spark.hadoop.fs.s3a.secret.key or any of the methods outlined in the aws-sdk documentation [Working with AWS credentials](#) In order to work with the newer s3a:// protocol also set the values for spark.hadoop.fs.s3a.impl and spark.hadoop.fs.s3a.endpoint . In addition, to support v4 of the S3 api be sure to pass the -Dcom.amazonaws.services.s3.enableV4 driver options for the config key spark.driver.extraJavaOptions For instructions on how to configure s3n:// check the hadoop documentation: [s3n authentication properties](#)

**See Also**

Other Spark serialization routines: [spark\\_load\\_table\(\)](#), [spark\\_read\\_avro\(\)](#), [spark\\_read\\_csv\(\)](#), [spark\\_read\\_delta\(\)](#), [spark\\_read\\_jdbc\(\)](#), [spark\\_read\\_libsvm\(\)](#), [spark\\_read\\_orc\(\)](#), [spark\\_read\\_parquet\(\)](#), [spark\\_read\\_source\(\)](#), [spark\\_read\\_table\(\)](#), [spark\\_read\\_text\(\)](#), [spark\\_read\(\)](#), [spark\\_save\\_table\(\)](#), [spark\\_write\\_avro\(\)](#), [spark\\_write\\_csv\(\)](#), [spark\\_write\\_delta\(\)](#), [spark\\_write\\_jdbc\(\)](#), [spark\\_write\\_json\(\)](#), [spark\\_write\\_orc\(\)](#), [spark\\_write\\_parquet\(\)](#), [spark\\_write\\_source\(\)](#), [spark\\_write\\_table\(\)](#), [spark\\_write\\_text\(\)](#)

---

spark\_read\_libsvm      *Read libsvm file into a Spark DataFrame.*

---

### Description

Read libsvm file into a Spark DataFrame.

### Usage

```
spark_read_libsvm(
  sc,
  name = NULL,
  path = name,
  repartition = 0,
  memory = TRUE,
  overwrite = TRUE,
  ...
)
```

### Arguments

sc	A spark_connection.
name	The name to assign to the newly generated table.
path	The path to the file. Needs to be accessible from the cluster. Supports the "hdfs://", "s3a://" and "file://" protocols.
repartition	The number of partitions used to distribute the generated table. Use 0 (the default) to avoid partitioning.
memory	Boolean; should the data be loaded eagerly into memory? (That is, should the table be cached?)
overwrite	Boolean; overwrite the table with the given name if it already exists?
...	Optional arguments; currently unused.

### See Also

Other Spark serialization routines: [spark\\_load\\_table\(\)](#), [spark\\_read\\_avro\(\)](#), [spark\\_read\\_csv\(\)](#), [spark\\_read\\_delta\(\)](#), [spark\\_read\\_jdbc\(\)](#), [spark\\_read\\_json\(\)](#), [spark\\_read\\_orc\(\)](#), [spark\\_read\\_parquet\(\)](#), [spark\\_read\\_source\(\)](#), [spark\\_read\\_table\(\)](#), [spark\\_read\\_text\(\)](#), [spark\\_read\(\)](#), [spark\\_save\\_table\(\)](#), [spark\\_write\\_avro\(\)](#), [spark\\_write\\_csv\(\)](#), [spark\\_write\\_delta\(\)](#), [spark\\_write\\_jdbc\(\)](#), [spark\\_write\\_json\(\)](#), [spark\\_write\\_orc\(\)](#), [spark\\_write\\_parquet\(\)](#), [spark\\_write\\_source\(\)](#), [spark\\_write\\_table\(\)](#), [spark\\_write\\_text\(\)](#)

spark\_read\_orc

*Read a ORC file into a Spark DataFrame***Description**

Read a **ORC** file into a Spark DataFrame.

**Usage**

```
spark_read_orc(
  sc,
  name = NULL,
  path = name,
  options = list(),
  repartition = 0,
  memory = TRUE,
  overwrite = TRUE,
  columns = NULL,
  schema = NULL,
  ...
)
```

**Arguments**

sc	A spark_connection.
name	The name to assign to the newly generated table.
path	The path to the file. Needs to be accessible from the cluster. Supports the "hdfs://", "s3a://" and "file://" protocols.
options	A list of strings with additional options. See <a href="http://spark.apache.org/docs/latest/sql-programming-guide.html#configuration">http://spark.apache.org/docs/latest/sql-programming-guide.html#configuration</a> .
repartition	The number of partitions used to distribute the generated table. Use 0 (the default) to avoid partitioning.
memory	Boolean; should the data be loaded eagerly into memory? (That is, should the table be cached?)
overwrite	Boolean; overwrite the table with the given name if it already exists?
columns	A vector of column names or a named vector of column types. If specified, the elements can be "binary" for BinaryType, "boolean" for BooleanType, "byte" for ByteType, "integer" for IntegerType, "integer64" for LongType, "double" for DoubleType, "character" for StringType, "timestamp" for TimestampType and "date" for DateType.
schema	A (java) read schema. Useful for optimizing read operation on nested data.
...	Optional arguments; currently unused.

**Details**

You can read data from HDFS (hdfs://), S3 (s3a://), as well as the local file system (file://).

**See Also**

Other Spark serialization routines: `spark_load_table()`, `spark_read_avro()`, `spark_read_csv()`, `spark_read_delta()`, `spark_read_jdbc()`, `spark_read_json()`, `spark_read_libsvm()`, `spark_read_parquet()`, `spark_read_source()`, `spark_read_table()`, `spark_read_text()`, `spark_read()`, `spark_save_table()`, `spark_write_avro()`, `spark_write_csv()`, `spark_write_delta()`, `spark_write_jdbc()`, `spark_write_json()`, `spark_write_orc()`, `spark_write_parquet()`, `spark_write_source()`, `spark_write_table()`, `spark_write_text()`

---

spark_read_parquet	<i>Read a Parquet file into a Spark DataFrame</i>
--------------------	---------------------------------------------------

---

**Description**

Read a **Parquet** file into a Spark DataFrame.

**Usage**

```
spark_read_parquet(
  sc,
  name = NULL,
  path = name,
  options = list(),
  repartition = 0,
  memory = TRUE,
  overwrite = TRUE,
  columns = NULL,
  schema = NULL,
  ...
)
```

**Arguments**

sc	A spark_connection.
name	The name to assign to the newly generated table.
path	The path to the file. Needs to be accessible from the cluster. Supports the "hdfs://", "s3a://" and "file://" protocols.
options	A list of strings with additional options. See <a href="http://spark.apache.org/docs/latest/sql-programming-guide.html#configuration">http://spark.apache.org/docs/latest/sql-programming-guide.html#configuration</a> .
repartition	The number of partitions used to distribute the generated table. Use 0 (the default) to avoid partitioning.
memory	Boolean; should the data be loaded eagerly into memory? (That is, should the table be cached?)

overwrite	Boolean; overwrite the table with the given name if it already exists?
columns	A vector of column names or a named vector of column types. If specified, the elements can be "binary" for BinaryType, "boolean" for BooleanType, "byte" for ByteType, "integer" for IntegerType, "integer64" for LongType, "double" for DoubleType, "character" for StringType, "timestamp" for TimestampType and "date" for DateType.
schema	A (java) read schema. Useful for optimizing read operation on nested data.
...	Optional arguments; currently unused.

### Details

You can read data from HDFS (`hdfs://`), S3 (`s3a://`), as well as the local file system (`file://`).

If you are reading from a secure S3 bucket be sure to set the following in your `spark-defaults.conf` `spark.hadoop.fs.s3a.access.key`, `spark.hadoop.fs.s3a.secret.key` or any of the methods outlined in the [aws-sdk documentation Working with AWS credentials](#) In order to work with the newer `s3a://` protocol also set the values for `spark.hadoop.fs.s3a.impl` and `spark.hadoop.fs.s3a.endpoint`. In addition, to support v4 of the S3 api be sure to pass the `-Dcom.amazonaws.services.s3.enableV4` driver options for the config key `spark.driver.extraJavaOptions` For instructions on how to configure `s3n://` check the [hadoop documentation: s3n authentication properties](#)

### See Also

Other Spark serialization routines: [spark\\_load\\_table\(\)](#), [spark\\_read\\_avro\(\)](#), [spark\\_read\\_csv\(\)](#), [spark\\_read\\_delta\(\)](#), [spark\\_read\\_jdbc\(\)](#), [spark\\_read\\_json\(\)](#), [spark\\_read\\_libsvm\(\)](#), [spark\\_read\\_orc\(\)](#), [spark\\_read\\_source\(\)](#), [spark\\_read\\_table\(\)](#), [spark\\_read\\_text\(\)](#), [spark\\_read\(\)](#), [spark\\_save\\_table\(\)](#), [spark\\_write\\_avro\(\)](#), [spark\\_write\\_csv\(\)](#), [spark\\_write\\_delta\(\)](#), [spark\\_write\\_jdbc\(\)](#), [spark\\_write\\_json\(\)](#), [spark\\_write\\_orc\(\)](#), [spark\\_write\\_parquet\(\)](#), [spark\\_write\\_source\(\)](#), [spark\\_write\\_table\(\)](#), [spark\\_write\\_text\(\)](#)

---

`spark_read_source`      *Read from a generic source into a Spark DataFrame.*

---

### Description

Read from a generic source into a Spark DataFrame.

### Usage

```
spark_read_source(
  sc,
  name = NULL,
  path = name,
  source,
  options = list(),
  repartition = 0,
  memory = TRUE,
```

```

    overwrite = TRUE,
    columns = NULL,
    ...
)

```

### Arguments

sc	A spark_connection.
name	The name to assign to the newly generated table.
path	The path to the file. Needs to be accessible from the cluster. Supports the "hdfs://", "s3a://" and "file://" protocols.
source	A data source capable of reading data.
options	A list of strings with additional options. See <a href="http://spark.apache.org/docs/latest/sql-programming-guide.html#configuration">http://spark.apache.org/docs/latest/sql-programming-guide.html#configuration</a> .
repartition	The number of partitions used to distribute the generated table. Use 0 (the default) to avoid partitioning.
memory	Boolean; should the data be loaded eagerly into memory? (That is, should the table be cached?)
overwrite	Boolean; overwrite the table with the given name if it already exists?
columns	A vector of column names or a named vector of column types. If specified, the elements can be "binary" for BinaryType, "boolean" for BooleanType, "byte" for ByteType, "integer" for IntegerType, "integer64" for LongType, "double" for DoubleType, "character" for StringType, "timestamp" for TimestampType and "date" for DateType.
...	Optional arguments; currently unused.

### See Also

Other Spark serialization routines: [spark\\_load\\_table\(\)](#), [spark\\_read\\_avro\(\)](#), [spark\\_read\\_csv\(\)](#), [spark\\_read\\_delta\(\)](#), [spark\\_read\\_jdbc\(\)](#), [spark\\_read\\_json\(\)](#), [spark\\_read\\_libsvm\(\)](#), [spark\\_read\\_orc\(\)](#), [spark\\_read\\_parquet\(\)](#), [spark\\_read\\_table\(\)](#), [spark\\_read\\_text\(\)](#), [spark\\_read\(\)](#), [spark\\_save\\_table\(\)](#), [spark\\_write\\_avro\(\)](#), [spark\\_write\\_csv\(\)](#), [spark\\_write\\_delta\(\)](#), [spark\\_write\\_jdbc\(\)](#), [spark\\_write\\_json\(\)](#), [spark\\_write\\_orc\(\)](#), [spark\\_write\\_parquet\(\)](#), [spark\\_write\\_source\(\)](#), [spark\\_write\\_table\(\)](#), [spark\\_write\\_text\(\)](#)

---

spark\_read\_table

*Reads from a Spark Table into a Spark DataFrame.*

---

### Description

Reads from a Spark Table into a Spark DataFrame.



**Usage**

```
spark_read_table(
  sc,
  name,
  options = list(),
  repartition = 0,
  memory = TRUE,
  columns = NULL,
  ...
)
```

**Arguments**

sc	A spark_connection.
name	The name to assign to the newly generated table.
options	A list of strings with additional options. See <a href="http://spark.apache.org/docs/latest/sql-programming-guide.html#configuration">http://spark.apache.org/docs/latest/sql-programming-guide.html#configuration</a> .
repartition	The number of partitions used to distribute the generated table. Use 0 (the default) to avoid partitioning.
memory	Boolean; should the data be loaded eagerly into memory? (That is, should the table be cached?)
columns	A vector of column names or a named vector of column types. If specified, the elements can be "binary" for BinaryType, "boolean" for BooleanType, "byte" for ByteType, "integer" for IntegerType, "integer64" for LongType, "double" for DoubleType, "character" for StringType, "timestamp" for TimestampType and "date" for DateType.
...	Optional arguments; currently unused.

**See Also**

Other Spark serialization routines: [spark\\_load\\_table\(\)](#), [spark\\_read\\_avro\(\)](#), [spark\\_read\\_csv\(\)](#), [spark\\_read\\_delta\(\)](#), [spark\\_read\\_jdbc\(\)](#), [spark\\_read\\_json\(\)](#), [spark\\_read\\_libsvm\(\)](#), [spark\\_read\\_orc\(\)](#), [spark\\_read\\_parquet\(\)](#), [spark\\_read\\_source\(\)](#), [spark\\_read\\_text\(\)](#), [spark\\_read\(\)](#), [spark\\_save\\_table\(\)](#), [spark\\_write\\_avro\(\)](#), [spark\\_write\\_csv\(\)](#), [spark\\_write\\_delta\(\)](#), [spark\\_write\\_jdbc\(\)](#), [spark\\_write\\_json\(\)](#), [spark\\_write\\_orc\(\)](#), [spark\\_write\\_parquet\(\)](#), [spark\\_write\\_source\(\)](#), [spark\\_write\\_table\(\)](#), [spark\\_write\\_text\(\)](#)

---

 spark\_read\_text

*Read a Text file into a Spark DataFrame*


---

**Description**

Read a text file into a Spark DataFrame.

**Usage**

```
spark_read_text(
  sc,
  name = NULL,
  path = name,
  repartition = 0,
  memory = TRUE,
  overwrite = TRUE,
  options = list(),
  whole = FALSE,
  ...
)
```

**Arguments**

sc	A spark_connection.
name	The name to assign to the newly generated table.
path	The path to the file. Needs to be accessible from the cluster. Supports the "hdfs://", "s3a://" and "file://" protocols.
repartition	The number of partitions used to distribute the generated table. Use 0 (the default) to avoid partitioning.
memory	Boolean; should the data be loaded eagerly into memory? (That is, should the table be cached?)
overwrite	Boolean; overwrite the table with the given name if it already exists?
options	A list of strings with additional options.
whole	Read the entire text file as a single entry? Defaults to FALSE.
...	Optional arguments; currently unused.

**Details**

You can read data from HDFS (hdfs://), S3 (s3a://), as well as the local file system (file://). If you are reading from a secure S3 bucket be sure to set the following in your spark-defaults.conf spark.hadoop.fs.s3a.access.key, spark.hadoop.fs.s3a.secret.key or any of the methods outlined in the aws-sdk documentation [Working with AWS credentials](#) In order to work with the newer s3a:// protocol also set the values for spark.hadoop.fs.s3a.impl and spark.hadoop.fs.s3a.endpoint . In addition, to support v4 of the S3 api be sure to pass the -Dcom.amazonaws.services.s3.enableV4 driver options for the config key spark.driver.extraJavaOptions For instructions on how to configure s3n:// check the hadoop documentation: [s3n authentication properties](#)

**See Also**

Other Spark serialization routines: [spark\\_load\\_table\(\)](#), [spark\\_read\\_avro\(\)](#), [spark\\_read\\_csv\(\)](#), [spark\\_read\\_delta\(\)](#), [spark\\_read\\_jdbc\(\)](#), [spark\\_read\\_json\(\)](#), [spark\\_read\\_libsvm\(\)](#), [spark\\_read\\_orc\(\)](#), [spark\\_read\\_parquet\(\)](#), [spark\\_read\\_source\(\)](#), [spark\\_read\\_table\(\)](#), [spark\\_read\\_text\(\)](#), [spark\\_save\\_table\(\)](#), [spark\\_write\\_avro\(\)](#), [spark\\_write\\_csv\(\)](#), [spark\\_write\\_delta\(\)](#), [spark\\_write\\_jdbc\(\)](#), [spark\\_write\\_json\(\)](#), [spark\\_write\\_orc\(\)](#), [spark\\_write\\_parquet\(\)](#), [spark\\_write\\_source\(\)](#), [spark\\_write\\_table\(\)](#), [spark\\_write\\_text\(\)](#)

---

spark_save_table	<i>Saves a Spark DataFrame as a Spark table</i>
------------------	-------------------------------------------------

---

**Description**

Saves a Spark DataFrame and as a Spark table.

**Usage**

```
spark_save_table(x, path, mode = NULL, options = list())
```

**Arguments**

x	A Spark DataFrame or dplyr operation
path	The path to the file. Needs to be accessible from the cluster. Supports the "hdfs://", "s3a://" and "file://" protocols.
mode	A character element. Specifies the behavior when data or table already exists. Supported values include: 'error', 'append', 'overwrite' and ignore. Notice that 'overwrite' will also change the column structure. For more details see also <a href="http://spark.apache.org/docs/latest/sql-programming-guide.html#save-modes">http://spark.apache.org/docs/latest/sql-programming-guide.html#save-modes</a> for your version of Spark.
options	A list of strings with additional options.

**See Also**

Other Spark serialization routines: [spark\\_load\\_table\(\)](#), [spark\\_read\\_avro\(\)](#), [spark\\_read\\_csv\(\)](#), [spark\\_read\\_delta\(\)](#), [spark\\_read\\_jdbc\(\)](#), [spark\\_read\\_json\(\)](#), [spark\\_read\\_libsvm\(\)](#), [spark\\_read\\_orc\(\)](#), [spark\\_read\\_parquet\(\)](#), [spark\\_read\\_source\(\)](#), [spark\\_read\\_table\(\)](#), [spark\\_read\\_text\(\)](#), [spark\\_read\(\)](#), [spark\\_write\\_avro\(\)](#), [spark\\_write\\_csv\(\)](#), [spark\\_write\\_delta\(\)](#), [spark\\_write\\_jdbc\(\)](#), [spark\\_write\\_json\(\)](#), [spark\\_write\\_orc\(\)](#), [spark\\_write\\_parquet\(\)](#), [spark\\_write\\_source\(\)](#), [spark\\_write\\_table\(\)](#), [spark\\_write\\_text\(\)](#)

---

spark_session_config	<i>Runtime configuration interface for the Spark Session</i>
----------------------	--------------------------------------------------------------

---

**Description**

Retrieves or sets runtime configuration entries for the Spark Session

**Usage**

```
spark_session_config(sc, config = TRUE, value = NULL)
```

**Arguments**

sc	A spark_connection.
config	The configuration entry name(s) (e.g., "spark.sql.shuffle.partitions"). Defaults to NULL to retrieve all configuration entries.
value	The configuration value to be set. Defaults to NULL to retrieve configuration entries.

---

spark_table_name	<i>Generate a Table Name from Expression</i>
------------------	----------------------------------------------

---

**Description**

Attempts to generate a table name from an expression; otherwise, assigns an auto-generated generic name with "sparklyr\_" prefix.

**Usage**

```
spark_table_name(expr)
```

**Arguments**

expr	The expression to attempt to use as name
------	------------------------------------------

---

spark_version	<i>Get the Spark Version Associated with a Spark Connection</i>
---------------	-----------------------------------------------------------------

---

**Description**

Retrieve the version of Spark associated with a Spark connection.

**Usage**

```
spark_version(sc)
```

**Arguments**

sc	A spark_connection.
----	---------------------

**Details**

Suffixes for e.g. preview versions, or snapshotted versions, are trimmed – if you require the full Spark version, you can retrieve it with `invoke(spark_context(sc), "version")`.

**Value**

The Spark version as a [numeric\\_version](#).

---

`spark_version_from_home`*Get the Spark Version Associated with a Spark Installation*

---

**Description**

Retrieve the version of Spark associated with a Spark installation.

**Usage**

```
spark_version_from_home(spark_home, default = NULL)
```

**Arguments**

<code>spark_home</code>	The path to a Spark installation.
<code>default</code>	The default version to be inferred, in case version lookup failed, e.g. no Spark installation was found at <code>spark_home</code> .

---

`spark_web`*Open the Spark web interface*

---

**Description**

Open the Spark web interface

**Usage**

```
spark_web(sc, ...)
```

**Arguments**

<code>sc</code>	A <code>spark_connection</code> .
<code>...</code>	Optional arguments; currently unused.

---

 spark\_write

 Write Spark DataFrame to file using a custom writer
 

---

### Description

Run a custom R function on Spark worker to write a Spark DataFrame into file(s). If Spark's speculative execution feature is enabled (i.e., 'spark.speculation' is true), then each write task may be executed more than once and the user-defined writer function will need to ensure no concurrent writes happen to the same file path (e.g., by appending UUID to each file name).

### Usage

```
spark_write(x, writer, paths, packages = NULL)
```

### Arguments

x	A Spark Dataframe to be saved into file(s)
writer	A writer function with the signature function(partition, path) where partition is a R dataframe containing all rows from one partition of the original Spark Dataframe x and path is a string specifying the file to write partition to
paths	A single destination path or a list of destination paths, each one specifying a location for a partition from x to be written to. If number of partition(s) in x is not equal to length(paths) then x will be re-partitioned to contain length(paths) partition(s)
packages	Boolean to distribute .libPaths() packages to each node, a list of packages to distribute, or a package bundle created with

### Examples

```
## Not run:

library(sparklyr)

sc <- spark_connect(master = "local[3]")

# copy some test data into a Spark Dataframe
sdf <- sdf_copy_to(sc, iris, overwrite = TRUE)

# create a writer function
writer <- function(df, path) {
  write.csv(df, path)
}

spark_write(
  sdf,
  writer,
  # re-partition sdf into 3 partitions and write them to 3 separate files
  paths = list("file:///tmp/file1", "file:///tmp/file2", "file:///tmp/file3"),
```

```

)

spark_write(
  sdf,
  writer,
  # save all rows into a single file
  paths = list("file:///tmp/all_rows")
)

## End(Not run)

```

---

spark\_write\_avro      *Serialize a Spark DataFrame into Apache Avro format*

---

### Description

Serialize a Spark DataFrame into Apache Avro format. Notice this functionality requires the Spark connection `sc` to be instantiated with either an explicitly specified Spark version (i.e., `spark_connect(..., version = <version>, packages = c("avro", <other package(s)>), ...)`) or a specific version of Spark avro package to use (e.g., `spark_connect(..., packages = c("org.apache.spark:spark-avro_2.12:3.0.0", <other package(s)>), ...)`).

### Usage

```

spark_write_avro(
  x,
  path,
  avro_schema = NULL,
  record_name = "topLevelRecord",
  record_namespace = "",
  compression = "snappy",
  partition_by = NULL
)

```

### Arguments

<code>x</code>	A Spark DataFrame or dplyr operation
<code>path</code>	The path to the file. Needs to be accessible from the cluster. Supports the "hdfs://", "s3a://" and "file://" protocols.
<code>avro_schema</code>	Optional Avro schema in JSON format
<code>record_name</code>	Optional top level record name in write result (default: "topLevelRecord")
<code>record_namespace</code>	Record namespace in write result (default: "")
<code>compression</code>	Compression codec to use (default: "snappy")
<code>partition_by</code>	A character vector. Partitions the output by the given columns on the file system.

**See Also**

Other Spark serialization routines: `spark_load_table()`, `spark_read_avro()`, `spark_read_csv()`, `spark_read_delta()`, `spark_read_jdbc()`, `spark_read_json()`, `spark_read_libsvm()`, `spark_read_orc()`, `spark_read_parquet()`, `spark_read_source()`, `spark_read_table()`, `spark_read_text()`, `spark_read()`, `spark_save_table()`, `spark_write_csv()`, `spark_write_delta()`, `spark_write_jdbc()`, `spark_write_json()`, `spark_write_orc()`, `spark_write_parquet()`, `spark_write_source()`, `spark_write_table()`, `spark_write_text()`

---

 spark\_write\_csv

 Write a Spark DataFrame to a CSV
 

---

**Description**

Write a Spark DataFrame to a tabular (typically, comma-separated) file.

**Usage**

```
spark_write_csv(
  x,
  path,
  header = TRUE,
  delimiter = ",",
  quote = "\"",
  escape = "\\ ",
  charset = "UTF-8",
  null_value = NULL,
  options = list(),
  mode = NULL,
  partition_by = NULL,
  ...
)
```

**Arguments**

<code>x</code>	A Spark DataFrame or dplyr operation
<code>path</code>	The path to the file. Needs to be accessible from the cluster. Supports the <code>"hdfs://"</code> , <code>"s3a://"</code> and <code>"file://"</code> protocols.
<code>header</code>	Should the first row of data be used as a header? Defaults to TRUE.
<code>delimiter</code>	The character used to delimit each column, defaults to <code>,</code> .
<code>quote</code>	The character used as a quote. Defaults to <code>'</code> .
<code>escape</code>	The character used to escape other characters, defaults to <code>\</code> .
<code>charset</code>	The character set, defaults to <code>"UTF-8"</code> .
<code>null_value</code>	The character to use for default values, defaults to NULL.
<code>options</code>	A list of strings with additional options.



mode	A character element. Specifies the behavior when data or table already exists. Supported values include: 'error', 'append', 'overwrite' and ignore. Notice that 'overwrite' will also change the column structure. For more details see also <a href="http://spark.apache.org/docs/latest/sql-programming-guide.html#save-modes">http://spark.apache.org/docs/latest/sql-programming-guide.html#save-modes</a> for your version of Spark.
partition_by	A character vector. Partitions the output by the given columns on the file system.
...	Optional arguments; currently unused.

**See Also**

Other Spark serialization routines: `spark_load_table()`, `spark_read_avro()`, `spark_read_csv()`, `spark_read_delta()`, `spark_read_jdbc()`, `spark_read_json()`, `spark_read_libsvm()`, `spark_read_orc()`, `spark_read_parquet()`, `spark_read_source()`, `spark_read_table()`, `spark_read_text()`, `spark_read()`, `spark_save_table()`, `spark_write_avro()`, `spark_write_delta()`, `spark_write_jdbc()`, `spark_write_json()`, `spark_write_orc()`, `spark_write_parquet()`, `spark_write_source()`, `spark_write_table()`, `spark_write_text()`

---

spark_write_delta	<i>Writes a Spark DataFrame into Delta Lake</i>
-------------------	-------------------------------------------------

---

**Description**

Writes a Spark DataFrame into Delta Lake.

**Usage**

```
spark_write_delta(
  x,
  path,
  mode = NULL,
  options = list(),
  partition_by = NULL,
  ...
)
```

**Arguments**

x	A Spark DataFrame or dplyr operation
path	The path to the file. Needs to be accessible from the cluster. Supports the "hdfs://", "s3a://" and "file://" protocols.
mode	A character element. Specifies the behavior when data or table already exists. Supported values include: 'error', 'append', 'overwrite' and ignore. Notice that 'overwrite' will also change the column structure. For more details see also <a href="http://spark.apache.org/docs/latest/sql-programming-guide.html#save-modes">http://spark.apache.org/docs/latest/sql-programming-guide.html#save-modes</a> for your version of Spark.

options	A list of strings with additional options.
partition_by	A character vector. Partitions the output by the given columns on the file system.
...	Optional arguments; currently unused.

**See Also**

Other Spark serialization routines: `spark_load_table()`, `spark_read_avro()`, `spark_read_csv()`, `spark_read_delta()`, `spark_read_jdbc()`, `spark_read_json()`, `spark_read_libsvm()`, `spark_read_orc()`, `spark_read_parquet()`, `spark_read_source()`, `spark_read_table()`, `spark_read_text()`, `spark_read()`, `spark_save_table()`, `spark_write_avro()`, `spark_write_csv()`, `spark_write_jdbc()`, `spark_write_json()`, `spark_write_orc()`, `spark_write_parquet()`, `spark_write_source()`, `spark_write_table()`, `spark_write_text()`

---

spark_write_jdbc	<i>Writes a Spark DataFrame into a JDBC table</i>
------------------	---------------------------------------------------

---

**Description**

Writes a Spark DataFrame into a JDBC table.

**Usage**

```
spark_write_jdbc(
  x,
  name,
  mode = NULL,
  options = list(),
  partition_by = NULL,
  ...
)
```

**Arguments**

x	A Spark DataFrame or dplyr operation
name	The name to assign to the newly generated table.
mode	A character element. Specifies the behavior when data or table already exists. Supported values include: 'error', 'append', 'overwrite' and ignore. Notice that 'overwrite' will also change the column structure. For more details see also <a href="http://spark.apache.org/docs/latest/sql-programming-guide.html#save-modes">http://spark.apache.org/docs/latest/sql-programming-guide.html#save-modes</a> for your version of Spark.
options	A list of strings with additional options.
partition_by	A character vector. Partitions the output by the given columns on the file system.
...	Optional arguments; currently unused.

**See Also**

Other Spark serialization routines: `spark_load_table()`, `spark_read_avro()`, `spark_read_csv()`, `spark_read_delta()`, `spark_read_jdbc()`, `spark_read_json()`, `spark_read_libsvm()`, `spark_read_orc()`, `spark_read_parquet()`, `spark_read_source()`, `spark_read_table()`, `spark_read_text()`, `spark_read()`, `spark_save_table()`, `spark_write_avro()`, `spark_write_csv()`, `spark_write_delta()`, `spark_write_json()`, `spark_write_orc()`, `spark_write_parquet()`, `spark_write_source()`, `spark_write_table()`, `spark_write_text()`

---

spark_write_json	<i>Write a Spark DataFrame to a JSON file</i>
------------------	-----------------------------------------------

---

**Description**

Serialize a Spark DataFrame to the **JavaScript Object Notation** format.

**Usage**

```
spark_write_json(
  x,
  path,
  mode = NULL,
  options = list(),
  partition_by = NULL,
  ...
)
```

**Arguments**

x	A Spark DataFrame or dplyr operation
path	The path to the file. Needs to be accessible from the cluster. Supports the <code>"hdfs://"</code> , <code>"s3a://"</code> and <code>"file://"</code> protocols.
mode	A character element. Specifies the behavior when data or table already exists. Supported values include: <code>'error'</code> , <code>'append'</code> , <code>'overwrite'</code> and <code>ignore</code> . Notice that <code>'overwrite'</code> will also change the column structure. For more details see also <a href="http://spark.apache.org/docs/latest/sql-programming-guide.html#save-modes">http://spark.apache.org/docs/latest/sql-programming-guide.html#save-modes</a> for your version of Spark.
options	A list of strings with additional options.
partition_by	A character vector. Partitions the output by the given columns on the file system.
...	Optional arguments; currently unused.

**See Also**

Other Spark serialization routines: `spark_load_table()`, `spark_read_avro()`, `spark_read_csv()`, `spark_read_delta()`, `spark_read_jdbc()`, `spark_read_json()`, `spark_read_libsvm()`, `spark_read_orc()`, `spark_read_parquet()`, `spark_read_source()`, `spark_read_table()`, `spark_read_text()`, `spark_read()`, `spark_save_table()`, `spark_write_avro()`, `spark_write_csv()`, `spark_write_delta()`, `spark_write_jdbc()`, `spark_write_orc()`, `spark_write_parquet()`, `spark_write_source()`, `spark_write_table()`, `spark_write_text()`

---

 spark\_write\_orc

 Write a Spark DataFrame to a ORC file
 

---

**Description**

Serialize a Spark DataFrame to the **ORC** format.

**Usage**

```
spark_write_orc(
  x,
  path,
  mode = NULL,
  options = list(),
  partition_by = NULL,
  ...
)
```

**Arguments**

x	A Spark DataFrame or dplyr operation
path	The path to the file. Needs to be accessible from the cluster. Supports the "hdfs://", "s3a://" and "file://" protocols.
mode	A character element. Specifies the behavior when data or table already exists. Supported values include: 'error', 'append', 'overwrite' and ignore. Notice that 'overwrite' will also change the column structure. For more details see also <a href="http://spark.apache.org/docs/latest/sql-programming-guide.html#save-modes">http://spark.apache.org/docs/latest/sql-programming-guide.html#save-modes</a> for your version of Spark.
options	A list of strings with additional options. See <a href="http://spark.apache.org/docs/latest/sql-programming-guide.html#configuration">http://spark.apache.org/docs/latest/sql-programming-guide.html#configuration</a> .
partition_by	A character vector. Partitions the output by the given columns on the file system.
...	Optional arguments; currently unused.

**See Also**

Other Spark serialization routines: `spark_load_table()`, `spark_read_avro()`, `spark_read_csv()`, `spark_read_delta()`, `spark_read_jdbc()`, `spark_read_json()`, `spark_read_libsvm()`, `spark_read_orc()`, `spark_read_parquet()`, `spark_read_source()`, `spark_read_table()`, `spark_read_text()`, `spark_read()`, `spark_save_table()`, `spark_write_avro()`, `spark_write_csv()`, `spark_write_delta()`, `spark_write_jdbc()`, `spark_write_json()`, `spark_write_parquet()`, `spark_write_source()`, `spark_write_table()`, `spark_write_text()`

---

spark\_write\_parquet     *Write a Spark DataFrame to a Parquet file*

---

**Description**

Serialize a Spark DataFrame to the **Parquet** format.

**Usage**

```
spark_write_parquet(
  x,
  path,
  mode = NULL,
  options = list(),
  partition_by = NULL,
  ...
)
```

**Arguments**

x	A Spark DataFrame or dplyr operation
path	The path to the file. Needs to be accessible from the cluster. Supports the "hdfs://", "s3a://" and "file://" protocols.
mode	A character element. Specifies the behavior when data or table already exists. Supported values include: 'error', 'append', 'overwrite' and ignore. Notice that 'overwrite' will also change the column structure. For more details see also <a href="http://spark.apache.org/docs/latest/sql-programming-guide.html#save-modes">http://spark.apache.org/docs/latest/sql-programming-guide.html#save-modes</a> for your version of Spark.
options	A list of strings with additional options. See <a href="http://spark.apache.org/docs/latest/sql-programming-guide.html#configuration">http://spark.apache.org/docs/latest/sql-programming-guide.html#configuration</a> .
partition_by	A character vector. Partitions the output by the given columns on the file system.
...	Optional arguments; currently unused.

**See Also**

Other Spark serialization routines: `spark_load_table()`, `spark_read_avro()`, `spark_read_csv()`, `spark_read_delta()`, `spark_read_jdbc()`, `spark_read_json()`, `spark_read_libsvm()`, `spark_read_orc()`, `spark_read_parquet()`, `spark_read_source()`, `spark_read_table()`, `spark_read_text()`, `spark_read()`, `spark_save_table()`, `spark_write_avro()`, `spark_write_csv()`, `spark_write_delta()`, `spark_write_jdbc()`, `spark_write_json()`, `spark_write_orc()`, `spark_write_source()`, `spark_write_table()`, `spark_write_text()`

---

spark\_write\_source      *Writes a Spark DataFrame into a generic source*

---

**Description**

Writes a Spark DataFrame into a generic source.

**Usage**

```
spark_write_source(
  x,
  source,
  mode = NULL,
  options = list(),
  partition_by = NULL,
  ...
)
```

**Arguments**

x	A Spark DataFrame or dplyr operation
source	A data source capable of reading data.
mode	A character element. Specifies the behavior when data or table already exists. Supported values include: 'error', 'append', 'overwrite' and ignore. Notice that 'overwrite' will also change the column structure. For more details see also <a href="http://spark.apache.org/docs/latest/sql-programming-guide.html#save-modes">http://spark.apache.org/docs/latest/sql-programming-guide.html#save-modes</a> for your version of Spark.
options	A list of strings with additional options.
partition_by	A character vector. Partitions the output by the given columns on the file system.
...	Optional arguments; currently unused.

**See Also**

Other Spark serialization routines: `spark_load_table()`, `spark_read_avro()`, `spark_read_csv()`, `spark_read_delta()`, `spark_read_jdbc()`, `spark_read_json()`, `spark_read_libsvm()`, `spark_read_orc()`, `spark_read_parquet()`, `spark_read_source()`, `spark_read_table()`, `spark_read_text()`, `spark_read()`, `spark_save_table()`, `spark_write_avro()`, `spark_write_csv()`, `spark_write_delta()`, `spark_write_jdbc()`, `spark_write_json()`, `spark_write_orc()`, `spark_write_parquet()`, `spark_write_table()`, `spark_write_text()`

---

spark_write_table	<i>Writes a Spark DataFrame into a Spark table</i>
-------------------	----------------------------------------------------

---

### Description

Writes a Spark DataFrame into a Spark table.

### Usage

```
spark_write_table(  
  x,  
  name,  
  mode = NULL,  
  options = list(),  
  partition_by = NULL,  
  ...  
)
```

### Arguments

x	A Spark DataFrame or dplyr operation
name	The name to assign to the newly generated table.
mode	A character element. Specifies the behavior when data or table already exists. Supported values include: 'error', 'append', 'overwrite' and ignore. Notice that 'overwrite' will also change the column structure.  For more details see also <a href="http://spark.apache.org/docs/latest/sql-programming-guide.html#save-modes">http://spark.apache.org/docs/latest/sql-programming-guide.html#save-modes</a> for your version of Spark.
options	A list of strings with additional options.
partition_by	A character vector. Partitions the output by the given columns on the file system.
...	Optional arguments; currently unused.

### See Also

Other Spark serialization routines: [spark\\_load\\_table\(\)](#), [spark\\_read\\_avro\(\)](#), [spark\\_read\\_csv\(\)](#), [spark\\_read\\_delta\(\)](#), [spark\\_read\\_jdbc\(\)](#), [spark\\_read\\_json\(\)](#), [spark\\_read\\_libsvm\(\)](#), [spark\\_read\\_orc\(\)](#), [spark\\_read\\_parquet\(\)](#), [spark\\_read\\_source\(\)](#), [spark\\_read\\_table\(\)](#), [spark\\_read\\_text\(\)](#), [spark\\_read\(\)](#), [spark\\_save\\_table\(\)](#), [spark\\_write\\_avro\(\)](#), [spark\\_write\\_csv\(\)](#), [spark\\_write\\_delta\(\)](#), [spark\\_write\\_jdbc\(\)](#), [spark\\_write\\_json\(\)](#), [spark\\_write\\_orc\(\)](#), [spark\\_write\\_parquet\(\)](#), [spark\\_write\\_source\(\)](#), [spark\\_write\\_text\(\)](#)

---

spark_write_text	<i>Write a Spark DataFrame to a Text file</i>
------------------	-----------------------------------------------

---

### Description

Serialize a Spark DataFrame to the plain text format.

### Usage

```
spark_write_text(
  x,
  path,
  mode = NULL,
  options = list(),
  partition_by = NULL,
  ...
)
```

### Arguments

x	A Spark DataFrame or dplyr operation
path	The path to the file. Needs to be accessible from the cluster. Supports the "hdfs://", "s3a://" and "file://" protocols.
mode	A character element. Specifies the behavior when data or table already exists. Supported values include: 'error', 'append', 'overwrite' and ignore. Notice that 'overwrite' will also change the column structure. For more details see also <a href="http://spark.apache.org/docs/latest/sql-programming-guide.html#save-modes">http://spark.apache.org/docs/latest/sql-programming-guide.html#save-modes</a> for your version of Spark.
options	A list of strings with additional options.
partition_by	A character vector. Partitions the output by the given columns on the file system.
...	Optional arguments; currently unused.

### See Also

Other Spark serialization routines: [spark\\_load\\_table\(\)](#), [spark\\_read\\_avro\(\)](#), [spark\\_read\\_csv\(\)](#), [spark\\_read\\_delta\(\)](#), [spark\\_read\\_jdbc\(\)](#), [spark\\_read\\_json\(\)](#), [spark\\_read\\_libsvm\(\)](#), [spark\\_read\\_orc\(\)](#), [spark\\_read\\_parquet\(\)](#), [spark\\_read\\_source\(\)](#), [spark\\_read\\_table\(\)](#), [spark\\_read\\_text\(\)](#), [spark\\_read\(\)](#), [spark\\_save\\_table\(\)](#), [spark\\_write\\_avro\(\)](#), [spark\\_write\\_csv\(\)](#), [spark\\_write\\_delta\(\)](#), [spark\\_write\\_jdbc\(\)](#), [spark\\_write\\_json\(\)](#), [spark\\_write\\_orc\(\)](#), [spark\\_write\\_parquet\(\)](#), [spark\\_write\\_source\(\)](#), [spark\\_write\\_table\(\)](#)



---

src_databases	<i>Show database list</i>
---------------	---------------------------

---

**Description**

Show database list

**Usage**

```
src_databases(sc, ...)
```

**Arguments**

sc	A spark_connection.
...	Optional arguments; currently unused.

---

stream_find	<i>Find Stream</i>
-------------	--------------------

---

**Description**

Finds and returns a stream based on the stream's identifier.

**Usage**

```
stream_find(sc, id)
```

**Arguments**

sc	The associated Spark connection.
id	The stream identifier to find.

**Examples**

```
## Not run:
sc <- spark_connect(master = "local")
sdf_len(sc, 10) %>%
  spark_write_parquet(path = "parquet-in")

stream <- stream_read_parquet(sc, "parquet-in") %>%
  stream_write_parquet("parquet-out")

stream_id <- stream_id(stream)
stream_find(sc, stream_id)

## End(Not run)
```

---

stream\_generate\_test *Generate Test Stream*

---

### Description

Generates a local test stream, useful when testing streams locally.

### Usage

```
stream_generate_test(
  df = rep(1:1000),
  path = "source",
  distribution = floor(10 + 1e+05 * stats::dbinom(1:20, 20, 0.5)),
  iterations = 50,
  interval = 1
)
```

### Arguments

df	The data frame used as a source of rows to the stream, will be cast to data frame if needed. Defaults to a sequence of one thousand entries.
path	Path to save stream of files to, defaults to "source".
distribution	The distribution of rows to use over each iteration, defaults to a binomial distribution. The stream will cycle through the distribution if needed.
iterations	Number of iterations to execute before stopping, defaults to fifty.
interval	The interval in seconds use to write the stream, defaults to one second.

### Details

This function requires the callr package to be installed.

---

stream\_id *Spark Stream's Identifier*

---

### Description

Retrieves the identifier of the Spark stream.

### Usage

```
stream_id(stream)
```

### Arguments

stream	The spark stream object.
--------	--------------------------

---

stream_lag	<i>Apply lag function to columns of a Spark Streaming DataFrame</i>
------------	---------------------------------------------------------------------

---

### Description

Given a streaming Spark dataframe as input, this function will return another streaming dataframe that contains all columns in the input and column(s) that are shifted behind by the offset(s) specified in ‘...’ (see example)

### Usage

```
stream_lag(x, cols, thresholds = NULL)
```

### Arguments

x	An object coercable to a Spark Streaming DataFrame.
cols	A list of expressions of the form <destination column> = <source column> ~ <offset> (e.g., ‘prev_value = value ~ 1’ will create a new column ‘prev_value’ containing all values from the source column ‘value’ shifted behind by 1
thresholds	Optional named list of timestamp column(s) and corresponding time duration(s) for determining whether a previous record is sufficiently recent relative to the current record. If the any of the time difference(s) between the current and a previous record is greater than the maximal duration allowed, then the previous record is discarded and will not be part of the query result. The durations can be specified with numeric types (which will be interpreted as max difference allowed in number of milliseconds between 2 UNIX timestamps) or time duration strings such as "5s", "5sec", "5min", "5hour", etc. Any timestamp column in ‘x’ that is not of timestamp or date Spark SQL types will be interpreted as number of milliseconds since the UNIX epoch.

### Examples

```
## Not run:

library(sparklyr)

sc <- spark_connect(master = "local", version = "2.2.0")

streaming_path <- tempfile("days_df_")
days_df <- tibble::tibble(
  today = weekdays(as.Date(seq(7), origin = "1970-01-01"))
)
num_iters <- 7
stream_generate_test(
  df = days_df,
  path = streaming_path,
  distribution = rep(nrow(days_df), num_iters),
  iterations = num_iters
```

```

)

stream_read_csv(sc, streaming_path) %>%
  stream_lag(cols = c(yesterday = today ~ 1, two_days_ago = today ~ 2)) %>%
  collect() %>%
  print(n = 10L)

## End(Not run)

```

---

stream_name	<i>Spark Stream's Name</i>
-------------	----------------------------

---

### Description

Retrieves the name of the Spark stream if available.

### Usage

```
stream_name(stream)
```

### Arguments

stream	The spark stream object.
--------	--------------------------

---

stream_read_csv	<i>Read CSV Stream</i>
-----------------	------------------------

---

### Description

Reads a CSV stream as a Spark dataframe stream.

### Usage

```

stream_read_csv(
  sc,
  path,
  name = NULL,
  header = TRUE,
  columns = NULL,
  delimiter = ",",
  quote = "\"",
  escape = "\\\"",
  charset = "UTF-8",
  null_value = NULL,
  options = list(),
  ...
)

```

**Arguments**

sc	A spark_connection.
path	The path to the file. Needs to be accessible from the cluster. Supports the "hdfs://", "s3a://" and "file://" protocols.
name	The name to assign to the newly generated stream.
header	Boolean; should the first row of data be used as a header? Defaults to TRUE.
columns	A vector of column names or a named vector of column types. If specified, the elements can be "binary" for BinaryType, "boolean" for BooleanType, "byte" for ByteType, "integer" for IntegerType, "integer64" for LongType, "double" for DoubleType, "character" for StringType, "timestamp" for TimestampType and "date" for DateType.
delimiter	The character used to delimit each column. Defaults to ','.
quote	The character used as a quote. Defaults to '"'.
escape	The character used to escape other characters. Defaults to '\\'.
charset	The character set. Defaults to "UTF-8".
null_value	The character to use for null, or missing, values. Defaults to NULL.
options	A list of strings with additional options.
...	Optional arguments; currently unused.

**See Also**

Other Spark stream serialization: [stream\\_read\\_delta\(\)](#), [stream\\_read\\_json\(\)](#), [stream\\_read\\_kafka\(\)](#), [stream\\_read\\_orc\(\)](#), [stream\\_read\\_parquet\(\)](#), [stream\\_read\\_socket\(\)](#), [stream\\_read\\_text\(\)](#), [stream\\_write\\_console\(\)](#), [stream\\_write\\_csv\(\)](#), [stream\\_write\\_delta\(\)](#), [stream\\_write\\_json\(\)](#), [stream\\_write\\_kafka\(\)](#), [stream\\_write\\_memory\(\)](#), [stream\\_write\\_orc\(\)](#), [stream\\_write\\_parquet\(\)](#), [stream\\_write\\_text\(\)](#)

**Examples**

```
## Not run:

sc <- spark_connect(master = "local")

dir.create("csv-in")
write.csv(iris, "csv-in/data.csv", row.names = FALSE)

csv_path <- file.path("file://", getwd(), "csv-in")

stream <- stream_read_csv(sc, csv_path) %>% stream_write_csv("csv-out")

stream_stop(stream)

## End(Not run)
```

---

stream_read_delta	<i>Read Delta Stream</i>
-------------------	--------------------------

---

## Description

Reads a Delta Lake table as a Spark dataframe stream.

## Usage

```
stream_read_delta(sc, path, name = NULL, options = list(), ...)
```

## Arguments

sc	A spark_connection.
path	The path to the file. Needs to be accessible from the cluster. Supports the "hdfs://", "s3a://" and "file://" protocols.
name	The name to assign to the newly generated stream.
options	A list of strings with additional options.
...	Optional arguments; currently unused.

## Details

Please note that Delta Lake requires installing the appropriate package by setting the packages parameter to "delta" in spark\_connect()

## See Also

Other Spark stream serialization: [stream\\_read\\_csv\(\)](#), [stream\\_read\\_json\(\)](#), [stream\\_read\\_kafka\(\)](#), [stream\\_read\\_orc\(\)](#), [stream\\_read\\_parquet\(\)](#), [stream\\_read\\_socket\(\)](#), [stream\\_read\\_text\(\)](#), [stream\\_write\\_console\(\)](#), [stream\\_write\\_csv\(\)](#), [stream\\_write\\_delta\(\)](#), [stream\\_write\\_json\(\)](#), [stream\\_write\\_kafka\(\)](#), [stream\\_write\\_memory\(\)](#), [stream\\_write\\_orc\(\)](#), [stream\\_write\\_parquet\(\)](#), [stream\\_write\\_text\(\)](#)

## Examples

```
## Not run:

library(sparklyr)
sc <- spark_connect(master = "local", version = "2.4.0", packages = "delta")

sdf_len(sc, 5) %>% spark_write_delta(path = "delta-test")

stream <- stream_read_delta(sc, "delta-test") %>%
  stream_write_json("json-out")

stream_stop(stream)

## End(Not run)
```

---

stream_read_json	<i>Read JSON Stream</i>
------------------	-------------------------

---

**Description**

Reads a JSON stream as a Spark dataframe stream.

**Usage**

```
stream_read_json(sc, path, name = NULL, columns = NULL, options = list(), ...)
```

**Arguments**

sc	A spark_connection.
path	The path to the file. Needs to be accessible from the cluster. Supports the "hdfs://", "s3a://" and "file://" protocols.
name	The name to assign to the newly generated stream.
columns	A vector of column names or a named vector of column types. If specified, the elements can be "binary" for BinaryType, "boolean" for BooleanType, "byte" for ByteType, "integer" for IntegerType, "integer64" for LongType, "double" for DoubleType, "character" for StringType, "timestamp" for TimestampType and "date" for DateType.
options	A list of strings with additional options.
...	Optional arguments; currently unused.

**See Also**

Other Spark stream serialization: [stream\\_read\\_csv\(\)](#), [stream\\_read\\_delta\(\)](#), [stream\\_read\\_kafka\(\)](#), [stream\\_read\\_orc\(\)](#), [stream\\_read\\_parquet\(\)](#), [stream\\_read\\_socket\(\)](#), [stream\\_read\\_text\(\)](#), [stream\\_write\\_console\(\)](#), [stream\\_write\\_csv\(\)](#), [stream\\_write\\_delta\(\)](#), [stream\\_write\\_json\(\)](#), [stream\\_write\\_kafka\(\)](#), [stream\\_write\\_memory\(\)](#), [stream\\_write\\_orc\(\)](#), [stream\\_write\\_parquet\(\)](#), [stream\\_write\\_text\(\)](#)

**Examples**

```
## Not run:

sc <- spark_connect(master = "local")

dir.create("json-in")
jsonlite::write_json(list(a = c(1, 2), b = c(10, 20)), "json-in/data.json")

json_path <- file.path("file://", getwd(), "json-in")

stream <- stream_read_json(sc, json_path) %>% stream_write_json("json-out")

stream_stop(stream)
```

```
## End(Not run)
```

---

```
stream_read_kafka      Read Kafka Stream
```

---

## Description

Reads a Kafka stream as a Spark dataframe stream.

## Usage

```
stream_read_kafka(sc, name = NULL, options = list(), ...)
```

## Arguments

sc	A spark_connection.
name	The name to assign to the newly generated stream.
options	A list of strings with additional options.
...	Optional arguments; currently unused.

## Details

Please note that Kafka requires installing the appropriate package by setting the packages parameter to "kafka" in spark\_connect()

## See Also

Other Spark stream serialization: [stream\\_read\\_csv\(\)](#), [stream\\_read\\_delta\(\)](#), [stream\\_read\\_json\(\)](#), [stream\\_read\\_orc\(\)](#), [stream\\_read\\_parquet\(\)](#), [stream\\_read\\_socket\(\)](#), [stream\\_read\\_text\(\)](#), [stream\\_write\\_console\(\)](#), [stream\\_write\\_csv\(\)](#), [stream\\_write\\_delta\(\)](#), [stream\\_write\\_json\(\)](#), [stream\\_write\\_kafka\(\)](#), [stream\\_write\\_memory\(\)](#), [stream\\_write\\_orc\(\)](#), [stream\\_write\\_parquet\(\)](#), [stream\\_write\\_text\(\)](#)

## Examples

```
## Not run:

library(sparklyr)
sc <- spark_connect(master = "local", version = "2.3", packages = "kafka")

read_options <- list(kafka.bootstrap.servers = "localhost:9092", subscribe = "topic1")
write_options <- list(kafka.bootstrap.servers = "localhost:9092", topic = "topic2")

stream <- stream_read_kafka(sc, options = read_options) %>%
  stream_write_kafka(options = write_options)
```



```
stream_stop(stream)

## End(Not run)
```

---

stream_read_orc	<i>Read ORC Stream</i>
-----------------	------------------------

---

## Description

Reads an **ORC** stream as a Spark dataframe stream.

## Usage

```
stream_read_orc(sc, path, name = NULL, columns = NULL, options = list(), ...)
```

## Arguments

sc	A spark_connection.
path	The path to the file. Needs to be accessible from the cluster. Supports the "hdfs://", "s3a://" and "file://" protocols.
name	The name to assign to the newly generated stream.
columns	A vector of column names or a named vector of column types. If specified, the elements can be "binary" for BinaryType, "boolean" for BooleanType, "byte" for ByteType, "integer" for IntegerType, "integer64" for LongType, "double" for DoubleType, "character" for StringType, "timestamp" for TimestampType and "date" for DateType.
options	A list of strings with additional options.
...	Optional arguments; currently unused.

## See Also

Other Spark stream serialization: [stream\\_read\\_csv\(\)](#), [stream\\_read\\_delta\(\)](#), [stream\\_read\\_json\(\)](#), [stream\\_read\\_kafka\(\)](#), [stream\\_read\\_parquet\(\)](#), [stream\\_read\\_socket\(\)](#), [stream\\_read\\_text\(\)](#), [stream\\_write\\_console\(\)](#), [stream\\_write\\_csv\(\)](#), [stream\\_write\\_delta\(\)](#), [stream\\_write\\_json\(\)](#), [stream\\_write\\_kafka\(\)](#), [stream\\_write\\_memory\(\)](#), [stream\\_write\\_orc\(\)](#), [stream\\_write\\_parquet\(\)](#), [stream\\_write\\_text\(\)](#)

## Examples

```
## Not run:

sc <- spark_connect(master = "local")

sdf_len(sc, 10) %>% spark_write_orc("orc-in")

stream <- stream_read_orc(sc, "orc-in") %>% stream_write_orc("orc-out")
```

```
stream_stop(stream)

## End(Not run)
```

---

```
stream_read_parquet Read Parquet Stream
```

---

### Description

Reads a parquet stream as a Spark dataframe stream.

### Usage

```
stream_read_parquet(
  sc,
  path,
  name = NULL,
  columns = NULL,
  options = list(),
  ...
)
```

### Arguments

sc	A spark_connection.
path	The path to the file. Needs to be accessible from the cluster. Supports the "hdfs://", "s3a://" and "file://" protocols.
name	The name to assign to the newly generated stream.
columns	A vector of column names or a named vector of column types. If specified, the elements can be "binary" for BinaryType, "boolean" for BooleanType, "byte" for ByteType, "integer" for IntegerType, "integer64" for LongType, "double" for DoubleType, "character" for StringType, "timestamp" for TimestampType and "date" for DateType.
options	A list of strings with additional options.
...	Optional arguments; currently unused.

### See Also

Other Spark stream serialization: [stream\\_read\\_csv\(\)](#), [stream\\_read\\_delta\(\)](#), [stream\\_read\\_json\(\)](#), [stream\\_read\\_kafka\(\)](#), [stream\\_read\\_orc\(\)](#), [stream\\_read\\_socket\(\)](#), [stream\\_read\\_text\(\)](#), [stream\\_write\\_console\(\)](#), [stream\\_write\\_csv\(\)](#), [stream\\_write\\_delta\(\)](#), [stream\\_write\\_json\(\)](#), [stream\\_write\\_kafka\(\)](#), [stream\\_write\\_memory\(\)](#), [stream\\_write\\_orc\(\)](#), [stream\\_write\\_parquet\(\)](#), [stream\\_write\\_text\(\)](#)

**Examples**

```
## Not run:

sc <- spark_connect(master = "local")

sdf_len(sc, 10) %>% spark_write_parquet("parquet-in")

stream <- stream_read_parquet(sc, "parquet-in") %>% stream_write_parquet("parquet-out")

stream_stop(stream)

## End(Not run)
```

---

stream_read_socket	<i>Read Socket Stream</i>
--------------------	---------------------------

---

**Description**

Reads a Socket stream as a Spark dataframe stream.

**Usage**

```
stream_read_socket(sc, name = NULL, columns = NULL, options = list(), ...)
```

**Arguments**

sc	A spark_connection.
name	The name to assign to the newly generated stream.
columns	A vector of column names or a named vector of column types. If specified, the elements can be "binary" for BinaryType, "boolean" for BooleanType, "byte" for ByteType, "integer" for IntegerType, "integer64" for LongType, "double" for DoubleType, "character" for StringType, "timestamp" for TimestampType and "date" for DateType.
options	A list of strings with additional options.
...	Optional arguments; currently unused.

**See Also**

Other Spark stream serialization: [stream\\_read\\_csv\(\)](#), [stream\\_read\\_delta\(\)](#), [stream\\_read\\_json\(\)](#), [stream\\_read\\_kafka\(\)](#), [stream\\_read\\_orc\(\)](#), [stream\\_read\\_parquet\(\)](#), [stream\\_read\\_text\(\)](#), [stream\\_write\\_console\(\)](#), [stream\\_write\\_csv\(\)](#), [stream\\_write\\_delta\(\)](#), [stream\\_write\\_json\(\)](#), [stream\\_write\\_kafka\(\)](#), [stream\\_write\\_memory\(\)](#), [stream\\_write\\_orc\(\)](#), [stream\\_write\\_parquet\(\)](#), [stream\\_write\\_text\(\)](#)

**Examples**

```
## Not run:

sc <- spark_connect(master = "local")

# Start socket server from terminal, example: nc -lk 9999
stream <- stream_read_socket(sc, options = list(host = "localhost", port = 9999))
stream

## End(Not run)
```

---

stream_read_text	<i>Read Text Stream</i>
------------------	-------------------------

---

**Description**

Reads a text stream as a Spark dataframe stream.

**Usage**

```
stream_read_text(sc, path, name = NULL, options = list(), ...)
```

**Arguments**

sc	A spark_connection.
path	The path to the file. Needs to be accessible from the cluster. Supports the "hdfs://", "s3a://" and "file://" protocols.
name	The name to assign to the newly generated stream.
options	A list of strings with additional options.
...	Optional arguments; currently unused.

**See Also**

Other Spark stream serialization: [stream\\_read\\_csv\(\)](#), [stream\\_read\\_delta\(\)](#), [stream\\_read\\_json\(\)](#), [stream\\_read\\_kafka\(\)](#), [stream\\_read\\_orc\(\)](#), [stream\\_read\\_parquet\(\)](#), [stream\\_read\\_socket\(\)](#), [stream\\_write\\_console\(\)](#), [stream\\_write\\_csv\(\)](#), [stream\\_write\\_delta\(\)](#), [stream\\_write\\_json\(\)](#), [stream\\_write\\_kafka\(\)](#), [stream\\_write\\_memory\(\)](#), [stream\\_write\\_orc\(\)](#), [stream\\_write\\_parquet\(\)](#), [stream\\_write\\_text\(\)](#)

**Examples**

```
## Not run:

sc <- spark_connect(master = "local")

dir.create("text-in")
```

```

writeLines("A text entry", "text-in/text.txt")

text_path <- file.path("file://", getwd(), "text-in")

stream <- stream_read_text(sc, text_path) %>% stream_write_text("text-out")

stream_stop(stream)

## End(Not run)

```

---

stream_render	<i>Render Stream</i>
---------------	----------------------

---

### Description

Collects streaming statistics to render the stream as an 'htmlwidget'.

### Usage

```
stream_render(stream = NULL, collect = 10, stats = NULL, ...)
```

### Arguments

stream	The stream to render
collect	The interval in seconds to collect data before rendering the 'htmlwidget'.
stats	Optional stream statistics collected using <code>stream_stats()</code> , when specified, stream should be omitted.
...	Additional optional arguments.

### Examples

```

## Not run:
library(sparklyr)
sc <- spark_connect(master = "local")

dir.create("iris-in")
write.csv(iris, "iris-in/iris.csv", row.names = FALSE)

stream <- stream_read_csv(sc, "iris-in/") %>%
  stream_write_csv("iris-out/")

stream_render(stream)
stream_stop(stream)

## End(Not run)

```

---

stream_stats	<i>Stream Statistics</i>
--------------	--------------------------

---

**Description**

Collects streaming statistics, usually, to be used with `stream_render()` to render streaming statistics.

**Usage**

```
stream_stats(stream, stats = list())
```

**Arguments**

stream	The stream to collect statistics from.
stats	An optional stats object generated using <code>stream_stats()</code> .

**Value**

A stats object containing streaming statistics that can be passed back to the `stats` parameter to continue aggregating streaming stats.

**Examples**

```
## Not run:
sc <- spark_connect(master = "local")
sdf_len(sc, 10) %>%
  spark_write_parquet(path = "parquet-in")

stream <- stream_read_parquet(sc, "parquet-in") %>%
  stream_write_parquet("parquet-out")

stream_stats(stream)

## End(Not run)
```

---

stream_stop	<i>Stops a Spark Stream</i>
-------------	-----------------------------

---

**Description**

Stops processing data from a Spark stream.

**Usage**

```
stream_stop(stream)
```

**Arguments**

stream      The spark stream object to be stopped.

---

stream\_trigger\_continuous

*Spark Stream Continuous Trigger*

---

**Description**

Creates a Spark structured streaming trigger to execute continuously. This mode is the most performant but not all operations are supported.

**Usage**

```
stream_trigger_continuous(checkpoint = 5000)
```

**Arguments**

checkpoint      The checkpoint interval specified in milliseconds.

**See Also**

[stream\\_trigger\\_interval](#)

---

stream\_trigger\_interval

*Spark Stream Interval Trigger*

---

**Description**

Creates a Spark structured streaming trigger to execute over the specified interval.

**Usage**

```
stream_trigger_interval(interval = 1000)
```

**Arguments**

interval      The execution interval specified in milliseconds.

**See Also**

[stream\\_trigger\\_continuous](#)

---

`stream_view`*View Stream*

---

**Description**

Opens a Shiny gadget to visualize the given stream.

**Usage**

```
stream_view(stream, ...)
```

**Arguments**

<code>stream</code>	The stream to visualize.
<code>...</code>	Additional optional arguments.

**Examples**

```
## Not run:
library(sparklyr)
sc <- spark_connect(master = "local")

dir.create("iris-in")
write.csv(iris, "iris-in/iris.csv", row.names = FALSE)

stream_read_csv(sc, "iris-in/") %>%
  stream_write_csv("iris-out/") %>%
  stream_view() %>%
  stream_stop()

## End(Not run)
```

---

`stream_watermark`*Watermark Stream*

---

**Description**

Ensures a stream has a watermark defined, which is required for some operations over streams.

**Usage**

```
stream_watermark(x, column = "timestamp", threshold = "10 minutes")
```



**Arguments**

x	An object coercable to a Spark Streaming DataFrame.
column	The name of the column that contains the event time of the row, if the column is missing, a column with the current time will be added.
threshold	The minimum delay to wait to data to arrive late, defaults to ten minutes.

---

stream\_write\_console *Write Console Stream*

---

**Description**

Writes a Spark dataframe stream into console logs.

**Usage**

```
stream_write_console(
  x,
  mode = c("append", "complete", "update"),
  options = list(),
  trigger = stream_trigger_interval(),
  ...
)
```

**Arguments**

x	A Spark DataFrame or dplyr operation
mode	Specifies how data is written to a streaming sink. Valid values are "append", "complete" or "update".
options	A list of strings with additional options.
trigger	The trigger for the stream query, defaults to micro-batches running every 5 seconds. See <a href="#">stream_trigger_interval</a> and <a href="#">stream_trigger_continuous</a> .
...	Optional arguments; currently unused.

**See Also**

Other Spark stream serialization: [stream\\_read\\_csv\(\)](#), [stream\\_read\\_delta\(\)](#), [stream\\_read\\_json\(\)](#), [stream\\_read\\_kafka\(\)](#), [stream\\_read\\_orc\(\)](#), [stream\\_read\\_parquet\(\)](#), [stream\\_read\\_socket\(\)](#), [stream\\_read\\_text\(\)](#), [stream\\_write\\_csv\(\)](#), [stream\\_write\\_delta\(\)](#), [stream\\_write\\_json\(\)](#), [stream\\_write\\_kafka\(\)](#), [stream\\_write\\_memory\(\)](#), [stream\\_write\\_orc\(\)](#), [stream\\_write\\_parquet\(\)](#), [stream\\_write\\_text\(\)](#)

**Examples**

```
## Not run:

sc <- spark_connect(master = "local")

sdf_len(sc, 10) %>%
  dplyr::transmute(text = as.character(id)) %>%
  spark_write_text("text-in")

stream <- stream_read_text(sc, "text-in") %>% stream_write_console()

stream_stop(stream)

## End(Not run)
```

---

stream_write_csv	<i>Write CSV Stream</i>
------------------	-------------------------

---

**Description**

Writes a Spark dataframe stream into a tabular (typically, comma-separated) stream.

**Usage**

```
stream_write_csv(
  x,
  path,
  mode = c("append", "complete", "update"),
  trigger = stream_trigger_interval(),
  checkpoint = file.path(path, "checkpoint"),
  header = TRUE,
  delimiter = ",",
  quote = "\"",
  escape = "\\\"",
  charset = "UTF-8",
  null_value = NULL,
  options = list(),
  ...
)
```

**Arguments**

x	A Spark DataFrame or dplyr operation
path	The path to the file. Needs to be accessible from the cluster. Supports the "hdfs://", "s3a://" and "file://" protocols.
mode	Specifies how data is written to a streaming sink. Valid values are "append", "complete" or "update".

trigger	The trigger for the stream query, defaults to micro-batches running every 5 seconds. See <a href="#">stream_trigger_interval</a> and <a href="#">stream_trigger_continuous</a> .
checkpoint	The location where the system will write all the checkpoint information to guarantee end-to-end fault-tolerance.
header	Should the first row of data be used as a header? Defaults to TRUE.
delimiter	The character used to delimit each column, defaults to ,.
quote	The character used as a quote. Defaults to ' ' ' '.
escape	The character used to escape other characters, defaults to \.
charset	The character set, defaults to "UTF-8".
null_value	The character to use for default values, defaults to NULL.
options	A list of strings with additional options.
...	Optional arguments; currently unused.

**See Also**

Other Spark stream serialization: [stream\\_read\\_csv\(\)](#), [stream\\_read\\_delta\(\)](#), [stream\\_read\\_json\(\)](#), [stream\\_read\\_kafka\(\)](#), [stream\\_read\\_orc\(\)](#), [stream\\_read\\_parquet\(\)](#), [stream\\_read\\_socket\(\)](#), [stream\\_read\\_text\(\)](#), [stream\\_write\\_console\(\)](#), [stream\\_write\\_delta\(\)](#), [stream\\_write\\_json\(\)](#), [stream\\_write\\_kafka\(\)](#), [stream\\_write\\_memory\(\)](#), [stream\\_write\\_orc\(\)](#), [stream\\_write\\_parquet\(\)](#), [stream\\_write\\_text\(\)](#)

**Examples**

```
## Not run:

sc <- spark_connect(master = "local")

dir.create("csv-in")
write.csv(iris, "csv-in/data.csv", row.names = FALSE)

csv_path <- file.path("file://", getwd(), "csv-in")

stream <- stream_read_csv(sc, csv_path) %>% stream_write_csv("csv-out")

stream_stop(stream)

## End(Not run)
```

---

stream\_write\_delta      *Write Delta Stream*

---

**Description**

Writes a Spark dataframe stream into a Delta Lake table.

**Usage**

```
stream_write_delta(
  x,
  path,
  mode = c("append", "complete", "update"),
  checkpoint = file.path("checkpoints", random_string()),
  options = list(),
  ...
)
```

**Arguments**

x	A Spark DataFrame or dplyr operation
path	The path to the file. Needs to be accessible from the cluster. Supports the "hdfs://", "s3a://" and "file://" protocols.
mode	Specifies how data is written to a streaming sink. Valid values are "append", "complete" or "update".
checkpoint	The location where the system will write all the checkpoint information to guarantee end-to-end fault-tolerance.
options	A list of strings with additional options.
...	Optional arguments; currently unused.

**Details**

Please note that Delta Lake requires installing the appropriate package by setting the packages parameter to "delta" in `spark_connect()`

**See Also**

Other Spark stream serialization: [stream\\_read\\_csv\(\)](#), [stream\\_read\\_delta\(\)](#), [stream\\_read\\_json\(\)](#), [stream\\_read\\_kafka\(\)](#), [stream\\_read\\_orc\(\)](#), [stream\\_read\\_parquet\(\)](#), [stream\\_read\\_socket\(\)](#), [stream\\_read\\_text\(\)](#), [stream\\_write\\_console\(\)](#), [stream\\_write\\_csv\(\)](#), [stream\\_write\\_json\(\)](#), [stream\\_write\\_kafka\(\)](#), [stream\\_write\\_memory\(\)](#), [stream\\_write\\_orc\(\)](#), [stream\\_write\\_parquet\(\)](#), [stream\\_write\\_text\(\)](#)

**Examples**

```
## Not run:

library(sparklyr)
sc <- spark_connect(master = "local", version = "2.4.0", packages = "delta")

dir.create("text-in")
writeLines("A text entry", "text-in/text.txt")

text_path <- file.path("file://", getwd(), "text-in")

stream <- stream_read_text(sc, text_path) %>% stream_write_delta(path = "delta-test")
```

```
stream_stop(stream)

## End(Not run)
```

---

```
stream_write_json      Write JSON Stream
```

---

### Description

Writes a Spark dataframe stream into a JSON stream.

### Usage

```
stream_write_json(
  x,
  path,
  mode = c("append", "complete", "update"),
  trigger = stream_trigger_interval(),
  checkpoint = file.path(path, "checkpoints", random_string("")),
  options = list(),
  ...
)
```

### Arguments

x	A Spark DataFrame or dplyr operation
path	The destination path. Needs to be accessible from the cluster. Supports the "hdfs://", "s3a://" and "file://" protocols.
mode	Specifies how data is written to a streaming sink. Valid values are "append", "complete" or "update".
trigger	The trigger for the stream query, defaults to micro-batches running every 5 seconds. See <a href="#">stream_trigger_interval</a> and <a href="#">stream_trigger_continuous</a> .
checkpoint	The location where the system will write all the checkpoint information to guarantee end-to-end fault-tolerance.
options	A list of strings with additional options.
...	Optional arguments; currently unused.

### See Also

Other Spark stream serialization: [stream\\_read\\_csv\(\)](#), [stream\\_read\\_delta\(\)](#), [stream\\_read\\_json\(\)](#), [stream\\_read\\_kafka\(\)](#), [stream\\_read\\_orc\(\)](#), [stream\\_read\\_parquet\(\)](#), [stream\\_read\\_socket\(\)](#), [stream\\_read\\_text\(\)](#), [stream\\_write\\_console\(\)](#), [stream\\_write\\_csv\(\)](#), [stream\\_write\\_delta\(\)](#), [stream\\_write\\_kafka\(\)](#), [stream\\_write\\_memory\(\)](#), [stream\\_write\\_orc\(\)](#), [stream\\_write\\_parquet\(\)](#), [stream\\_write\\_text\(\)](#)

**Examples**

```
## Not run:

sc <- spark_connect(master = "local")

dir.create("json-in")
jsonlite::write_json(list(a = c(1, 2), b = c(10, 20)), "json-in/data.json")

json_path <- file.path("file://", getwd(), "json-in")

stream <- stream_read_json(sc, json_path) %>% stream_write_json("json-out")

stream_stop(stream)

## End(Not run)
```

---

stream\_write\_kafka      *Write Kafka Stream*

---

**Description**

Writes a Spark dataframe stream into an kafka stream.

**Usage**

```
stream_write_kafka(
  x,
  mode = c("append", "complete", "update"),
  trigger = stream_trigger_interval(),
  checkpoint = file.path("checkpoints", random_string("")),
  options = list(),
  ...
)
```

**Arguments**

x	A Spark DataFrame or dplyr operation
mode	Specifies how data is written to a streaming sink. Valid values are "append", "complete" or "update".
trigger	The trigger for the stream query, defaults to micro-batches running every 5 seconds. See <a href="#">stream_trigger_interval</a> and <a href="#">stream_trigger_continuous</a> .
checkpoint	The location where the system will write all the checkpoint information to guarantee end-to-end fault-tolerance.
options	A list of strings with additional options.
...	Optional arguments; currently unused.

## Details

Please note that Kafka requires installing the appropriate package by setting the `packages` parameter to "kafka" in `spark_connect()`

## See Also

Other Spark stream serialization: [stream\\_read\\_csv\(\)](#), [stream\\_read\\_delta\(\)](#), [stream\\_read\\_json\(\)](#), [stream\\_read\\_kafka\(\)](#), [stream\\_read\\_orc\(\)](#), [stream\\_read\\_parquet\(\)](#), [stream\\_read\\_socket\(\)](#), [stream\\_read\\_text\(\)](#), [stream\\_write\\_console\(\)](#), [stream\\_write\\_csv\(\)](#), [stream\\_write\\_delta\(\)](#), [stream\\_write\\_json\(\)](#), [stream\\_write\\_memory\(\)](#), [stream\\_write\\_orc\(\)](#), [stream\\_write\\_parquet\(\)](#), [stream\\_write\\_text\(\)](#)

## Examples

```
## Not run:

library(sparklyr)
sc <- spark_connect(master = "local", version = "2.3", packages = "kafka")

read_options <- list(kafka.bootstrap.servers = "localhost:9092", subscribe = "topic1")
write_options <- list(kafka.bootstrap.servers = "localhost:9092", topic = "topic2")

stream <- stream_read_kafka(sc, options = read_options) %>%
  stream_write_kafka(options = write_options)

stream_stop(stream)

## End(Not run)
```

---

stream\_write\_memory     *Write Memory Stream*

---

## Description

Writes a Spark dataframe stream into a memory stream.

## Usage

```
stream_write_memory(
  x,
  name = random_string("sparklyr_tmp_"),
  mode = c("append", "complete", "update"),
  trigger = stream_trigger_interval(),
  checkpoint = file.path("checkpoints", name, random_string("")),
  options = list(),
  ...
)
```

**Arguments**

x	A Spark DataFrame or dplyr operation
name	The name to assign to the newly generated stream.
mode	Specifies how data is written to a streaming sink. Valid values are "append", "complete" or "update".
trigger	The trigger for the stream query, defaults to micro-batches running every 5 seconds. See <a href="#">stream_trigger_interval</a> and <a href="#">stream_trigger_continuous</a> .
checkpoint	The location where the system will write all the checkpoint information to guarantee end-to-end fault-tolerance.
options	A list of strings with additional options.
...	Optional arguments; currently unused.

**See Also**

Other Spark stream serialization: [stream\\_read\\_csv\(\)](#), [stream\\_read\\_delta\(\)](#), [stream\\_read\\_json\(\)](#), [stream\\_read\\_kafka\(\)](#), [stream\\_read\\_orc\(\)](#), [stream\\_read\\_parquet\(\)](#), [stream\\_read\\_socket\(\)](#), [stream\\_read\\_text\(\)](#), [stream\\_write\\_console\(\)](#), [stream\\_write\\_csv\(\)](#), [stream\\_write\\_delta\(\)](#), [stream\\_write\\_json\(\)](#), [stream\\_write\\_kafka\(\)](#), [stream\\_write\\_orc\(\)](#), [stream\\_write\\_parquet\(\)](#), [stream\\_write\\_text\(\)](#)

**Examples**

```
## Not run:

sc <- spark_connect(master = "local")

dir.create("csv-in")
write.csv(iris, "csv-in/data.csv", row.names = FALSE)

csv_path <- file.path("file://", getwd(), "csv-in")

stream <- stream_read_csv(sc, csv_path) %>% stream_write_memory("csv-out")

stream_stop(stream)

## End(Not run)
```

---

stream\_write\_orc

*Write a ORC Stream*


---

**Description**

Writes a Spark dataframe stream into an **ORC** stream.



**Usage**

```
stream_write_orc(
  x,
  path,
  mode = c("append", "complete", "update"),
  trigger = stream_trigger_interval(),
  checkpoint = file.path(path, "checkpoints", random_string("")),
  options = list(),
  ...
)
```

**Arguments**

x	A Spark DataFrame or dplyr operation
path	The destination path. Needs to be accessible from the cluster. Supports the "hdfs://", "s3a://" and "file://" protocols.
mode	Specifies how data is written to a streaming sink. Valid values are "append", "complete" or "update".
trigger	The trigger for the stream query, defaults to micro-batches running every 5 seconds. See <a href="#">stream_trigger_interval</a> and <a href="#">stream_trigger_continuous</a> .
checkpoint	The location where the system will write all the checkpoint information to guarantee end-to-end fault-tolerance.
options	A list of strings with additional options.
...	Optional arguments; currently unused.

**See Also**

Other Spark stream serialization: [stream\\_read\\_csv\(\)](#), [stream\\_read\\_delta\(\)](#), [stream\\_read\\_json\(\)](#), [stream\\_read\\_kafka\(\)](#), [stream\\_read\\_orc\(\)](#), [stream\\_read\\_parquet\(\)](#), [stream\\_read\\_socket\(\)](#), [stream\\_read\\_text\(\)](#), [stream\\_write\\_console\(\)](#), [stream\\_write\\_csv\(\)](#), [stream\\_write\\_delta\(\)](#), [stream\\_write\\_json\(\)](#), [stream\\_write\\_kafka\(\)](#), [stream\\_write\\_memory\(\)](#), [stream\\_write\\_parquet\(\)](#), [stream\\_write\\_text\(\)](#)

**Examples**

```
## Not run:

sc <- spark_connect(master = "local")

sdf_len(sc, 10) %>% spark_write_orc("orc-in")

stream <- stream_read_orc(sc, "orc-in") %>% stream_write_orc("orc-out")

stream_stop(stream)

## End(Not run)
```

---

stream\_write\_parquet    *Write Parquet Stream*

---

### Description

Writes a Spark dataframe stream into a parquet stream.

### Usage

```
stream_write_parquet(
  x,
  path,
  mode = c("append", "complete", "update"),
  trigger = stream_trigger_interval(),
  checkpoint = file.path(path, "checkpoints", random_string("")),
  options = list(),
  ...
)
```

### Arguments

x	A Spark DataFrame or dplyr operation
path	The destination path. Needs to be accessible from the cluster. Supports the "hdfs://", "s3a://" and "file://" protocols.
mode	Specifies how data is written to a streaming sink. Valid values are "append", "complete" or "update".
trigger	The trigger for the stream query, defaults to micro-batches running every 5 seconds. See <a href="#">stream_trigger_interval</a> and <a href="#">stream_trigger_continuous</a> .
checkpoint	The location where the system will write all the checkpoint information to guarantee end-to-end fault-tolerance.
options	A list of strings with additional options.
...	Optional arguments; currently unused.

### See Also

Other Spark stream serialization: [stream\\_read\\_csv\(\)](#), [stream\\_read\\_delta\(\)](#), [stream\\_read\\_json\(\)](#), [stream\\_read\\_kafka\(\)](#), [stream\\_read\\_orc\(\)](#), [stream\\_read\\_parquet\(\)](#), [stream\\_read\\_socket\(\)](#), [stream\\_read\\_text\(\)](#), [stream\\_write\\_console\(\)](#), [stream\\_write\\_csv\(\)](#), [stream\\_write\\_delta\(\)](#), [stream\\_write\\_json\(\)](#), [stream\\_write\\_kafka\(\)](#), [stream\\_write\\_memory\(\)](#), [stream\\_write\\_orc\(\)](#), [stream\\_write\\_text\(\)](#)

**Examples**

```
## Not run:

sc <- spark_connect(master = "local")

sdf_len(sc, 10) %>% spark_write_parquet("parquet-in")

stream <- stream_read_parquet(sc, "parquet-in") %>% stream_write_parquet("parquet-out")

stream_stop(stream)

## End(Not run)
```

---

stream\_write\_text      *Write Text Stream*

---

**Description**

Writes a Spark dataframe stream into a text stream.

**Usage**

```
stream_write_text(
  x,
  path,
  mode = c("append", "complete", "update"),
  trigger = stream_trigger_interval(),
  checkpoint = file.path(path, "checkpoints", random_string("")),
  options = list(),
  ...
)
```

**Arguments**

x	A Spark DataFrame or dplyr operation
path	The destination path. Needs to be accessible from the cluster. Supports the "hdfs://", "s3a://" and "file://" protocols.
mode	Specifies how data is written to a streaming sink. Valid values are "append", "complete" or "update".
trigger	The trigger for the stream query, defaults to micro-batches running every 5 seconds. See <a href="#">stream_trigger_interval</a> and <a href="#">stream_trigger_continuous</a> .
checkpoint	The location where the system will write all the checkpoint information to guarantee end-to-end fault-tolerance.
options	A list of strings with additional options.
...	Optional arguments; currently unused.

**See Also**

Other Spark stream serialization: `stream_read_csv()`, `stream_read_delta()`, `stream_read_json()`, `stream_read_kafka()`, `stream_read_orc()`, `stream_read_parquet()`, `stream_read_socket()`, `stream_read_text()`, `stream_write_console()`, `stream_write_csv()`, `stream_write_delta()`, `stream_write_json()`, `stream_write_kafka()`, `stream_write_memory()`, `stream_write_orc()`, `stream_write_parquet()`

**Examples**

```
## Not run:

sc <- spark_connect(master = "local")

dir.create("text-in")
writeLines("A text entry", "text-in/text.txt")

text_path <- file.path("file://", getwd(), "text-in")

stream <- stream_read_text(sc, text_path) %>% stream_write_text("text-out")

stream_stop(stream)

## End(Not run)
```

tbl\_cache

*Cache a Spark Table***Description**

Force a Spark table with name `name` to be loaded into memory. Operations on cached tables should normally (although not always) be more performant than the same operation performed on an uncached table.

**Usage**

```
tbl_cache(sc, name, force = TRUE)
```

**Arguments**

<code>sc</code>	A <code>spark_connection</code> .
<code>name</code>	The table name.
<code>force</code>	Force the data to be loaded into memory? This is accomplished by calling the <code>count</code> API on the associated Spark DataFrame.

---

tbl_change_db	<i>Use specific database</i>
---------------	------------------------------

---

**Description**

Use specific database

**Usage**

```
tbl_change_db(sc, name)
```

**Arguments**

sc	A spark_connection.
name	The database name.

---

tbl_uncache	<i>Uncache a Spark Table</i>
-------------	------------------------------

---

**Description**

Force a Spark table with name name to be unloaded from memory.

**Usage**

```
tbl_uncache(sc, name)
```

**Arguments**

sc	A spark_connection.
name	The table name.

---

transform_sdf	<i>transform a subset of column(s) in a Spark Dataframe</i>
---------------	-------------------------------------------------------------

---

**Description**

transform a subset of column(s) in a Spark Dataframe

**Usage**

```
transform_sdf(x, cols, fn)
```

**Arguments**

x	An object coercible to a Spark DataFrame
cols	Subset of columns to apply transformation to
fn	Transformation function taking column name as the 1st parameter, the corresponding <code>org.apache.spark.sql.Column</code> object as the 2nd parameter, and returning a transformed <code>org.apache.spark.sql.Column</code> object

---

unite	<i>Unite</i>
-------	--------------

---

**Description**

See [unite](#) for more details.

---

unnest	<i>Unnest</i>
--------	---------------

---

**Description**

See [unnest](#) for more details.

[.tbl\_spark

*Subsetting operator for Spark dataframe***Description**

Subsetting operator for Spark dataframe allowing a subset of column(s) to be selected using syntaxes similar to those supported by R dataframes

**Usage**

```
## S3 method for class 'tbl_spark'
x[i]
```

**Arguments**

x	The Spark dataframe
i	Expression specifying subset of column(s) to include or exclude from the result (e.g., ["col1"], [c("col1", "col2")], [1:10], [-1], [NULL], or [])

**Examples**

```
## Not run:
library(sparklyr)
sc <- spark_connect(master = "spark://HOST:PORT")
example_sdf <- copy_to(sc, tibble::tibble(a = 1, b = 2))
example_sdf["a"] %>% print()

## End(Not run)
```

%&gt;%

*Infix operator for composing a lambda expression***Description**

Infix operator that allows a lambda expression to be composed in R and be translated to Spark SQL equivalent using 'dbplyr::translate\_sql' functionalities

**Usage**

```
params %>% ...
```

**Arguments**

params	Parameter(s) of the lambda expression, can be either a single parameter or a comma separated listed of parameters in the form of <code>.(param1,param2,...)</code> (see examples)
...	Body of the lambda expression, <i>must</i> be within parentheses*

**Details**

Notice when composing a lambda expression in R, the body of the lambda expression *must* always be surrounded with parentheses\*, otherwise a parsing error will occur.

**Examples**

```
## Not run:  
  
a %-% (mean(a) + 1) # translates to <SQL> `a` -> (AVG(`a`) OVER () + 1.0)  
  
.(a, b) %-% (a < 1 && b > 1) # translates to <SQL> `a`,`b` -> (`a` < 1.0 AND `b` > 1.0)  
  
## End(Not run)
```



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