Package 'PIPS'

July 2, 2014

Type Package

Title Predicted Interval Plots

Author Daniel G. Muenz, Ray Griner <rgriner@sdac.harvard.edu>, Huichao Chen, Lijuan Deng, Sachiko Miyahara, and Scott R. Evans <evans@sdac.harvard.edu>, with contributions from Lingling Li,Hajime Uno, and Laura M. Smeaton.

Maintainer Ray Griner <rgriner@sdac.harvard.edu>

Version 1.0.1

Date 2012-08-31

Depends R (>= 2.12.1)

Description Generate Predicted Interval Plots. Simulate and plot confidence intervals of an effect estimate given observed data and a hypothesis about the distribution of future data.

License GPL-2

LazyLoad yes

Repository CRAN

Date/Publication 2012-09-03 16:05:34

NeedsCompilation no

R topics documented:

PIPS-package *Generate Predicted Interval Plots*

Description

Generate Predicted Interval Plots. Simulate and plot confidence intervals of an effect estimate given observed data and a hypothesis about the distribution of future data.

Details

Package:	PIPS
Type:	Package
Version:	1.0.1
Date:	2012-08-31
License:	GPL-2
LazyLoad:	yes

Note

The work was supported by National Institute of Health (NIH) grants including the Neurologic AIDS Research Consortium grant NS32228 from NINDS, the Statistical and Data Management Center of the Adult AIDS Clinical Trials Group grant 1 U01 068634 from NIAID, the Statistical Methods for HIV/AIDS Studies 2 R01 AI052817-04 from NIAID, and the Statistical and Data Management Center of the International Maternal Pediatric and Adolescent AIDS Clinical Trials Group grant U01 AI068616 from NIAID.

Author(s)

Daniel G. Muenz, Ray Griner, Huichao Chen, Lijuan Deng, Sachiko Miyahara, and Scott R. Evans <evans@sdac.harvard.edu>, with contributions from Lingling Li, Hajime Uno, and Laura M. Smeaton.

LL, HU, and SRE contributed code that created predicted interval plots (PIPS) for time to event analyses. LMS provided enhancements for time-to-event outcomes. (Time-to-event outcomes are not yet supported by the package, but these programs aided our design.) HC wrote code for binary outcomes. LD and SM wrote for normal outcomes. DGM consolidated, modularized, and improved these contributions. RG finished the modularization and tested. SRE provided statistical concepts/methodology.

Affiliations:

DGM, RG, HC, LD, SM, LS, SRE: Center for Biostatistics in AIDS Research, Harvard School of Public Health, Boston, MA

HC, SM, HU, SRE: Department of Biostatistics, Harvard School of Public Health, Boston, MA

LL: Harvard Pilgrim Health Care Institute, Boston, MA

HU: Dana Farber Cancer Institute, Boston, MA

Maintainer: Ray Griner <rgriner@sdac.harvard.edu>

References

Evans SR, Li L, Wei LJ, "Data Monitoring in Clinical Trials Using Prediction", *Drug Information Journal*, 41:733-742, 2007.

Li L, Evans SR, Uno H, Wei LJ. "Predicted Interval Plots: A Graphical Tool for Data Monitoring in Clinical Trials", *Statistics in Biopharmaceutical Research*, 1:4:348-355, 2009.

See Also

pred.int

plot.pred.int

print.pred.int

Examples

```
# Make some fake data
myY<-c(rep(1,times=20),rep(0,times=80),rep(1,times=25),rep(0,times=25))
myGroup<-c(rep('A',100),rep('B',50))

# Run the programs
pips <- pred.int(y=myY, group=myGroup, N=c(200,100),
                 data.type="binary", iters=100)
print(pips)
plot(pips)

# Run demo(package="PIPS") for more examples.
```

---

plot.pred.int *Plot objects of class* pred.int *for predicted interval plots*

Description

Plot objects of class pred.int for predicted interval plots

Usage

```
## S3 method for class 'pred.int'
plot(x, conf.int = TRUE, vline = NA, which = NULL, axes = TRUE,
    pi.col.fun=NULL, ci.col=2, main, xlab, ylab, xlim, ...)
```

Arguments

x	Object of class pred.int containing the PIPs data for plotting
conf.int	Print confidence interval for observed data? TRUE (default)/FALSE
vline	Vector of x-values for vertical lines to print on the graph. These may represent superiority/inferiority bounds or other x-values of interest
which	Only create graphs for some of the comparisons
axes	TRUE/FALSE. Print axes on graph? Default is TRUE. Probably you should only suppress axes now if you will add them later (for example if you don't like the default axes)
pi.col.fun	An optional one parameter function that takes a number between 0 and 100 and returns a color. This can be used to color the predicted intervals different colors. The input argument is the position of the interval on the vertical axis of the graph. Default coloring is three shades of gray: Percentiles (0-10) and (90-100) are light gray, (10-25) and (75-90) are darker, and (25-75) is darkest
ci.col	Color for effect estimate and confidence interval for the observed data. Default is 2 (second color in palette).
main	Main title of graph. If blank, a default will be used. Can be either a single title or a vector of titles. If a vector, the first will be used for the first graph, the second for the second graph, etc... If any title contains the string "#BY#", this will be replaced with the name of the comparison (i.e. "B vs A")
xlab	Label on xaxis. If blank, a default will be used.
ylab	Label on xaxis. If blank, a default will be used.
xlim	Limits of xaxis (as vector of length 2). Default is large enough to contain the predicted intervals and confidence interval. Limits narrower than the defaults will be ignored.
...	Other options will be passed through to the plot.default function.

Value

No return value. Called for its side effect.

Author(s)

Daniel G. Muenz, Ray Griner <rgriner@sdac.harvard.edu>, Huichao Chen, Lijuan Deng, Sachiko Miyahara, and Scott R. Evans <evans@sdac.harvard.edu>, with contributions from Lingling Li, Hajime Uno, and Laura M. Smeaton.

See package documentation for affiliations and contributions.

References

Evans SR, Li L, Wei LJ, "Data Monitoring in Clinical Trials Using Prediction", *Drug Information Journal*, 41:733-742, 2007.

Li L, Evans SR, Uno H, Wei LJ. "Predicted Interval Plots: A Graphical Tool for Data Monitoring in Clinical Trials", *Statistics in Biopharmaceutical Research*, 1:4:348-355, 2009.

See Also

PIPS

pred.int

print.pred.int

Examples

```
# Make some fake data
myY<-c(rep(1,times=20),rep(0,times=80),rep(1,times=25),rep(0,times=25))
myGroup<-c(rep('A',100),rep('B',50))

# Run the programs
pips <- pred.int(y=myY, group=myGroup, N=c(200,100),
                 data.type="binary", iters=100)
print(pips)
plot(pips)

# Run demo(package="PIPS") for more examples.
```

---

pred.int *Generates predicted intervals for predicted interval plots*

Description

Generates predicted intervals of some effect estimate given observed data and a hypothesis about the distribution of future data.

Usage

```
pred.int(y, group = NA, N, true.y = "observed", ref = NA,
         data.type = c("t.test", "binary"), var.equal = FALSE,
         conf.level = 0.95, obs.conf.level=NA, iters = 100)
```

Arguments

y	a numeric vector of outcomes (with at least 2 elements and no missing values)
group	an optional vector of groups. If it exists, it must be the same length as y with no missing values. If missing, all observations put in the same group, and one-sample analyses are performed. See 'Details' for more information.
N	A required vector with length equal to the number of distinct groups. The ith element is what we want the number of observations to be for the ith group after simulation. (So if y is length 150 and only one group, then to simulate 50 outcomes we pass N=200.)
true.y	Either "observed","no.diff", or a vector of constants. Define mean/proportion used when simulating the data.

ref	An optional group name that will serve as the reference group. Default is the first alphabetically.
data.type	A required field indicating the type of data/statistical test that should be performed to get the effect estimate. Either "t.test" or "binary"
var.equal	TRUE/FALSE whether to assume variance equal in t-test. Default is FALSE. This does not affect the variance used when simulating data. Data is always simulated with the variance for the group, not the pooled variance
conf.level	Confidence level for intervals (between 0 and 1). Default is 0.95. This is the confidence level used for the predicted intervals and will also define the confidence level used for the observed interval unless obs.conf.level is also used.
obs.conf.level	Confidence level for the observed intervals (between 0 and 1). Default is the same level specified for the predicted intervals in the conf.level parameter.
iters	Number of predicted intervals to generate. Default is 100

Details

The pred.int function takes a vector of observations (y) as well as (optionally) the group of each observation (group), and the total number of observations expected in each group (N) when all data is observed. The function then calculates the amount of data that needs to be simulated in each group, and simulates the outcome, which is either binary or normal depending on the value of data.type.

When simulating data, the parameter true.y determines the mean/proportion of the population from which the simulated data will be drawn. This is either the observed mean/proportion (true.y="observed"), the pooled mean/proportion (true.y="no.diff"), or a vector of constants (representing the mean/proportion in each group).

Selecting data.type="t.test" with more than one group generates confidence intervals using a t.test either under the assumption of equal variance if var.equal=TRUE or unequal variance if var.equal=FALSE. In the latter case the degrees of freedom are corrected using Satterthwaite's approximation.

Selecting data.type="binary" generates confidence intervals using a test for equality of proportions (similar to that calculated in prop.test). A continuity correction is not applied.

When there is more than one group, the program treats one group as the reference group and generates N-1 sets of predicted intervals (where N is the number of groups), where each group is compared to the reference group. When all the observations are in the same group (or no group vector was provided) one-sample tests are performed.

Value

An object of class pred.int is returned, which is a list of the following:

obs.mean	Observed mean for each group (vector with length = n(groups)
obs.n	Observed n for each group
sim.n	Number simulated for each group
ci	A list of vectors of length 3 that contain the point estimate, lower, and upper confidence intervals for the observed effect. There are n(groups)-1 elements in the list (one for each comparison/graph)

pi	A list of matrices with 3 columns and iters rows. The columns are the point estimate and lower/upper confidence limit for each predicted interval. There are (n(groups)-1) matrices in the list (one for each comparison/graph).
data.type	Data type (passed from input parameter)
conf.level	Confidence level used for predicted intervals (passed from input parameter)
obs.conf.level	Confidence level used for observed intervals (see obs.conf.level input parameter)

Author(s)

Daniel G. Muenz, Ray Griner <rgriner@sdac.harvad.edu>, Huichao Chen, Lijuan Deng, Sachiko Miyahara, and Scott R. Evans <evans@sdac.harvard.edu>, with contributions from Lingling Li, Hajime Uno, and Laura M. Smeaton.

See package documentation for affiliations and contributions.

References

Evans SR, Li L, Wei LJ, "Data Monitoring in Clinical Trials Using Prediction", *Drug Information Journal*, 41:733-742, 2007.

Li L, Evans SR, Uno H, Wei LJ. "Predicted Interval Plots: A Graphical Tool for Data Monitoring in Clinical Trials", *Statistics in Biopharmaceutical Research*, 1:4:348-355, 2009.

See Also

PIPS

plot.pred.int

print.pred.int

Examples

```
# Make some fake data
myY<-c(rep(1,times=20),rep(0,times=80),rep(1,times=25),rep(0,times=25))
myGroup<-c(rep('A',100),rep('B',50))

# Run the programs
pips <- pred.int(y=myY, group=myGroup, N=c(200,100),
                 data.type="binary", iters=100)
print(pips)
plot(pips)
```

`print.pred.int` *Print objects of class* `pred.int` *for predicted interval plots*

Description

Print objects of class `pred.int` for predicted interval plots

Usage

```
## S3 method for class 'pred.int'
print(x, pi.count = 8,
     digits = max(3, getOption("digits") - 3), ...)
```

Arguments

`x`	Object of class `pred.int` to print
`pi.count`	Number of predicted intervals to print. Default is 8.
`digits`	Number of digits to print. Default is max(3, getOption("digits")-3)
`...`	Additional arguments to pass to print.default

Value

Returns a copy of the object passed

Author(s)

Daniel G. Muenz, Ray Griner <rgriner@sdac.harvard.edu>, Huichao Chen, Lijuan Deng, Sachiko Miyahara, and Scott R. Evans <evans@sdac.harvard.edu>, with contributions from Lingling Li, Hajime Uno, and Laura M. Smeaton.

See package documentation for affiliations and contributions.

References

Evans SR, Li L, Wei LJ, "Data Monitoring in Clinical Trials Using Prediction", *Drug Information Journal*, 41:733-742, 2007.

Li L, Evans SR, Uno H, Wei LJ. "Predicted Interval Plots: A Graphical Tool for Data Monitoring in Clinical Trials", *Statistics in Biopharmaceutical Research*, 1:4:348-355, 2009.

See Also

`PIPS`

`pred.int`

`plot.pred.int`

Examples

```
# Make some fake data
myY<-c(rep(1,times=20),rep(0,times=80),rep(1,times=25),rep(0,times=25))
myGroup<-c(rep('A',100),rep('B',50))

# Run the programs
pips <- pred.int(y=myY, group=myGroup, N=c(200,100),
                 data.type="binary", iters=100)
print(pips)
plot(pips)
```

Index