

Package ‘pplot’

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Type Package

Title Chronological and Ordered p-Plots for Empirical Data

Version 0.9

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Suggests MBESS

Description Generates chronological and ordered p-plots for data vectors or vectors of p-values. The p-plot visualizes the evolution of the p-value of a significance test across the sampled data. It allows for assessing the consistency of the observed effects, for detecting the presence of potential moderator variables, and for estimating the influence of outlier values on the observed results. For non-significant findings, it can diagnose patterns indicative of underpowered study designs. The p-plot can thus either back the binary accept-vs-reject decision of common null-hypothesis significance tests, or it can qualify this decision and stimulate additional empirical work to arrive at more robust and replicable statistical inferences.

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pplot

Generating p-plots

Description

Generates chronological and ordered p-plots for data vectors or vectors of p-values. The p-plot visualizes the evolution of the p-value of a significance test across the sampled data. It allows for assessing the consistency of the observed effects, for detecting the presence of potential moderator variables, and for estimating the influence of outlier values on the observed results. For non-significant findings, it can diagnose patterns indicative of underpowered study designs. The p-plot can thus either back the binary accept-vs-reject decision of common null-hypothesis significance tests, or it can qualify this decision and stimulate additional empirical work to arrive at more robust and replicable statistical inferences.

Details

Package: pplot
Type: Package
Version: 0.9
Date: 2025-04-04
License: GPL-3

This package contains the following functions:

`pplot.pvals`: Generates p-plot from a series of p-values.

`pplot.t.test`: Generates chronological or ordered p-plot from a series of data points.

Version history:

v0.9 | 2025-04-03 | Package release.

Author(s)

Roland Pfister <mail(at)roland-pfister.net>, Christian Frings;

pplot.pvals

Generate p-plot from a series of p-values

Description

Takes a series of p-values and plots them against the corresponding number of observations included in a test. Adds reference lines at the chosen alpha level (horizontal line) and at the latest point in time the p-plot crosses the significance threshold (if any).

Usage

```
pplot.pvals(xs,  
            ps,  
            xtitle = "Observation",  
            alpha = 0.05,  
            n.sig = TRUE,  
            ylim.p = c(0,1),  
            pcol.alpha = 125)
```

Arguments

<code>xs</code>	Vector of observations that the p values are computed on.
<code>ps</code>	vector of p-values.
<code>xtitle</code>	Axis title for the x-axis of the p-plot.
<code>alpha</code>	Significance threshold to be used for determining oversampling.
<code>n.sig</code>	Logical: Show vertical line at last crossing of the significance threshold?
<code>ylim.p</code>	Plot limits on the y-axis.
<code>pcol.alpha</code>	Transparency of the data points; set to 255 for solid fill.

Details

`pplot.pvals` generates a p-plot from two vectors: `xs` containing the sample sizes underlying the test results, and `ps` as the resulting p-values.

Value

`pplot.pvals()` returns a single integer with the number of oversampled datasets (-1 for a non-significant test at the full sample size).

Author(s)

Roland Pfister

See Also

[pplot.t.test](#);

Examples

```
# Show p-plot for significant test (the simulation  
# has a power of > 88% to return a significant  
# effect).  
testdata <- rnorm(64, mean = 0.4, sd = 1)  
ps <- matrix(data = NA, nrow = 60, ncol = 1)  
for (itest in c(2:64)) {  
  ps[itest] <- t.test(testdata[1:itest])$p.value  
}  
xs <- c(1:64)
```

```

pplot.pvals(xs,ps)

# Show p-plot for non-significant test (simulation
# does not include a true effect).
testdata <- rnorm(64, mean = 0.0, sd = 1)
ps <- matrix(data = NA, nrow = 60, ncol = 1)
for (itest in c(2:64)) {
  ps[itest] <- t.test(testdata[1:itest])$p.value
}
xs <- c(1:64)
pplot.pvals(xs,ps)

```

pplot.t.test

Generate p-plot from a series of data points

Description

Takes a series of data points and computes either a chronological or ordered p-plot for testing the mean of the data points against 0 with a one-sample t-test.

Usage

```

pplot.t.test(data,
             sort = FALSE,
             startindex = 2,
             produce.plot = TRUE,
             xtitle = "Observation",
             plottype = 3,
             alpha = 0.05,
             alternative = "two.sided",
             n.sig = TRUE,
             n.sig.adjust = -1,
             ylim.p = c(0,1),
             ylim.es = -1,
             conf.level = 0.95,
             pcol.alpha = 125)

```

Arguments

data	Vector of data points.
sort	Logical. TRUE generates an ordered p-plot, FALSE generates a chronological p-plot.
startindex	Number of observations to begin the p-plot with (minimum 2).
produce.plot	Logical whether to produce plot or not. Setting to FALSE can be used to extract series of p-values as well as effect size estimates from the data.
xtitle	Axis title for the x-axis of the p-plot.

plottype	1 = only p-plot, 2 = only effect size plot, 3 = both plots.
alpha	Significance threshold to be used for determining oversampling.
alternative	Argument passed on to the <code>t.test()</code> function (see the corresponding documentation).
n.sig	Logical: Show vertical line at last crossing of the significance threshold?
n.sig.adjust	-1 = auto, 0 = left-adjusted, 0.5 = centered, 1 = right.
ylim.p	Plot limits on the y-axis of the p-plot. Vector of min, max.
ylim.es	Plot limits on the y-axis of the effect size plot. Either a vector of min and max, or only one value to be used as minimum with maximum being determined as a function of the data.
conf.level	Confidence level for effect size CIs.
pcol.alpha	Transparency of the data points; set to 255 for solid fill.

Details

`pplot.t.test` generates a chronological or ordered p-plot from a vector of data points. It returns a vector of p-values, or a data frame containing p-values and effect size estimates.

Value

`pplot.t.test()` returns either a vector of p-values, a data frame containing effect size estimates, or both (depending on the `plottype` argument).

Author(s)

Roland Pfister

See Also

[pplot.pvals](#); [ci.sm](#);

Examples

```
# Show p-plot for significant test (the simulation
# has a power of > 88% to return a significant
# effect).
testdata <- rnorm(64, mean = 0.4, sd = 1)
pplot.t.test(testdata)

# Show p-plot for non-significant test (simulation
# does not include a true effect).
testdata <- rnorm(64, mean = 0.0, sd = 1)
pplot.t.test(testdata)
```

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