Package ‘TippingPoint’

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Title  Enhanced Tipping Point Displays the Results of Sensitivity Analysis for Missing Data

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Description  Using the idea of "tipping point" (proposed in Gregory Campbell, Gene Pennello and Lilly Yue(2011)
             <DOI:10.1080/10543406.2011.550094>) to visualize the results of sensitivity analysis for missing data, the package provides
             a set of functions to list out all the possible combinations of missing values in two treatment arms, calculate
             corresponding estimated treatment effects and p values, and draw a colored heat-map. It could deal with randomized
             experiments with a binary outcome or a continuous outcome. In addition, the package provides a visualized method to compare various imputation
             methods by adding the rectangles or convex hulls on the basic plot.

Depends  R (>= 3.0.0)
Imports  ggplot2 (>= 2.0.0), RColorBrewer, reshape2
Suggests  knitr, rmarkdown, bayesSurv

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imputedata ......................................................... 2
imputedata ......................................................... 2
tippingdata ....................................................... 3
TippingPoint ....................................................... 3
TippingPoint.default ........................................... 4
TippingPoint.formula ........................................... 6

Index

imputedata  Imputation results under different methods

Description

Imputation results based on Missing At Random(MAR) and Missing Completely At Random(MCAR) assumption for treatment and control group.

Usage

imputedata

Format

Data frame with 500 rows and 8 variables:

- MAR_T1: Average value of nonrespondents for continuous outcome in treatment group under MAR assumption.
- MAR_C1: Average value of nonrespondents for continuous outcome in control group under MAR assumption.
- MAR_T2: Number of success of nonrespondents for binary outcome in treatment group under MAR assumption.
- MAR_C2: Number of success of nonrespondents for binary outcome in control group under MAR assumption.
- MCAR_T1: Average value of nonrespondents for continuous outcome in treatment group under MCAR assumption.
- MCAR_C1: Average value of nonrespondents for continuous outcome in control group under MCAR assumption.
- MCAR_T2: Number of success of nonrespondents for binary outcome in treatment group under MCAR assumption.
- MCAR_C2: Number of success of nonrespondents for binary outcome in control group under MCAR assumption.


**tippingdata**

An hypothetical dataset used to demonstrate functions.

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### Description

A hypothetical dataset with continuous and binary outcome.

### Usage

tippingdata

### Format

Data frame with 270 rows and 5 variables:

- continuous: continuous outcome
- binary: binary outcome
- educ: education time(years)
- female: 0=male, 1=female
- treat: 0=control group, 1=treatment group

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**TippingPoint**

Generic function for Enhanced Tipping Point Displays

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### Description

Generic function for Enhanced Tipping Point Displays

### Usage

TippingPoint(...)

### Arguments

... Additional arguments, see TippingPoint.default, TippingPoint.formula for more details.

### References

4. https://sites.google.com/site/vliublinska/research
See Also

TippingPoint.default, TippingPoint.formula.

Examples

TippingPoint(outcome=tippingdata$binary, treat= tippingdata$treat, 
group.infor=TRUE, plot.type = "estimate",ind.values = TRUE, 
impValuesT = NA,  impValuesC = NA, 
summary.type = "density", alpha = 0.95, S=1.5, n.grid = 100, 
HistMeanT = c(0.38,0.4), HistMeanC = c(0.2,0.55))
TippingPoint.default

plot.type A character, one of "estimate", "p.value" or "both" indicating which one should be represented by a heat-map layer.

summary.type A character, how to summarize the joint posterior distribution of imputed outcomes for treated and controls, one of "density", "credible.region" or "convex.hull". see geom_density2d, mahalanobis, geom_polygon, credible.region for more details.

alpha A numeric between 0-1, with alpha of points in Convex hull, 1-alpha removed by Machalanobis distance. It also specifies the probabilities for credible regions used in credible.region, in this case, alpha should be above 0.5 and below 1. The default value is 0.95.

HistMeanT A numeric vector or NULL, historical values or proportions for the treatment group.

HistMeanC A numeric vector or NULL, historical values or proportions for the control group.

ind.values A logical, whether or not to display values in heat-map layer.

impValuesT NA or imputed values for the treatment group, see imputedata for more details.

impValuesC NA or imputed values for the control group, see imputedata for more details.

impValuesColor NA or imputed colors correspond to the columns in impValuesT or impValuesC. The default colors are from Set1 in RColorBrewer allowing up to 9. Specify explicitly if need more colors. See display.brewer.all for more colors.

show.points A logical, whether to show the points for imputed values.

point.size Size of points for imputed values.

point.shape Shape of points for imputed values.

S A integer indicating range of plotting, the default value is 3.

n.grid A integer, number of points in the grid, only for continuous case, the default is 150.

... Additional arguments

See Also

TippingPoint, TippingPoint.formula.

Examples

# See more details in vignette using:
# vignette("TippingPoint")
TippingPoint(outcome=tippingdata$binary, treat= tippingdata$treat, plot.type = "p.value", ind.values = TRUE,
impValuesT = imputedata[,c("MAR_T2","MCAR_T2")],
impValuesC = imputedata[,c("MAR_C2","MCAR_C2")],
impValuesColor = RColorBrewer::brewer.pal(8,"Accent")[c(4,6)],
summary.type = "credible.region", alpha = 0.95,
S=1.5, n.grid = 100, HistMeanT = c(0.38,0.4), HistMeanC = c(0.2,0.55))
Description
The formula method for enhanced tipping point displays.

Usage
## S3 method for class 'formula'
TippingPoint(formula, data, ...)

Arguments
  formula A formula of the form outcome ~ treat.
  data A data.frame containing the variables in the formula.
  ... Additional arguments, see details in TippingPoint.default.

See Also
TippingPoint, TippingPoint.default.

Examples
# See more details in vignette using:
# vignette("TippingPoint")
TippingPoint(binary~treat, data=tippingdata,
  plot.type = "both", ind.values = TRUE,
  impValuesT = imputedata[,c("MAR_T2","MCAR_T2")],
  impValuesC = imputedata[,c("MAR_C2","MCAR_C2")],
  impValuesColor =c("red","blue"),
  point.size=0.8, point.shape = 15,
  summary.type = "convex.hull", alpha = 0.95, S=1.5, n.grid = 100,
  HistMeanT = c(0.38,0.4), HistMeanC = c(0.2,0.55))
Index

* datasets
  imputedata, 2
  tippingdata, 3

credible.region, 5

display.brewer.all, 5

geom_density2d, 5
geom_polygon, 5

imputedata, 2, 5

mahalanobis, 5

tippingdata, 3
TippingPoint, 3, 5, 6
TippingPoint.default, 3, 4, 4, 6
TippingPoint.formula, 3–5, 6