Package: jsdtools (via r-universe)

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Title Jensen-Shannon Divergence Estimation, Confidence Intervals, and Distribution Plots

Version 0.1.0

Description Estimates Jensen-Shannon divergence (JSD) for quantifying distributional differences between two groups on a given variable. Supports both continuous and discrete variables, with tools for point estimation, bootstrap confidence intervals, and visualization of raw group-specific distributions.

License GPL (>= 3)

Encoding UTF-8

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`fixed_range` *Fixed integration range for continuous JSD*

Description

Fixed integration range for continuous JSD

Usage

```
fixed_range(x, y, qrange = c(0.001, 0.999), extend = 3)
```

Arguments

`x`	Numeric vector for group 1.
`y`	Numeric vector for group 2.
`qrange`	Quantile range used to determine the main data span.
`extend`	Extension multiplier based on IQR.

Value

Named numeric vector with elements ‘L‘ and ‘U‘.

`jsd` *Estimate Jensen-Shannon divergence*

Description

Unified front-end for JSD estimation for continuous and discrete variables.

Usage

```
jsd(x, y, type = c("auto", "continuous", "discrete"), base = 2, ...)
```

Arguments

x	First vector.
y	Second vector.
type	One of ‘"auto"‘, ‘"continuous"‘, or ‘"discrete"‘.
base	Logarithm base. Defaults to 2. Use ‘exp(1)‘ for nats.
...	Additional arguments passed to the type-specific estimator.

Value

An object of class ‘"jsd_estimate"‘.

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jsd_ci *Bootstrap confidence interval for Jensen-Shannon divergence*

Description

Unified front-end for JSD confidence interval estimation for continuous and discrete variables.

Usage

```
jsd_ci(
  x,
  y,
  type = c("auto", "continuous", "discrete"),
  B = 1000,
  conf_level = 0.95,
  base = 2,
  seed = NULL,
  ...
)
```

Arguments

x	First vector.
y	Second vector.
type	One of ‘"auto"‘, ‘"continuous"‘, or ‘"discrete"‘.
B	Number of bootstrap replicates.
conf_level	Confidence level. Defaults to 0.95.
base	Logarithm base. Defaults to 2. Use ‘exp(1)‘ for nats.
seed	Optional random seed.
...	Additional arguments passed to the type-specific bootstrap estimator.

Value

An object of class ‘"jsd_ci"‘.

`jsd_continuous` *Estimate JSD for continuous variables*

Description

Computes Jensen-Shannon divergence (JSD) between two numeric vectors using kernel density estimation (KDE) and numerical integration.

Usage

```
jsd_continuous(
  x,
  y,
  L = NULL,
  U = NULL,
  base = 2,
  bw = "nrd0",
  kernel = "gaussian",
  grid_n = 4096,
  qrange = c(0.001, 0.999),
  extend = 3,
  eps = 1e-12,
  renormalize = TRUE,
  na_rm = TRUE
)
```

Arguments

`x`	Numeric vector for group 1.
`y`	Numeric vector for group 2.
`L`	Optional lower integration bound.
`U`	Optional upper integration bound.
`base`	Logarithm base. Defaults to 2. Use ‘exp(1)‘ for nats.
`bw`	Bandwidth passed to [stats::density()].
`kernel`	Kernel passed to [stats::density()].
`grid_n`	Number of grid points used for KDE.
`qrange`	Quantile range used when ‘L‘ and ‘U‘ are not supplied.
`extend`	Extension multiplier for the automatically chosen range.
`eps`	Small constant for numerical stability.
`renormalize`	Logical; renormalize estimated densities over the grid?
`na_rm`	Logical; remove missing values?

Value

An object of class ‘"jsd_estimate"‘.

`jsd_continuous_ci` *Bootstrap confidence interval for continuous JSD*

Description

Bootstrap confidence interval for continuous JSD

Usage

```
jsd_continuous_ci(
  x,
  y,
  B = 1000,
  conf_level = 0.95,
  L = NULL,
  U = NULL,
  base = 2,
  bw = "nrd0",
  kernel = "gaussian",
  grid_n = 4096,
  qrange = c(0.001, 0.999),
  extend = 3,
  eps = 1e-12,
  renormalize = TRUE,
  seed = NULL,
  na_rm = TRUE,
  na_rm_failed = TRUE
)
```

Arguments

`x`	Numeric vector for group 1.
`y`	Numeric vector for group 2.
`B`	Number of bootstrap replicates.
`conf_level`	Confidence level. Defaults to 0.95.
`L`	Optional lower integration bound.
`U`	Optional upper integration bound.
`base`	Logarithm base. Defaults to 2. Use ‘exp(1)‘ for nats.
`bw`	Bandwidth passed to [stats::density()].
`kernel`	Kernel passed to [stats::density()].
`grid_n`	Number of grid points used for KDE.
`qrange`	Quantile range used when ‘L‘ and ‘U‘ are not supplied.
`extend`	Extension multiplier for the automatically chosen range.

eps	Small constant for numerical stability.
renormalize	Logical; renormalize estimated densities over the grid?
seed	Optional random seed.
na_rm	Logical; remove missing values?
na_rm_failed	Logical; drop failed bootstrap draws when summarizing?

Value

An object of class '"jsd_ci"'.

`jsd_discrete` *Estimate JSD for discrete variables*

Description

Computes Jensen-Shannon divergence (JSD) between two discrete variables using empirical probability mass functions.

Usage

```
jsd_discrete(
  x,
  y,
  support = NULL,
  base = 2,
  eps = 1e-12,
  add_smoothing = FALSE,
  na_rm = TRUE
)
```

Arguments

x	Vector for group 1. Can be numeric, factor, character, or logical.
y	Vector for group 2. Can be numeric, factor, character, or logical.
support	Optional support values. If 'NULL', the union of observed values in 'x' and 'y' is used.
base	Logarithm base. Defaults to 2. Use 'exp(1)' for nats.
eps	Small constant for numerical stability.
add_smoothing	Logical; add 1 to each cell count?
na_rm	Logical; remove missing values?

Value

An object of class '"jsd_estimate"'.

`jsd_discrete_ci` *Bootstrap confidence interval for discrete JSD*

Description

Bootstrap confidence interval for discrete JSD

Usage

```
jsd_discrete_ci(
  x,
  y,
  B = 1000,
  conf_level = 0.95,
  support = NULL,
  base = 2,
  eps = 1e-12,
  add_smoothing = FALSE,
  seed = NULL,
  na_rm = TRUE,
  na_rm_failed = TRUE
)
```

Arguments

`x`	Vector for group 1.
`y`	Vector for group 2.
`B`	Number of bootstrap replicates.
`conf_level`	Confidence level. Defaults to 0.95.
`support`	Optional support values.
`base`	Logarithm base. Defaults to 2. Use ‘exp(1)‘ for nats.
`eps`	Small constant for numerical stability.
`add_smoothing`	Logical; add 1 to each cell count?
`seed`	Optional random seed.
`na_rm`	Logical; remove missing values?
`na_rm_failed`	Logical; drop failed bootstrap draws when summarizing?

Value

An object of class ‘"jsd_ci"‘.

plot_continuous *Plot two continuous distributions*

Description

Plot two continuous distributions

Usage

```
plot_continuous(
  x,
  y,
  group_names = c("Group 1", "Group 2"),
  bins = 30,
  style = c("both", "hist", "density"),
  main = "Two-group raw distributions",
  xlab = "Value",
  ylab = "Density",
  col_x = rgb(0.2, 0.4, 0.8, 0.4),
  col_y = rgb(0.8, 0.2, 0.2, 0.4),
  line_col_x = "#2F5FB3",
  line_col_y = "#CC3333",
  lwd = 2,
  na_rm = TRUE,
  show_jsd = TRUE,
  jsd_digits = 3
)
```

Arguments

x	Numeric vector for group 1.
y	Numeric vector for group 2.
group_names	Group labels.
bins	Approximate number of histogram bins.
style	One of ‘"both"‘, ‘"hist"‘, or ‘"density"‘.
main	Plot title.
xlab	X-axis label.
ylab	Y-axis label.
col_x	Fill color for group 1.
col_y	Fill color for group 2.
line_col_x	Line color for group 1 density.
line_col_y	Line color for group 2 density.
lwd	Line width for density curves.

na_rm	Logical; remove missing values?
show_jsd	Logical; whether to display JSD on the plot.
jsd_digits	Number of digits for displayed JSD.

Value

Invisibly returns plotting data.

`plot_discrete` *Plot two discrete distributions with overlap*

Description

Plot two discrete distributions with overlap

Usage

```
plot_discrete(
  x,
  y,
  support = NULL,
  group_names = c("Group 1", "Group 2"),
  main = "Two-group discrete distributions",
  xlab = "Value",
  ylab = "Proportion",
  col_x = adjustcolor("#2F5FB3", alpha.f = 0.2),
  col_y = adjustcolor("#CC3333", alpha.f = 0.2),
  overlap_col = adjustcolor("grey55", alpha.f = 0.35),
  line_col_x = "#2F5FB3",
  line_col_y = "#CC3333",
  lwd = 2,
  pch = 16,
  cex_pt = 1.1,
  las = 1,
  bar_width = 0.2,
  show_jsd = TRUE,
  jsd_digits = 3,
  na_rm = TRUE
)
```

Arguments

x	Vector for group 1.
y	Vector for group 2.
support	Optional support values.
group_names	Group labels.

main	Plot title.
xlab	X-axis label.
ylab	Y-axis label.
col_x	Color for group 1.
col_y	Color for group 2.
overlap_col	Fill color for overlap bars.
line_col_x	Line color for group 1.
line_col_y	Line color for group 2.
lwd	Line width.
pch	Point character.
cex_pt	Point size.
las	Axis label style for x-axis.
bar_width	Width of overlap bars.
show_jsd	Logical; whether to display JSD on the plot.
jsd_digits	Number of digits for displayed JSD.
na_rm	Logical; remove missing values?

Value

Invisibly returns plotting data.

`plot_dist` *Plot two-group distributions*

Description

Unified front-end for plotting continuous or discrete two-group raw distributions.

Usage

```
plot_dist(x, y, type = c("auto", "continuous", "discrete"), ...)
```

Arguments

x	First vector.
y	Second vector.
type	One of ‘"auto"‘, ‘"continuous"‘, or ‘"discrete"‘.
...	Additional arguments passed to the type-specific plotting function.

Value

Invisibly returns plotting data.

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