

Package Jackstrap

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Type Package

Title Jackstrap Sousa & Stosic (2005) (Outliers in DEA)

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Description

This package applies the method developed by Sousa and Stosic (2005) Technical Efficiency of the Brazilian Municipalities. 181.

Depends R (>= 2.15.1), fBasics, Benchmarking, dplyr, ggplot2, foreach, doParallel, reshape, tidyr

License GPL-3

Encoding UTF-8

LazyData TRUE

RoxygenNote 6.1.1

Suggests knitr, rmarkdown

VignetteBuilder knitr

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hist_jack_ks	<i>Histogram with Jackstrap Efficiency Indicators: This function builds graphics with distributions of efficiency indicators without outliers and complete sample. The outliers are defined by K-S Test.</i>
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Description

Histogram with Jackstrap Efficiency Indicators: This function builds graphics with distributions of efficiency indicators without outliers and complete sample. The outliers are defined by K-S Test.

Usage

```
hist_jack_ks(efficiency, model_hist_ks)
```

Arguments

efficiency	is the jackstrap object created by jackstrap function.
model_hist_ks	is the desired graphic model. There are four kinds: 1- Density Histogram of efficiency indicator with complete sample and without outliers by K-S test; 2 - Histogram of efficiency with complete sample and without outliers by K-S test; 3 - Histogram of efficiency without outliers by K-S test; 4 - Histogram of efficiency with complete sample.

Value

Return the plot with efficiency indicators with complete sample and/or without outliers by combination leverage level and K-S test;

Examples

```
hist_jack_ks(efficiency_ks, 1)
hist_jack_ks(efficiency_ks, 2)
hist_jack_ks(efficiency_ks, 3)
hist_jack_ks(efficiency_ks, 4)
```

hist_jack_step	<i>Histogram with Jackstrap Efficiency Indicators: This function builds a graphic with indicator distributions without outliers and complete sample. The outliers are defined by heaviside step function.</i>
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Description

Histogram with Jackstrap Efficiency Indicators: This function builds a graphic with indicator distributions without outliers and complete sample. The outliers are defined by heaviside step function method.

Usage

```
hist_jack_step(efficiency, model_hist_step)
```

Arguments

`efficiency` is the jackstrap object created by jackstrap function.

`model_hist_step`

is the desired graphic model. There are four kinds: 1- Density Histogram of efficiency indicators with complete sample and without outliers by heaviside step function; 2 - Histogram of efficiency with complete sample and without outliers by heaviside step function; 3 - Histogram of efficiency without outliers by heaviside step function; 4 - Histogram of efficiency with complete sample.

Value

Return the plot with efficiency indicators with complete sample and/or without outliers by heaviside step function;

Examples

```
hist_jack_step(efficiency, 1)
hist_jack_step(efficiency, 2)
hist_jack_step(efficiency, 3)
hist_jack_step(efficiency, 4)
```

jackstrap

Jackstrap Method: The tool identifies outliers in Nonparametric Frontier. This function applies the developed technique by Sousa and Stosic (2005) Technical Efficiency of the Brazilian Municipalities: Correcting Nonparametric Frontier Measurements for Outliers

Description

Jackstrap Method: Tool identifies outliers in Nonparametric Frontier. This function applies the developed technique by Sousa and Stosic (2005) Technical Efficiency of the Brazilian Municipalities: Correcting Nonparametric Frontier Measurements for Outliers

Usage

```
jackstrap(data, ycolumn, xcolumn, bootstrap = 1000,
  perc_sample_buble = 0.2, dea_method = "vrs",
  orientation_dea = "in", n_seed = NULL, repos = FALSE,
  num_cores = 1)
```

Arguments

`data` is the dataset with input and output used to measure efficiency; Dataset needs to have this form: 1th column: name of DMU (string); 2th column: code of DMU (integer); n columns of output variables; n columns of input variables.

`ycolumn` is the quantity of y columns of dataset.

`xcolumn` is the quantity of x columns of dataset.

`bootstrap` is the quantity of applied resampling.

`perc_sample_buble`

is the percentage of sample in each bubble.

dea_method	is the DEA method: "crs" is DEA with constant returns to scale (CCR); "vrs" is DEA with variable returns to scale; and "fdh" is Free Disposal Hull (FDH) with variable returns to scale.
orientation_dea	is the direction of the DEA: "in" for focus on inputs; and "out" for focus on outputs.
n_seed	is the code as seed used to get new random samples.
repos	identify if the resampling method is with replacement TRUE or not FALSE.
num_cores	is the number of cores available to process.

Value

Return the jackstrap object with follow informations: "parameters" contain the parameters used on function; "bootstrap" is quantity of applied resampling; "mean_leverage" is leverage average for each DMU; "mean_geral_leverage" is general average of leverage and step function threshold; "sum_leverage" is accrued leverage on all resampling for each DMU; "count_dmu" is amount of each DMU selected by bootstrap. "efficiency_step_func" are efficiency indicators obtained by heaviside step function criteria; "result_kstest_method" are p-values of K-S test obtained by removing sequentially one by one the high leverage DMU; "efficiency_ks_method" are efficiency indicators obtained by K-S test criteria.

Examples

```
municipalities <- as.data.frame(jackstrap::municipalities)

efficiency <- jackstrap (data=municipalities, ycolumn=2, xcolumn=1, bootstrap=500,
                        perc_sample_bubble=0.10, dea_method="vrs",
                        orientation_dea="in", n_seed = 2000, repos=FALSE, num_cores=4)
```

jackstrap_ks	<i>Jackstrap KS Method: The tool identifies outliers in Nonparametric Frontier. This function applies the developed technique by Sousa and Stosic (2005) Technical Efficiency of the Brazilian Municipalities: Correcting Nonparametric Frontier Measurements for Outliers and to use the K-S test with criteria to define outliers</i>
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Description

Jackstrap KS Method: Tool identifies outliers in Nonparametric Frontier. This function applies the developed technique by Sousa and Stosic (2005) Technical Efficiency of the Brazilian Municipalities: Correcting Nonparametric Frontier Measurements for Outliers and to use the K-S test with criteria to define outliers

Usage

```
jackstrap_ks(data, jackstrap_obj, num_cores, perc)
```

Arguments

<code>data</code>	is the dataset with input and output used to measure efficiency; Dataset need to have this form: 1th column: name of DMU (string); 2th column: code of DMU (integer); n columns of output variables; n columns of input variables.
<code>jackstrap_obj</code>	is the object created by the function jackstrap.
<code>num_cores</code>	is number of cores used to process.
<code>perc</code>	is the percentage of sample used to K-S test.

Value

Return the jackstrap object increased with follow informations: "result_kstest_method" are p-values of K-S test obtained by removing sequentially one by one the high leverage DMU; "efficiency_ks_method" are efficiency indicators obtained by K-S test criteria.

Examples

```
efficiency_ks <- jackstrap_ks (data=municipalities, jackstrap_obj=efficiency, num_cores = 4, perc=0.80)
```

municipalities	<i>Dataset of Brazilian Municipalities</i>
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Description

Dataset of Brazilian Municipalities

Usage

```
municipalities
```

Format

A data frame with 489 rows (DMUs) and 3 variables (2 outputs and 1 inputs):

Description of DMUs string variable with descriptions of the each DMUs

Code integer variable identifies each DMU for integer code

y1 float variable with quantity of first produced output with resources

y2 float variable with quantity of second produced output with resources

x1 float variable with first input (resource) used to produce output (y)

plot_jackstrap_ks	<i>Plot Jackstrap KS: This function plots p-value of Kolmogorov-Smirnov Test in order decreasing of leverage.</i>
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Description

Plot Jackstrap KS: This function plots p-value of Kolmogorov-Smirnov Test in order decreasing of leverage.

Usage

```
plot_jackstrap_ks(data_plot, model_plot)
```

Arguments

data_plot	is the jackstrap object created by jackstrap function.
model_plot	is the desired model. There are two models: 1 - The graphic shows the amount of removed DMU on x axis and p-value of K-S test on y axis; 2 - The graphic shows DMU code on x axis and p-value of K-S test on y axis.

Value

Return the plot with p-value of K-S test and removed DMU or DMU code.

Examples

```
plot_jackstrap_ks(efficiency_ks, 1)
```

summary_jackstrap	<i>Summary Jackstrap: This function shows the main outcomes with outlier technique developed by Sousa and Stosic(2005).</i>
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Description

Summary Jackstrap: This function shows the main outcomes with outlier technique developed by Sousa and Stosic(2005).

Usage

```
summary_jackstrap(object_jackstrap)
```

Arguments

object_jackstrap	is the jackstrap object created by jackstrap function.
data	is the dataset of research.

Value

Return the data frame with follow informations: "parameters" contain the parameters used on function; "outliers_by_step_func" are the outliers by heaviside step function criteria; "outliers_by_ks" are the outliers by K-S test; "dmu_efficiency_by_step_func" are DMUs evaluated as efficient by heaviside step function criteria; "dmu_inefficiency_by_step_func" are the DMUs evaluated as maximum inefficient by heaviside step function criteria; "dmu_efficiency_ks" are DMUs evaluated as efficient by K-S test criteria; "dmu_inefficiency_by_ks" are the DMUs evaluated as maximum inefficient by K-S test criteria.

Examples

```
summary_efic <- summary_jackstrap(eficiency_ks)
```

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