Package ‘coRanking’
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Title Co-Ranking Matrix
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Description Calculates the co-ranking matrix to assess the quality of a dimensionality reduction.
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BugReports https://github.com/gdkrmr/coRanking/issues
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  'r_nx.R'
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coRanking-package  

Methods for the co-ranking matrix

Description

coranKing provides methods for the calculation of the co-ranking matrix and derived measures to assess the quality of a dimensionality reduction.

Details

This package provides functions for calculating the co-ranking matrix, plotting functions and some derived measures for quality assessment of dimensionality reductions.

Funding provided by the Department for Biogeochemical Integration, Empirical Inference of the Earth System Group, at the Max Planck Institute for Biogeochemistry, Jena.

References


See Also

Useful links:

- https://github.com/gdkrmr/coRanking
- Report bugs at https://github.com/gdkrmr/coRanking/issues

Usage

AUC\_ln\_K(R\_NX)
Arguments

\( R_{NX} \)  

The \( R_{NX} \) curve, a vector of values

Details

It is calculated as:

\[
AUC_{lnK}(R_{NX}(K)) = \left( \frac{\sum_{K=1}^{N-2} R_{NX}(K)/K}{\sum_{K=1}^{N-2} 1/K} \right)
\]

Value

A value, the area under the curve.

Author(s)

Guido Kraemer

References


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coranking  

Co-Ranking Matrix

Description

Calculate the co-ranking matrix to assess the quality of a dimensionality reduction.

Usage

\[
coranking(  
    xi,  
    x,  
    input_Xi = c("data", "dist", "rank"),  
    input_X = input_Xi,  
    use = "C"  
)
\]

Arguments

\( \text{xi} \)  

high dimensional data

\( \text{x} \)  

low dimensional data

\( \text{input_Xi} \)  

type of input of \( \text{xi} \) (see. details)

\( \text{input_X} \)  

type of input of \( \text{x} \) (see. details)

\( \text{use} \)  

R or C backend
Details

Calculate the coranking matrix, to assess the quality of a dimensionality reduction. \( X_i \) is input in high dimensions, \( X \) is input in low dimensions the type of input is given in `input_Xi` and `input_X`, they can be one of c('data', 'dist', 'rank').

Value

a matrix of class 'coranking'

Author(s)

Guido Kraemer

See Also

`rankmatrix`

Usage

```r
imageplot(
  Q,
  lwd = 2,
  bty = "n",
  main = "co-ranking matrix",
  xlab = expression(R),
  ylab = expression(Ro),
  col = colorRampPalette(colors = c("gray85", "red", "yellow", "green", "blue"))(100),
  axes = FALSE,
  legend = TRUE,
  ...
)
```

Arguments

- `Q` of class coranking.
- `lwd` linewidth in legend
- `bty` boxtype of legend
- `main` title of plot
- `xlab` label of the x axis
Details

Plots the co-ranking matrix nicely for visual inspection. uses the image function internaly, ... is passed down to the image function. The values in the co-ranking matrix are logscaled for better contrast.

Author(s)
Guido Kramer

Description

Calculate the local continuity meta-criterion from a co-ranking matrix.

Usage

LCMC(Q, K = 1:nrow(Q))

Arguments

Q a co-ranking matrix  
K vector of integers describing neighborhood size

Details

The local continuity meta-criterion (Chen and Buja, 2006) is defined as

\[
LCMC = \frac{K}{1 - N} + \frac{1}{NK} \sum_{(k,l) \in U_L^K} q_{kl}
\]

Higher values mean a better performance of the dimensionality reduction.

Value

A number, the local continuity meta-criterion

Author(s)
Guido Kraemer
**plot_R_NX**  
*Plot the $R_{NX}(K)$ curve*

**Description**  
Produces a plot with the $R_{NX}(K)$ curves from the arguments.

**Usage**  
```
plot_R_NX(R_NXs, pal = grDevices::palette(), ylim = c(0, 0.9), ...)
```

**Arguments**  
- **R_NXs**: A list of $R_{NX}$ curves, names from the list will appear in the legend.
- **pal**: A vector of colors.
- **ylim**: Set the y-axis limits of the plot.
- **...**: Options for the plotting function.

**Value**  
Nothing, produces a plot.

**Author(s)**  
Guido Kraemer

**References**  

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**rankmatrix**  
*Rank matrix*

**Description**  
Replaces the elements of $X$ with their rank in the column vector of the distance matrix.

**Usage**  
```
rankmatrix(X, input = c("data", "dist"), use = "C")
```
Arguments

- **X**: data, dist object, or distance matrix
- **input**: type of input
- **use**: if 'C' uses the compiled library, else uses the native R code

Details

Each column vector in the distance matrix (or the distance matrix computed from the input) is replaced by a vector indicating the rank of the distance inside that vector. This is a computation step necessary for the co-ranking matrix and provided mainly so that the user has the possibility to save computation time.

Value

returns a matrix of class 'rankmatrix'

Author(s)

Guido Kraemer

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**R_NX**

*The R_NX(K) criterion*

Description

A curve indicating the improvement of the embedding over a random embedding for the neighborhood size $K$. Values range from 0, for a random embedding, to 1 for a perfect embedding.

Usage

*R_NX(Q)*

Arguments

- **Q**: a co-ranking matrix

Details

$R_{NX}(K)$ is calculated as follows:

$$Q_{NX}(K) = \sum_{1 \leq k \leq K} \sum_{1 \leq l \leq K} \frac{q_{kl}}{KN}$$

Counts the upper left $K$-by-$K$ block of $Q$, i.e. it considers the preserved ranks on the diagonal and the permutations within a neighborhood.

$$R_{NX}(K) = \frac{(N - 1)Q_{NX}(K) - K}{N - 1 - K}$$

A resulting value of 0 corresponds to a random embedding, a value of 1 to a perfect embedding of the $K$-ary neighborhood.
**Value**

A vector with the values for $R_{NX}(K)$

**Author(s)**

Guido Kraemer

**References**


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