Package ‘bioDist’

December 21, 2016

Title  Different distance measures
Version  1.46.0
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Description  A collection of software tools for calculating distance measures.
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License  Artistic-2.0
Depends  R (>= 2.0), methods, Biobase,KernSmooth
Suggests  locfit
biocViews  Clustering, Classification
NeedsCompilation  no

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closest.top

Find the closest genes.

Description

Find the closest genes to the supplied target gene based on the supplied distances.
Usage

closest.top(x, dist.mat, top)

Arguments

x the name of the gene (feature) to use.
dist.mat either a dist object or a matrix of distances.
top the number of closest genes desired.

Details

The feature named x must be in the supplied distances. If so, then the top closest other features are returned.

Value

A vector of names of the top closest features.

Author(s)

Beiying Ding

See Also

cor.dist, spearman.dist, tau.dist, euc, man, Kl dist.matrix, KLD.matrix, mutualInfo

Examples

data(sample.ExpressionSet)
sE <- sample.ExpressionSet[1:100,]
d1 <- Kl dist.matrix(sE, sample = FALSE)
closest.top(featureNames(sE)[1], d1, 5)

---

cor.dist  Pearson correlational distance

Description

Calculate pairwise Pearson correlational distances, i.e. 1-COR or 1-|COR|, and saves as a ‘dist’ object

Usage

cor.dist(x, ...)

---
Arguments

\( x \)  
\( n \times p \) matrix or ExpressionSet; if \( x \) is an ExpressionSet, then the function uses its `exprs` slot.

... arguments passed to `cor.dist`:

- `absif` TRUE, then \( 1-|\text{COR}| \) else \( 1-\text{COR} \), default is TRUE.
- `diagif` TRUE, then the diagonal of the distance matrix will be displayed, default is FALSE.
- `upperif` TRUE, then the upper triangle of the distance matrix will be displayed, default is FALSE.
- `samplefor` objects of classes that extend eSet: if TRUE, then distances are computed between samples(columns), otherwise, they are computed between features(rows).

Details

The `cor` function is used to compute the pairwise distances between rows of an input matrix, except if the input is an object of a class that extends eSet and `sample` is TRUE.

Value

Pairwise Pearson correlational distance object

Author(s)

Beiying Ding

See Also

`spearman.dist`, `tau.dist`, `euc`, `man`, `KLdist.matrix`, `KLD.matrix`, `mutualInfo`

Examples

```r
x <- matrix(rnorm(200), nrow = 5)
cor.dist(x)
```

---

**euc**  
Euclidean distance

Description

Calculate pairwise Euclidean distances and saves the result as a `dist` object

Usage

`euc(x, ...)`
**KLD.matrix**

Arguments

- **x**: n by p matrix or an object of a class that extends eSet; if x is a matrix, pairwise distances are calculated between the rows of a matrix. If x is an object of a class that extends eSet, the method makes use of the `exprs` method and pairwise distances are calculated between samples(columns) if `sample` is TRUE. Arguments passed to `euc`
  - `diag`: if TRUE, then the diagonal of the distance matrix will be displayed; default is FALSE.
  - `upper`: if TRUE, then the upper triangle of the distance matrix will be displayed; default is FALSE.
  - `sample`: For objects of classes that extends eSet, pairwise distances are calculated between samples(columns) if `sample` is TRUE; default value is TRUE.

Details

The method calculates pairwise euclidean distances, assuming that all samples have the same number of observations.

Value

An object of class `dist` with the pairwise Euclidean distance between rows except in case of objects of class that extend eSet when `sample` is TRUE.

Author(s)

Beiying Ding

See Also

`spearman.dist`, `tau.dist`, `man`, `KLdist.matrix`, `KLD.matrix`, `mutualInfo`

Examples

```r
x <- matrix(rnorm(200), nrow = 5)
euc(x)
```

**Description**

Calculate KLD by estimating by smoothing \( \log(f(x)/g(x)) \cdot f(x) \) and then integrating.

Usage

`KLD.matrix(x, ...)`
Arguments

\(x\)

n by p matrix or list or an object of a class that extends eSet; if \(x\) is an object of a class that extends eSet (e.g., ExpressionSet), then the function works against its ‘exprs’ slot.

\[
\ldots
\]

arguments passed to KL.D.matrix:

- \texttt{methoduse locfit or density to estimate integrand; default is c("locfit", "density") (i.e., both methods).}
- \texttt{supuppupper and lower limits of the integral; default is NULL in which case the limits of the integral are calculated from the range of the data.}
- \texttt{subdivisionssubdivisions for the integration; default is 1000.}
- \texttt{diagif TRUE, then the diagonal of the distance matrix will be displayed; default is FALSE.}
- \texttt{upperif TRUE, then the upper triangle of the distance matrix will be displayed; default is FALSE.}
- \texttt{samplefor ExpressionSet methods: if TRUE, then distances are computed between samples, otherwise, they are computed between genes.}

Details

The distance is computed between rows of the input matrix (except if the input is an object of a class that extends eSet and \texttt{sample} is TRUE).

The presumption is that all samples have the same number of observations. The list method is meant for use when samples sizes are unequal.

Value

An object of class \texttt{dist} with the pairwise, between rows, Kullback-Leibler distances.

Author(s)

Beiying Ding, Vincent Carey

See Also

cor.dist, spearman.dist, tau.dist, dist, KL.dist.matrix, mutualInfo

Examples

\[
\begin{align*}
\text{x <- matrix(rnorm(100), nrow = 5)} \\
\text{KL.D.matrix(x, method = "locfit", supp = range(x))}
\end{align*}
\]

---

\textbf{KL.dist.matrix} \hspace{1cm} \textit{Discrete version of Kullback-Leibler Distance (KLD)}

Description

Calculate the KLD by binning continuous data.

KL distance is calculated using the formula

\[
KLD(f_1(x), f_2(x)) = \sum_{i=1}^{N} f_1(x_i) * \log \frac{f_1(x_i)}{f_2(x_i)}
\]
Usage

KLdist.matrix(x, ...)

Arguments

x  
n by p matrix or a list or an object of a class that extends eSet. If x is an object of  
a class derived from eSet (ExpressionSet,SnpSet etc), then the values returned  
by the exprs function are used.

...  
arguments passed to KLdist.matrix:

  gridsize  the number of grid points used to select the optimal bin width of the  
           histogram used to estimate density. If no value is supplied, the grid size is  
           calculated internally; default is NULL.

  symmetrize  if TRUE, then symmetrize; the default is FALSE.

  diag  if TRUE, then the diagonal of the distance matrix will be displayed; the  
       default is FALSE.

  upper  if TRUE, then the upper triangle of the distance matrix will be displayed;  
         default is FALSE.

  sample  for eSet methods: if TRUE, then the distances are computed between  
          samples, otherwise, between features; the default is TRUE.

Details

The data are binned, and then the KL distance between the two discrete distributions is computed  
and used. The distance is computed between rows of the input matrix (except if the input is an  
object of a class that extends eSet and sample is TRUE).

The presumption is that all samples have the same number of observations. The list method is meant  
for use when samples sizes are unequal.

Value

An object of class dist is returned.

Author(s)

Beiying Ding

See Also

cor.dist, spearman.dist, tau.dist.euc, man,KLD.matrix,mutualInfo

Examples

x <- matrix(rnorm(100), nrow = 5)
KLdist.matrix(x, symmetrize = TRUE)
**Description**

Calculate pairwise Manhattan distances and saves as a `dist` object.

**Usage**

```r
man(x, ...)
```

**Arguments**

- `x`: n by p matrix or an object of class that extends eSet. If `x` is an object of class that extends eSet, (eg ExpressionSet) then the function uses its 'exprs' slot.
- `...`: arguments passed to `man`:
  - `diagif` TRUE, then the diagonal of the distance matrix will be displayed; default is FALSE.
  - `upperif` TRUE, then the upper triangle of the distance matrix will be displayed; default is FALSE.

**Details**

This is just an interface to `dist` with the right parameters set.

**Value**

An instance of the `dist` class with the pairwise Manhattan distances between the rows of `x` in case of a matrix or between the features (rows) in case of a class that extends eSet.

**Author(s)**

Beiying Ding

**See Also**

`cor.dist`, `spearman.dist`, `tau.dist.euc`, `KLdist.matrix`, `KLD.matrix`, `mutualInfo`

**Examples**

```r
x <- matrix(rnorm(200), nrow = 5)
man(x)
```
mutualInfo  

**Mutual Information**

**Description**

Calculate mutual information via binning

**Usage**

```r
mutualInfo(x, ...)  
MIdist(x, ...)
```

**Arguments**

- `x` an n by p matrix or ExpressionSet; if x is an ExpressionSet, then the function uses its 'exprs' slot.
- `...` arguments passed to `mutualInfo` and `MIdist`:
  - `nbinn`umber of bins to calculate discrete probabilities; default is 10.
  - `diag`if TRUE, then the diagonal of the distance matrix will be displayed; default is FALSE.
  - `upper`if TRUE, then the upper triangle of the distance matrix will be displayed; default is FALSE.
  - `sample`for ExpressionSet methods, if TRUE, then distances are computed between samples, otherwise, between genes.

**Details**

For `mutualInfo` each row of `x` is divided into `nbinn` groups and then the mutual information is computed, treating the data as if they were discrete.

For `MIdist` we use the transformation proposed by Joe (1989),

\[
\delta^* = (1 - \exp(-2\delta))^{1/2}
\]

where \(\delta\) is the mutual information. The `MIdist` is then \(1 = \delta^*\). Joe argues that this measure is then similar to Kendall’s tau, `tau.dist`.

**Value**

An object of class `dist` which contains the pairwise distances.

**Author(s)**

Robert Gentleman

**References**


**See Also**

dist, KLDist.matrix, cor.dist, KLD.matrix
spearman.dist

Examples

```r
x <- matrix(rnorm(100), nrow = 5)
mutualInfo(x, nbin = 3)
```

---

**Description**

Calculate pairwise Spearman correlational distances, i.e. 1-SPEAR or 1-|SPEAR|, for all rows of a matrix and return a `dist` object.

**Usage**

```r
spearman.dist(x, ...)
```

**Arguments**

- `x`: n by p matrix or ExpressionSet; if `x` is an ExpressionSet, then the function uses its `exprs` slot.
- `...`: arguments passed to `spearman.dist`:
  - `absif`:
    - `TRUE`, then 1-|SPEAR| else 1-SPEAR; default is `TRUE`.
  - `diagif`:
    - `TRUE`, then the diagonal of the distance matrix will be displayed; default is `FALSE`.
  - `upperif`:
    - `TRUE`, then the upper triangle of the distance matrix will be displayed; default is `FALSE`.
  - `samplefor` the ExpressionSet method: if `TRUE` (the default), then distances are computed between samples.

**Details**

We call `cor` with the appropriate arguments to compute the row-wise correlations.

**Value**

One minus the Spearman correlation, between rows of `x`, are returned, as an instance of the `dist` class.

**Author(s)**

Beiying Ding

**See Also**

cor.dist, tau.dist, euc, man, KLDist.matrix, KLD.matrix, mutualInfo, dist

**Examples**

```r
x <- matrix(rnorm(200), nrow = 5)
spearman.dist(x)
```
tau.dist  

Kendall’s tau correlational distance

Description

Calculate pairwise Kendall’s tau correlational distances, i.e. 1-TAU or 1-|TAU|, for all rows of the input matrix and return an instance of the dist class.

Usage

tau.dist(x, ...)

Arguments

- **x**: n by p matrix or ExpressionSet; if x is an ExpressionSet, then the function uses its ’exprs’ slot.
- **...**: arguments passed to tau.dist:
  - **absi**: if TRUE, then 1-|TAU| else 1-TAU; default is TRUE.
  - **diagi**: if TRUE, then the diagonal of the distance matrix will be displayed; default is FALSE.
  - **upperi**: if TRUE, then the upper triangle of the distance matrix will be displayed; default is FALSE.
  - **sample**: for the ExpressionSet method: if TRUE (the default), then distances are computed between samples.

Details

Row-wise correlations are computed by calling the cor function with the appropriate arguments.

Value

One minus the row-wise Kendall’s tau correlations are returned as an instance of the dist class. Note that this can be extremely slow for large data sets.

Author(s)

Beiying Ding

See Also

cor.dist, spearman.dist, euc, man, KLDist.matrix, KLD.matrix, mutualInfo

Examples

```r
x <- matrix(rnorm(200), nrow = 5)
tau.dist(x)
```
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