

Package ‘STMotif’

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Type Package

Title Discovery of Motifs in Spatial-Time Series

Version 1.0.1

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Description Allows to identify motifs in spatial-time series. A motif is a previously unknown subsequence of a (spatial) time series with relevant number of occurrences. For this purpose, the Combined Series Approach (CSA) is used.

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Encoding UTF-8

LazyData true

Imports stats, ggplot2, reshape2, scales, grDevices, RColorBrewer, shiny

RoxygenNote 6.1.0

Suggests knitr, rmarkdown, testthat

VignetteBuilder knitr

NeedsCompilation no

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Depends R (>= 2.10)

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CSAMiningProcess	<i>CSAMiningProcess</i>
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Description

CSA Datamining Process

Usage

CSAMiningProcess(D, DS, w, a, sb, tb, si, ka)

Arguments

D	Dataset containing numeric values
DS	Dataset containing SAX encoded values
w	Word Size
a	Number of letters to do the encode
sb	Spatial block size
tb	Temporal block size
si	Minimum number of occurrences inside each block
ka	Minimum number of spatial-time series with occurrences inside each block

Value

Return a list of ranked motifs. Each motif contains the information [isaxcode, recmatrix, vectst, rank], as described:

isaxcode: Motif sequences in character format

recmatrix: Matrix giving as information the blocks containing this motif

vectst: Coordinate of the start positions of the motif in the original dataset

rank: L of information used for motif ranking, as [dist, word, qtd, proj]

Note

To see more informations: [CSA Datamining Process](#)

Examples

```
#CSA Datamining process
D <- STMotif::example_dataset
DS <- NormSAX(STMotif::example_dataset,7)
rmotif <- CSAMiningProcess(D,DS,3,7,10,10,3,7)
```

displayPlotSeries *Plot spatial series by selected columns*

Description

Plot a selected motif and range of columns of the dataset

Usage

```
displayPlotSeries(dataset, rmotifs, position, space)
```

Arguments

dataset	Dataset containing numeric values
rmotifs	List of ranked motifs
position	Select by an integer a motif with his position
space	Select a range of columns to plot the corresponding spatial series

Value

Plot the spatial series

Examples

```
#Launch all the workflow
#Plot the result
D <- STMotif::example_dataset
DS <- NormSAX(STMotif::example_dataset,7)
stmotifs <- SearchSTMotifs(D,DS,3,7,10,10,3,7)
rstmotifs <- RankSTMotifs(stmotifs)
displayPlotSeries(dataset = D, rmotifs = rstmotifs ,position = 1 ,space = c(1,2,5:7))
```

example_dataset	<i>Example of dataset</i>
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Description

Toy example to launch functions. The dimensions of the dataset are 100 rows and 50 columns and this dataset contains 50 spatial-time series.

Usage

```
example_dataset
```

Format

An object of class `data.frame` with 100 rows and 50 columns.

intensityDataset	<i>Plot the intensity of values</i>
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Description

Display the intensity of values and highlight one motif

Usage

```
intensityDataset(dataset, rankList, alpha)
```

Arguments

dataset	Dataset containing numeric values
rankList	List of ranked motifs
alpha	Number of letter used to do the encode

Value

Pixelated dataset

Examples

```
#Launch all the workflow
#Plot the result
D <- STMotif::example_dataset
DS <- NormSAX(STMotif::example_dataset,7)
stmotifs <- SearchSTMotifs(D,DS,3,7,10,10,3,7)
rstmotifs <- RankSTMotifs(stmotifs)
intensityDataset(dataset = STMotif::example_dataset, rankList = rstmotifs, 7)
```

NormSAX	<i>Normalize the data and SAX indexing</i>
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Description

Normalize the data and SAX indexing

Usage

```
NormSAX(D, a)
```

Arguments

D	Dataset containing numeric values
a	Number of letters use to encode

Value

A normalized and encoded dataset for a given alphabet a #' @note To see more informations:
[Normalize the data and SAX indexing](#)

Examples

```
#Normalization and Sax Dataset  
DS <- NormSAX(STMotif::example_dataset, 7)
```

RankSTMotifs	<i>Rank the STMotifs Rank motifs by their quality</i>
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Description

Rank the STMotifs Rank motifs by their quality

Usage

```
RankSTMotifs(stmotifs)
```

Arguments

stmotifs	List of identified motifs
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Value

The ranked version of the identified list of motifs

Examples

```
#Search for Spatial-time Motifs
D <- STMotif::example_dataset
DS <- NormSAX(STMotif::example_dataset,7)
stmotifs <- SearchSTMotifs(D,DS,3,7,10,10,3,7)
rstmotifs <- RankSTMotifs(stmotifs)
```

runVisualization *Interactive visualization*

Description

Launch a process to have an interactive visualization

Usage

```
runVisualization(dataset, rankList, alpha)
```

Arguments

dataset	Dataset containing numeric values
rankList	List of ranked motifs
alpha	Number of letters used to do the encode

Examples

```
## Not run:
#Launch all the workflow
D <- STMotif::example_dataset
DS <- NormSAX(STMotif::example_dataset,7)
stmotifs <- SearchSTMotifs(D,DS,3,7,10,10,3,7)
rstmotifs <- RankSTMotifs(stmotifs)
#Launch the process
runVisualization(dataset = STMotif::example_dataset, rstmotifs, 7)

## End(Not run)
```

SearchSTMotifs	<i>SearchSTMotifs</i>
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Description

Search for Spatial-time Motifs

Usage

```
SearchSTMotifs(D, DS, w, a, sb, tb, si = 3, ka = 3)
```

Arguments

D	Dataset containing numeric values
DS	Dataset containing SAX encoded values
w	Word Size
a	Number of letters to do the encode
sb	"Space slice" Number of columns in each block
tb	"Time slice" Number of rows in each block
si	Support of Global Occurrence (GO)
ka	Support for Spatial Occurrence (SO)

Value

Return a list of identified motifs. Each motif contains the information [isaxcode, recmatrix, vectst], as described:

isaxcode: Motif sequences in character format

recmatrix: Matrix giving as information the blocks containing this motif

vectst: Coordinate of the start positions of the motif in the original dataset

Note

To see more informations: [Search for Spatial-time Motifs](#)

Examples

```
#Search for Spatial-time Motifs
D <- STMotif::example_dataset
DS <- NormSAX(STMotif::example_dataset, 7)
stmotifs <- SearchSTMotifs(D, DS, 3, 7, 10, 10, 3, 7)
```

STMotif

Package STMotif

Description

This package ‘STMotifs‘ allows to identify motifs in spatial-time series. A motif is a previously unknown subsequence of a (spatial) time series with relevant number of occurrences. For this purpose, the Combined Series Approach (CSA) is used.

Details

To have more information about the package : [PACKAGE STMOTIF](#)

STSADatasetAdjust

Adjust a Dataset Adjust the dimensions of a dataset to build the blocks

Description

Adjust a Dataset Adjust the dimensions of a dataset to build the blocks

Usage

```
STSADatasetAdjust(D, tb, sb)
```

Arguments

D	Dataset containing numeric values
tb	Temporal block size
sb	Spatial block size

Value

Dataset adjusted to build the blocks.

Examples

```
#Adjust a block  
D <- STSADatasetAdjust(STMotif::example_dataset, 10, 10)
```

`top5motifs`*Plot the 5 motifs*

Description

Display the intensity of values and highlight the top five motifs

Usage

```
top5motifs(dataset, rankList, alpha)
```

Arguments

<code>dataset</code>	Dataset containing numeric values
<code>rankList</code>	List of ranked motifs
<code>alpha</code>	Number of letters used to do the encode

Value

Pixelated dataset

Examples

```
#Launch all the workflow
D <- STMotif::example_dataset
DS <- NormSAX(STMotif::example_dataset,7)
stmotifs <- SearchSTMotifs(D,DS,3,7,10,10,3,7)
rstmotifs <- RankSTMotifs(stmotifs)
#Plot the result
top5motifs(dataset = STMotif::example_dataset, rankList = rstmotifs, alpha = 7)
```

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