

# Package ‘STMotif’

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**Type** Package

**Title** Discovery of Motifs in Spatial-Time Series

**Version** 1.0.2

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**Description** Allow 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.

**License** GPL-2 | GPL-3

**Encoding** UTF-8

**LazyData** true

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

**RoxygenNote** 6.1.1

**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)
```

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displayPlotSeries      *Plot spatial series by selected columns*

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**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))
```

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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.

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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)
```

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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)
```

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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)
```

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runVisualization      *Interactive visualization*

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## 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)
```

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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)
```

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STMotif

*Package STMotif*

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### Description

This package ‘STSMotifs‘ 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](#)

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STSDatasetAdjust

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

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### Description

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

### Usage

```
STSDatasetAdjust(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 <- STSDatasetAdjust(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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