Package 'CREAM'

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Type Package

Title Clustering of Genomic Regions Analysis Method

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Description Provides a new method for identification of clusters of genomic regions within chromosomes. Primarily, it is used for calling clusters of cis-regulatory elements (COREs). 'CREAM' uses genome-wide maps of genomic regions in the tissue or cell type of interest, such as those generated from chromatin-based assays including DNaseI, ATAC or ChIP-Seq. 'CREAM' considers proximity of the elements within chromosomes of a given sample to identify COREs in the following steps: 1) It identifies window size or the maximum allowed distance between the elements within each CORE, 2) It identifies number of elements which should be clustered as a CORE, 3) It calls COREs, 4) It filters the COREs with lowest order which does not pass the threshold considered in the approach.

License GPL (>= 3)

Imports stats, utils

Depends R (>= 3.3)

URL https://github.com/bhklab/CREAM

Suggests testthat

RoxygenNote 6.0.1

LazyData true

biocViews PeakDetection, FunctionalPrediction, BiomedicalInformatics, Clustering

BugReports https://github.com/bhklab/CREAM/issues

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NeedsCompilation no

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R topics documented:

CREAM *CREAM is the main function for CORE identification*

Description

CREAM is the main function for CORE identification

Usage

```
CREAM(in_path, WScutoff = 1.5, MinLength = 1000, peakNumMin = 2)
```

Arguments

in_path	Path to the input file (The file inclusing the functional regions) Note. You have to make sure that there is no overlapping regions within the input file
WScutoff	Threshold used to identify WS within distribution of maximum distance between peaks for each order of CORE
MinLength	Criteria for the minimum number of functional regions in the input file
peakNumMin	Minimum number of peaks for CORE identification

Value

Bed file including the identified COREs

Examples

```
CREAM(system.file("extdata", "A549_Chr21.bed", package = "CREAM"),
MinLength = 1000, peakNumMin = 2)
```

ElementRecog *ElementRecog is a function to identify COREs*

Description

ElementRecog is a function to identify COREs

Usage

```
ElementRecog(InputData, windowSize_Vec, peakNumMax, peakNumMin)
```

Arguments

InputData	The input data as a table including chromosome regions in which the first column is chromosome annotation, and second and third columns are start and ending positions.
windowSize_Vec	Vector of window sizes ordered based on order of CORE
peakNumMax	Maximum order of COREs (e.g. maximum number of peaks within COREs)
peakNumMin	Minimum order of COREs (e.g. minimum number of peaks within COREs)

Value

Identified COREs for the given input regions

Examples

```
InputData <- read.table(system.file("extdata", "A549_Chr21.bed",
package = "CREAM"), sep="\t")
colnames(InputData) <- c("chr", "start", "end")
MinLength <- 1000
if(nrow(InputData) < MinLength){
   stop(paste( "Number of functional regions is less than ", MinLength,
   ".", sep = "", collapse = ""))
}
peakNumMin <- 2
WScutoff <- 1.5
WindowVecFinal <- WindowVec(InputData, peakNumMin, WScutoff)
OutputList <- ElementRecog(InputData, WindowVecFinal,
(1+length(WindowVecFinal)), peakNumMin)
```

`PeakMinFilt` *PeakMinFilt is a function to filter the lowest Order of COREs which distance between functional regions is close to the corresponding Window Size*

Description

PeakMinFilt is a function to filter the lowest Order of COREs which distance between functional regions is close to the corresponding Window Size

Usage

```
PeakMinFilt(Clusters_init, WindowVecFinal)
```

Arguments

`Clusters_init`	Table of indetified COREs before filteration
`WindowVecFinal`	Vector of window sizes ordered based on order of CORE

Value

Minimum order of COREs

`WindowSizeRecog` *WindowSizeRecog is a function to specify window size for each order of COREs*

Description

WindowSizeRecog is a function to specify window size for each order of COREs

Usage

```
WindowSizeRecog(InputData, COREorder, WScutoff)
```

Arguments

`InputData`	The input data as a table including chromosome regions in which the first column is chromosome annotation, and second and third columns are start and ending positions.
`COREorder`	Order of the COREs which window size has to be determined for.
`WScutoff`	Threshold used to identify WS within distribution of maximum distance between peaks for each order of CORE

Value

Window size identified for each order of CORE

Examples

```
InputData <- read.table(system.file("extdata", "A549_Chr21.bed",
package = "CREAM"), sep="\t")
colnames(InputData) <- c("chr", "start", "end")
MinLength <- 1000
if(nrow(InputData) < MinLength){
   stop(paste( "Number of functional regions is less than ", MinLength,
   ".", sep = "", collapse = ""))
}
peakNumMin <- 2
WScutoff <- 1.5
WindowSize <- WindowSizeRecog(InputData, peakNumMin, WScutoff)
```

`WindowVec` *WindowVec is a function to specify window size for each order of COREs*

Description

WindowVec is a function to specify window size for each order of COREs

Usage

```
WindowVec(InputData, peakNumMin, WScutoff)
```

Arguments

`InputData`	The input data as a table including chromosome regions in which the first column is chromosome annotation, and second and third columns are start and ending positions.
`peakNumMin`	Minimum order of COREs
`WScutoff`	Threshold used to identify WS within distribution of maximum distance between peaks for each order of CORE

Value

Vector of window sizes from order 2 up to maximum order of COREs

Examples

```
InputData <- read.table(system.file("extdata", "A549_Chr21.bed",
package = "CREAM"), sep="\t")
colnames(InputData) <- c("chr", "start", "end")
MinLength <- 1000
if(nrow(InputData) < MinLength){
   stop(paste( "Number of functional regions is less than ", MinLength,
   ".", sep = "", collapse = ""))
}
peakNumMin <- 2
WScutoff <- 1.5
WindowVecFinal <- WindowVec(InputData, peakNumMin, WScutoff)
```

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