Package 'dagLogo'

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Type Package

Title dagLogo

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Description
Visualize significant conserved amino acid sequence pattern in groups based on probability theory

License GPL (>=2)

Depends R (>= 3.0.1), methods, biomaRt, grImport, grid, motifStack

Imports pheatmap, Biostrings

Suggests XML, UniProt.ws, RUnit, BiocGenerics, BiocStyle

biocViews SequenceMatching, GenomicsSequence, Visualization

R topics documented:

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dagLogo-package *Visualize significant conserved amino acid sequence pattern in groups based on probability theory*

Description

We implement iceLogo by R to visualize significant conserved amino acid sequence pattern based on probability theory. Compare to iceLogo, dagLogo can also visualize significant sequence patterns by clustering the peptides by groups such as charge, chemistry, hydrophobicity and etc.

Details

Package:	dagLogo
Type:	Package
Version:	1.0
Date:	2013-09-31
License:	GPL (>= 2)

DAG: Differential Amino acid Group

There are several differences between dagLogo from iceLogo:

1. The sequence patterns can be grouped by charge, chemistry, hydrophobicity and etc.

2. dagLogo accepts different length of aligned amino acid sequences.

3. Except Random, regional (called restricted in dagLogo) and terminal (called anchored) background model, the background sequence could be set to other regions of the genes in inputs and complementary set of the proteome.

Author(s)

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Examples

```
 data("seq.example")
 data("proteome.example")
bg <- buildBackgroundModel(seq.example, proteome=proteome.example, permutationSize=10L)
 t <- testDAU(seq.example, bg)
 dagLogo(t)
```

`buildBackgroundModel` *build background model*

Description

build background model for dag test

Usage

```
buildBackgroundModel(dagPeptides,
                                  bg=c("wholeGenome", "inputSet", "nonInputSet"),
                                   model=c("any", "anchored"),
                                targetPosition=c("any", "Nterminus", "Cterminus"),
                                   uniqueSeq=TRUE,
                                   permutationSize=30L,
                                   rand.seed=1,
                                   replacement=FALSE,
                                   proteome)
```

Arguments

`dagPeptides`	an object of dagPeptides, output of `fetchSequence` or `formatSequence`
`bg`	could be "wholeGenome", "inputSet" or "nonInputSet"
`model`	could be "any" or "anchored"
`targetPosition`	could be "any", "Nterminus" or "Cterminus"
`uniqueSeq`	should the background sequence be unique?
`permutationSize`	how many times should it samples
`rand.seed`	random seed
`replacement`	Should sampling be with replacement?
`proteome`	an object of Proteome, output of `prepareProteome`

Details

The background could be generated from wholeGenome, inputSet or nonInputSet. whole genome: randomly select subsequences from the whole genome with each subsequence containing amino acids with same width of input sequences. anchored whole genome: randomly select subsequences from the whole genome with each subsequence containing amino acids with same width of input sequences where the middle amino acids must contain anchor amino acid, e.g., K, which is specified by user. input set: same to whole genome, but only use protein sequence from input id and not including the site specified in input sequences anchored input set: same to anchored whole genome, but only use protein sequences from input id, and not including the site specified in input sequences. non-input set: whole genome - input set. anchored non-input set: whole genome - input set and the middle amino acids must contain anchor amino acid.

Value

an object of dagBackground which contains background and permutationSize.

Author(s)

Jianhong Ou, Julie Zhu

See Also

prepareProteome

Examples

```
data("seq.example")
data("proteome.example")
bg <- buildBackgroundModel(seq.example, proteome=proteome.example)
```

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colorsets *retrieve color setting for logo*

Description

retrieve prepared color setting for logo

Usage

```
colorsets(colorScheme=c("null", "classic", "charge", "chemistry", "hydrophobicity"))
```

Arguments

colorScheme	could be 'null', 'charge', 'chemistry', 'classic' or 'hydrophobicity'

Value

A character vector of color scheme

Author(s)

Jianhong Ou

Examples

```
col <- colorsets("hydrophobicity")
```

dagBackground-class *Class* "dagBackground"

Description

An object of class "dagBackground" represents background model.

Objects from the Class

Objects can be created by calls of the form new("dagBackground", background, permutationSize).

Slots

background Object of class "list" records the background model
permutationSize code"integer" permutation size of background

dagHeatmap *plot heatmap for test results*

Description

plot heatmap for test results

Usage

```
dagHeatmap(testDAUresults, type=c("diff", "zscore"), ...)
```

Arguments

testDAUresults	output of testDAU, should be an object of testDAUresults
type	"diff" or "zscore"
...	parameter could be passed to pheatmap

Value

none

Author(s)

Jianhong Ou

Examples

```
 data("seq.example")
 data("proteome.example")
bg <- buildBackgroundModel(seq.example, proteome=proteome.example, permutationSize=10)
 t <- testDAU(seq.example, bg)
 dagHeatmap(t)
```

dagLogo *plot sequence logo for test results*

Description

plot sequence logo for test results

Usage

```
dagLogo(testDAUresults, type=c("diff", "zscore"), pvalueCutoff=0.05, namehash=NULL,
                    font="Helvetica-Bold", textgp=gpar(), legend=FALSE)
```

Arguments

testDAUresults	output of testDAU, should be an object of testDAUresults
type	"diff" or "zscore"
pvalueCutoff	pvalue cutoff for logo plot
namehash	the hash table to convert rownames of test results to a single letter to be plotted in the logo
font	font for logo symbol
textgp	text parameter
legend	plot legend or not, default false.

Value

none

Author(s)

Jianhong Ou

See Also

nameHash

Examples

```
 data("seq.example")
 data("proteome.example")
bg <- buildBackgroundModel(seq.example, proteome=proteome.example, permutationSize=10)
 t <- testDAU(seq.example, bg)
 dagLogo(t)
```

dagPeptides-class *Class* "dagPeptides"

Description

An object of class "dagPeptides" represents the information of peptides.

Objects from the Class

Objects can be created by calls of the form new("dagPeptides", data, peptides, upstreamOffset, downstreamOffset

Slots

data Object of class "data.frame" The details of the input sequences. It includes the columns: IDs, anchorAA (anchor Amino Acid), anchorPos (anchor Position), peptide (protein peptide), anchor, upstream, downstream (peptides in given upstream and downstream offset from anchor)

peptides code"matrix" The input peptides. Each column contains one peptide in that position

upstreamOffset "numeric" The upstream offset from anchor

downstreamOffset "numeric" The downstream offset from anchor

type "charactger" ID type of inputs

ecoli.proteome *the subset proteome of Escherichia coli*

Description

the subset proteome of Escherichia coli

Usage

```
data(ecoli.proteome)
```

Format

An object of Proteome for Escherichia coli proteome. The format is: A list with one data frame and an character.

proteome 'data.frame': obs. of 4 variables

type 'character': "UniProt"

The format of proteome is

ENTREZ_GENE a character vector, records entrez gene id

SEQUENCE a character vector, peptide sequences

ID a character vector, Uniprot ID

LEN a character vector, length of peptides

Details

used in the examples Annotation data obtained by: library(UniProt.ws) taxId(UniProt.ws) <- 562 proteome <- prepareProteome(UniProt.ws, species="Escherichia coli")

Examples

```
data(ecoli.proteome)
head(ecoli.proteome@proteome)
ecoli.proteome@type
```

`fetchSequence` *fetch sequence by id*

Description

fetch amino acid sequence by given identifiers via biomaRt or proteome prepared by `prepareProteome`

Usage

```
fetchSequence(IDs, type="entrezgene", anchorAA=NULL, anchorPos,
                              mart, proteome, upstreamOffset, downstreamOffset)
```

Arguments

`IDs`	A vector of Identifiers to retrieve peptides
`type`	type of identifiers
`anchorAA`	a vector of character, anchor Amino Acid
`anchorPos`	a vector of character or numeric, anchor position, for example, K121
`mart`	an object of Mart
`proteome`	an object of Proteome, output of `prepareProteome`
`upstreamOffset`	an integer, upstream offset position
`downstreamOffset`	an integer, downstream offset position

Value

return an object of `dagPeptides`

Author(s)

Jianhong Ou, Julie Zhu

See Also

`formatSequence`

Examples

```
mart <- useMart("ensembl", "dmelanogaster_gene_ensembl")
dat <- read.csv(system.file("extdata", "dagLogoTestData.csv", package="dagLogo"))
seq <- fetchSequence(as.character(dat$entrez_geneid[1:5]),
            anchorPos=as.character(dat$NCBI_site[1:5]),
            mart=mart,
            upstreamOffset=7,
            downstreamOffset=7)
```

`formatSequence` *prepare an object of dagPeptides from sequences*

Description

prepare an object of dagPeptides from sequences

Usage

```
formatSequence(seq, proteome, upstreamOffset, downstreamOffset)
```

Arguments

`seq`	a vector of character, amino acid sequences
`proteome`	an object of Proteome, output of `prepareProteome`
`upstreamOffset`	an integer, upstream offset position
`downstreamOffset`	an integer, downstream offset position

Value

return an object of dagPeptides, which is a list contains: data, peptides, upstreamOffset, downstreamOffset and type information

Author(s)

Jianhong Ou, Julie Zhu

See Also

`fetchSequence`

Examples

```
if(interactive()){
    dat <- unlist(read.delim(system.file("extdata",
                             "grB.txt", package="dagLogo"),
                             header=F, as.is=TRUE))
    proteome <- prepareProteome(fasta=system.file("extdata",
                                                  "HUMAN.fasta",
                                                  package="dagLogo"))
    seq <- formatSequence(dat, proteome)
}
```

---

nameHash *convert group name to a single character*

Description

convert group name to a single character to shown in a logo

Usage

```
nameHash(nameScheme=c("classic", "charge", "chemistry", "hydrophobicity"))
```

Arguments

nameScheme	could be "classic", "charge", "chemistry", "hydrophobicity"

Value

A character vector of name scheme

Author(s)

Jianhong Ou

Examples

```
nameHash("charge")
```

prepareProteome *prepare proteome for background building*

Description

prepare proteome from UniProt webserver or a fasta file

Usage

```
prepareProteome(UniProt.ws, fasta, species="unknown")
```

Arguments

UniProt.ws	an object of UniProt.ws
fasta	fasta file name or an object of AAStringSet
species	an character to assign the species of the proteome

Value

an object of Proteome which contain protein sequence information

Author(s)

Jianhong Ou

See Also

formatSequence, buildBackgroundModel

Examples

```
if(interactive()){
    library(UniProt.ws)
    taxId(UniProt.ws) <- 7227
    proteome <- prepareProteome(UniProt.ws, species="Drosophila melanogaster")
}
```

Proteome-class *Class* "Proteome"

Description

An object of class "Proteome" represents proteome of a given species.

Objects from the Class

Objects can be created by calls of the form new("Proteome", proteome, type, species).

Slots

proteome Object of class "data.frame" the proteome of a given species, should include ids and peptide sequences.

type code"character" indicates how the object is prepared, could be "fasta" or "UniProt"

species "character" the species

proteome.example *the subset proteome of fruit fly*

Description

the subset proteome of fruit fly

Usage

```
data(proteome.example)
```

Format

An object of Proteome for fly subset proteome. The format is: A list with one data frame and an character.

proteome 'data.frame': 1406 obs. of 4 variables

type 'character': "UniProt"

The format of proteome is

ENTREZ_GENE a character vector, records entrez gene id

SEQUENCE a character vector, peptide sequences

ID a character vector, Uniprot ID

LEN a character vector, length of peptides

Details

used in the examples Annotation data obtained by: library(UniProt.ws) taxId(UniProt.ws) <- 7227 proteome <- prepareProteome(UniProt.ws) proteome@proteome <- proteome@proteome[sample(1:19902, 1406),]

Examples

```
data(proteome.example)
head(proteome.example@proteome)
proteome.example@type
```

---

seq.example *example object of dagPeptides*

Description

example object of dagPeptides

Usage

```
data(seq.example)
```

Format

An object of dagPeptides. The format is: A list.

`data` 'data.frame': 732 obs. of 7 variables

`peptides` 'matrix': amnio acid in each position

`upstreamOffset` an integer, upstream offset position

`downstreamOffset` an integer, downstream offset position

`type` "character", type of identifiers

The format of data is

`IDs` a character vector, input identifiers

`anchorAA` a character vector, anchor amino acid provided in inputs

`anchorPos` a numeric vector, anchor position in the protein

`peptide` a character vector, peptide sequences

`anchor` a character vector, anchor amino acid in the protein

`upstream` a character vector, upstream peptides

`downstream` a character vector, downstream peptides

Details

used in the examples seq obtained by: mart <- useMart("ensembl", "dmelanogaster_gene_ensembl") dat <- read.csv(system.file("extdata", "dagLogoTestData.csv", package="dagLogo")) seq <- fetchSequence(as.character(dat$entrez_geneid), anchorPos=as.character(dat$NCBI_site), mart=mart, upstreamOffset=7, downstreamOffset=7)

Examples

```
data(seq.example)
head(seq.example@peptides)
seq.example@upstreamOffset
seq.example@downstreamOffset
```

`testDAU` *DAU test*

Description

Performs DAU test

Usage

```
testDAU(dagPeptides, dagBackground,
             group=c("null", "classic", "charge", "chemistry", "hydrophobicity"))
```

Arguments

`dagPeptides`	an object of dagPeptides, output of `fetchSequence` or f`formatSequence`
`dagBackground`	an object of dagBackground, output of `buildBackgroundModel`
`group`	could be "null", "classic", "charge", "chemistry", "hydrophobicity"

Value

an object of testDAUresults ready for plotting

Author(s)

Jianhong Ou, Julie Zhu

Examples

```
data("seq.example")
data("proteome.example")
bg <- buildBackgroundModel(seq.example, proteome=proteome.example)
t <- testDAU(seq.example, bg)
```

testDAUresults-class *Class* "testDAUresults"

Description

An object of class "testDAUresults" represents background model.

Objects from the Class

Objects can be created by calls of the form new("dagBackground", group="character", difference=

Slots

group Object of class "character" could be "null", "classic", "charge", "chemistry", "hydrophobicity"

difference code"matrix" the difference of inputs from background for each amino acid in each position

zscore code"matrix" z score for each amino acid in each position

pvalue code"matrix" pvalue for each amino acid in each position

background code"matrix" background frequencies for each amino acid in each position

motif code"matrix" inputs frequencies for each amino acid in each position

upstream "numeric" The upstream offset from anchor

downstream "numeric" The downstream offset from anchor

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