

# Package ‘ChIPseeker’

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**Type** Package

**Title** ChIPseeker for ChIP peak Annotation, Comparison, and Visualization

**Version** 1.47.1

**Maintainer** Guangchuang Yu <guangchuangyu@gmail.com>

**Description** This package implements functions to retrieve the nearest genes around the peak, annotate genomic region of the peak, statistical methods for estimate the significance of overlap among ChIP peak data sets, and incorporate GEO database for user to compare the own dataset with those deposited in database. The comparison can be used to infer cooperative regulation and thus can be used to generate hypotheses. Several visualization functions are implemented to summarize the coverage of the peak experiment, average profile and heatmap of peaks binding to TSS regions, genomic annotation, distance to TSS, and overlap of peaks or genes.

**Depends** R (>= 3.5.0)

**Imports** AnnotationDbi, aplot, BiocGenerics, boot, dplyr, enrichplot, IRanges, GenomeInfoDb, GenomicRanges, GenomicFeatures, ggplot2, gplots, graphics, grDevices, gtools, magrittr, methods, plotrix, parallel, RColorBrewer, rlang, rtracklayer, S4Vectors, scales, stats, tibble, TxDb.Hsapiens.UCSC.hg19.knownGene, utils, yulab.utils (>= 0.2.0)

**Suggests** clusterProfiler, ggimage, ggplotify, ggupset, ggVennDiagram, knitr, org.Hs.eg.db, prettydoc, ReactomePA, rmarkdown, testthat, TxDb.Hsapiens.UCSC.hg38.knownGene

**Remotes** GuangchuangYu/enrichplot

**URL** <https://yulab-smu.top/contribution-knowledge-mining/>

**BugReports** <https://github.com/YuLab-SMU/ChIPseeker/issues>

**Encoding** UTF-8

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**ByteCompile** true

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---

|                    |                                                                                       |
|--------------------|---------------------------------------------------------------------------------------|
| ChIPseeker-package | <i>ChIPseeker: ChIPseeker for ChIP peak Annotation, Comparison, and Visualization</i> |
|--------------------|---------------------------------------------------------------------------------------|

---

## Description

This package implements functions to retrieve the nearest genes around the peak, annotate genomic region of the peak, statistical methods for estimate the significance of overlap among ChIP peak data sets, and incorporate GEO database for user to compare the own dataset with those deposited in database. The comparison can be used to infer cooperative regulation and thus can be used to generate hypotheses. Several visualization functions are implemented to summarize the coverage of the peak experiment, average profile and heatmap of peaks binding to TSS regions, genomic annotation, distance to TSS, and overlap of peaks or genes.

## Author(s)

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## See Also

Useful links:

- <https://yulab-smu.top/contribution-knowledge-mining/>
- Report bugs at <https://github.com/YuLab-SMU/ChIPseeker/issues>

---

**Description**

capture name of variable

**Usage**

```
.(..., .env = parent.frame())
```

**Arguments**

|      |             |
|------|-------------|
| ...  | expression  |
| .env | environment |

**Value**

expression

**Examples**

```
x <- 1  
eval(.(x)[[1]])
```

---

|                |                                    |
|----------------|------------------------------------|
| .ChIPseekerEnv | <i>env function for ChIPseeker</i> |
|----------------|------------------------------------|

---

**Description**

env function for ChIPseeker

**Usage**

```
.ChIPseekerEnv(Txdb, item = "ChIPseekerEnv", force = FALSE)
```

**Arguments**

|       |                                            |
|-------|--------------------------------------------|
| Txdb  | txdb object                                |
| item  | item name                                  |
| force | force to update txdb item in cache or not. |

---

|              |                     |
|--------------|---------------------|
| annotatePeak | <i>annotatePeak</i> |
|--------------|---------------------|

---

## Description

Annotate peaks

## Usage

```
annotatePeak(
  peak,
  tssRegion = c(-3000, 3000),
  TxDb = NULL,
  level = "transcript",
  assignGenomicAnnotation = TRUE,
  genomicAnnotationPriority = c("Promoter", "5UTR", "3UTR", "Exon", "Intron",
    "Downstream", "Intergenic"),
  annoDb = NULL,
  addFlankGeneInfo = FALSE,
  flankDistance = 5000,
  sameStrand = FALSE,
  ignoreOverlap = FALSE,
  ignoreUpstream = FALSE,
  ignoreDownstream = FALSE,
  overlap = "TSS",
  verbose = TRUE,
  columns = c("ENTREZID", "ENSEMBL", "SYMBOL", "GENENAME")
)
```

## Arguments

|                           |                                                               |
|---------------------------|---------------------------------------------------------------|
| peak                      | peak file or GRanges object                                   |
| tssRegion                 | Region Range of TSS                                           |
| TxDb                      | TxDb or EnsDb annotation object                               |
| level                     | one of transcript and gene                                    |
| assignGenomicAnnotation   | logical, assign peak genomic annotation or not                |
| genomicAnnotationPriority | genomic annotation priority                                   |
| annoDb                    | annotation package                                            |
| addFlankGeneInfo          | logical, add flanking gene information from the peaks         |
| flankDistance             | distance of flanking sequence                                 |
| sameStrand                | logical, whether find nearest/overlap gene in the same strand |

ignoreOverlap logical, whether ignore overlap of TSS with peak  
 ignoreUpstream logical, if True only annotate gene at the 3' of the peak.  
 ignoreDownstream logical, if True only annotate gene at the 5' of the peak.  
 overlap one of 'TSS' or 'all', if overlap="all", then gene overlap with peak will be reported as nearest gene, no matter the overlap is at TSS region or not.  
 verbose print message or not  
 columns names of columns to be obtained from database

## Value

data.frame or GRanges object with columns of:  
 all columns provided by input.  
 annotation: genomic feature of the peak, for instance if the peak is located in 5'UTR, it will annotated by 5'UTR. Possible annotation is Promoter-TSS, Exon, 5' UTR, 3' UTR, Intron, and Inter-genic.  
 geneChr: Chromosome of the nearest gene  
 geneStart: gene start  
 geneEnd: gene end  
 geneLength: gene length  
 geneStrand: gene strand  
 geneId: entrezgene ID  
 distanceToTSS: distance from peak to gene TSS  
 if annoDb is provided, extra column will be included:  
 ENSEMBL: ensembl ID of the nearest gene  
 SYMBOL: gene symbol  
 GENENAME: full gene name

## Author(s)

G Yu

## See Also

[plotAnnoBar](#) [plotAnnoPie](#) [plotDistToTSS](#)

## Examples

```
## Not run:
require(TxDb.Hsapiens.UCSC.hg19.knownGene)
txdb <- TxDb.Hsapiens.UCSC.hg19.knownGene
peakfile <- system.file("extdata", "sample_peaks.txt", package="ChIPseeker")
peakAnno <- annotatePeak(peakfile, tssRegion=c(-3000, 3000), TxDb=txdb)
peakAnno

## End(Not run)
```

as.data.frame.csAnno    *as.data.frame.csAnno*

---

**Description**

convert csAnno object to data.frame

**Usage**

```
## S3 method for class 'csAnno'  
as.data.frame(x, row.names = NULL, optional = FALSE, ...)
```

**Arguments**

|           |                       |
|-----------|-----------------------|
| x         | csAnno object         |
| row.names | row names             |
| optional  | should be omitted.    |
| ...       | additional parameters |

**Value**

data.frame

**Author(s)**

Guangchuang Yu <https://guangchuangyu.github.io>

---

as.GRanges    *as.GRanges*

---

**Description**

convert csAnno object to GRanges

**Usage**

```
as.GRanges(x)
```

**Arguments**

|   |               |
|---|---------------|
| x | csAnno object |
|---|---------------|

**Value**

GRanges object

### Author(s)

Guangchuang Yu <https://guangchuangyu.github.io>

---

check\_upstream\_and\_downstream

*check upstream and downstream parameter*

---

### Description

check\_upstream\_and\_downstream

### Usage

check\_upstream\_and\_downstream(upstream, downstream)

### Arguments

|            |            |
|------------|------------|
| upstream   | upstream   |
| downstream | downstream |

---

ChIPseekerCache

*Name of the ChIPseeker cache environment (internal static variable)*

---

### Description

Name of the ChIPseeker cache environment (internal static variable)

### Usage

ChIPseekerCache

### Format

character vector

---

|                |                       |
|----------------|-----------------------|
| combine_csAnno | <i>combine_csAnno</i> |
|----------------|-----------------------|

---

**Description**

Combine csAnno Object

**Usage**

```
combine_csAnno(x, ...)
```

**Arguments**

|     |                |
|-----|----------------|
| x   | csAnno object  |
| ... | csAnno objects |

**Details**

<https://github.com/YuLab-SMU/ChIPseeker/issues/157>

**Value**

csAnno object

---

|         |                |
|---------|----------------|
| covplot | <i>covplot</i> |
|---------|----------------|

---

**Description**

plot peak coverage

**Usage**

```
covplot(  
  peak,  
  weightCol = NULL,  
  xlab = "Chromosome Size (bp)",  
  ylab = "",  
  title = "ChIP Peaks over Chromosomes",  
  chrs = NULL,  
  xlim = NULL,  
  lower = 1,  
  fill_color = "black"  
)
```

**Arguments**

|            |                                                          |
|------------|----------------------------------------------------------|
| peak       | peak file or GRanges object                              |
| weightCol  | weight column of peak                                    |
| xlab       | xlab                                                     |
| ylab       | ylab                                                     |
| title      | title                                                    |
| chrs       | selected chromosomes to plot, all chromosomes by default |
| xlim       | ranges to plot, default is whole chromosome              |
| lower      | lower cutoff of coverage signal                          |
| fill_color | specify the color/palette for the plot. Order matters    |

**Value**

ggplot2 object

**Author(s)**

G Yu

---

|              |                                                                                 |
|--------------|---------------------------------------------------------------------------------|
| csAnno-class | <i>Class "csAnno" This class represents the output of ChIPseeker Annotation</i> |
|--------------|---------------------------------------------------------------------------------|

---

**Description**

Class "csAnno" This class represents the output of ChIPseeker Annotation

**Slots**

anno annotation  
 tssRegion TSS region  
 level transcript or gene  
 hasGenomicAnnotation logical  
 detailGenomicAnnotation Genomic Annotation in detail  
 annoStat annotation statistics  
 peakNum number of peaks

**Author(s)**

Guangchuang Yu <https://guangchuangyu.github.io>

**See Also**

[annotatePeak](#)

---

|                     |                            |
|---------------------|----------------------------|
| downloadGEObedFiles | <i>downloadGEObedFiles</i> |
|---------------------|----------------------------|

---

**Description**

download all BED files of a particular genome version

**Usage**

```
downloadGEObedFiles(genome, destDir = getwd())
```

**Arguments**

|         |                    |
|---------|--------------------|
| genome  | genome version     |
| destDir | destination folder |

**Author(s)**

G Yu

---

|                     |                            |
|---------------------|----------------------------|
| downloadGSMbedFiles | <i>downloadGSMbedFiles</i> |
|---------------------|----------------------------|

---

**Description**

download BED supplementary files of a list of GSM accession numbers

**Usage**

```
downloadGSMbedFiles(GSM, destDir = getwd())
```

**Arguments**

|         |                       |
|---------|-----------------------|
| GSM     | GSM accession numbers |
| destDir | destination folder    |

**Author(s)**

G Yu

---

|          |                 |
|----------|-----------------|
| dropAnno | <i>dropAnno</i> |
|----------|-----------------|

---

**Description**

dropAnno

**Usage**

```
dropAnno(csAnno, distanceToTSS_cutoff = 10000)
```

**Arguments**

csAnno                    output of annotatePeak  
distanceToTSS\_cutoff    distance to TSS cutoff

**Details**

drop annotation exceeding distanceToTSS\_cutoff

**Value**

csAnno object

**Author(s)**

Guangchuang Yu

---

|                   |                          |
|-------------------|--------------------------|
| enrichAnnoOverlap | <i>enrichAnnoOverlap</i> |
|-------------------|--------------------------|

---

**Description**

calcuatue overlap significant of ChIP experiments based on their nearest gene annotation

**Usage**

```
enrichAnnoOverlap(  
  queryPeak,  
  targetPeak,  
  TxDb = NULL,  
  pAdjustMethod = "BH",  
  chainFile = NULL,  
  distanceToTSS_cutoff = NULL  
)
```

**Arguments**

|                      |                                                     |
|----------------------|-----------------------------------------------------|
| queryPeak            | query bed file                                      |
| targetPeak           | target bed file(s) or folder containing bed files   |
| TxDb                 | TxDb                                                |
| pAdjustMethod        | pvalue adjustment method                            |
| chainFile            | chain file for liftOver                             |
| distanceToTSS_cutoff | restrict nearest gene annotation by distance cutoff |

**Value**

data.frame

**Author(s)**

G Yu

---

|                   |                          |
|-------------------|--------------------------|
| enrichPeakOverlap | <i>enrichPeakOverlap</i> |
|-------------------|--------------------------|

---

**Description**

calculate overlap significant of ChIP experiments based on the genome coordinations

**Usage**

```
enrichPeakOverlap(
  queryPeak,
  targetPeak,
  TxDb = NULL,
  pAdjustMethod = "BH",
  nShuffle = 1000,
  chainFile = NULL,
  pool = TRUE,
  mc.cores = detectCores() - 1,
  verbose = TRUE
)
```

**Arguments**

|               |                                                                                     |
|---------------|-------------------------------------------------------------------------------------|
| queryPeak     | query bed file or GRanges object                                                    |
| targetPeak    | target bed file(s) or folder that containing bed files or a list of GRanges objects |
| TxDb          | TxDb                                                                                |
| pAdjustMethod | pvalue adjustment method                                                            |

|           |                                               |
|-----------|-----------------------------------------------|
| nShuffle  | shuffle numbers                               |
| chainFile | chain file for liftOver                       |
| pool      | logical, whether pool target peaks            |
| mc.cores  | number of cores, see <a href="#">mclapply</a> |
| verbose   | logical                                       |

**Value**

|            |
|------------|
| data.frame |
|------------|

**Author(s)**

|      |
|------|
| G Yu |
|------|

---

|             |                    |
|-------------|--------------------|
| getAnnoStat | <i>getAnnoStat</i> |
|-------------|--------------------|

---

**Description**

|                              |
|------------------------------|
| getting status of annotation |
|------------------------------|

**Usage**

|                |
|----------------|
| getAnnoStat(x) |
|----------------|

**Arguments**

|   |               |
|---|---------------|
| x | csAnno object |
|---|---------------|

---

|              |                     |
|--------------|---------------------|
| getBioRegion | <i>getBioRegion</i> |
|--------------|---------------------|

---

**Description**

|                                         |
|-----------------------------------------|
| prepare a bioregion of selected feature |
|-----------------------------------------|

**Usage**

|                                                                                                                     |
|---------------------------------------------------------------------------------------------------------------------|
| getBioRegion(<br>TxDb = NULL,<br>upstream = 1000,<br>downstream = 1000,<br>by = "gene",<br>type = "start_site"<br>) |
|---------------------------------------------------------------------------------------------------------------------|

Arguments

|            |                                                                      |
|------------|----------------------------------------------------------------------|
| TxDb       | TxDb                                                                 |
| upstream   | upstream from start site or end site                                 |
| downstream | downstream from start site or end site                               |
| by         | one of 'gene', 'transcript', 'exon', 'intron', '3UTR', '5UTR', 'UTR' |
| type       | one of "start_site", "end_site", "body"                              |

Details

this function combined previous functions getPromoters(), getBioRegion() and getGeneBody() in order to solve the following issues.

(1) <https://github.com/GuangchuangYu/ChIPseeker/issues/16>

(2) <https://github.com/GuangchuangYu/ChIPseeker/issues/87>

The getBioRegion() function can prevoid a region of interest from txdb object. There are three kinds of regions, start\_site, end\_site and body.

We take transcript region to expain the differences of these three regions. tx: chr1 1000 1400.

body region refers to the 1000-1400bp.

start\_site region with upstream = 100, downstream = 100 refers to 900-1100bp.

end\_site region with upstream = 100, downstream = 100 refers to 1300-1500bp.

Value

GRanges object

Author(s)

Guangchuang Yu, Ming L

---

|             |                    |
|-------------|--------------------|
| getGeneAnno | <i>getGeneAnno</i> |
|-------------|--------------------|

---

Description

get gene annotation, symbol, gene name etc.

Usage

getGeneAnno(annoDb, geneID, type, columns)

Arguments

|         |                                               |
|---------|-----------------------------------------------|
| annoDb  | annotation package                            |
| geneID  | query geneID                                  |
| type    | gene ID type                                  |
| columns | names of columns to be obtained from database |

**Value**

data.frame

**Author(s)**

G Yu

---

getGenomicAnnotation    *getGenomicAnnotation*

---

**Description**

get Genomic Annotation of peaks

**Usage**

```
getGenomicAnnotation(  
  peaks,  
  distance,  
  tssRegion = c(-3000, 3000),  
  TxDb,  
  level,  
  genomicAnnotationPriority,  
  sameStrand = FALSE  
)
```

**Arguments**

|                           |                                      |
|---------------------------|--------------------------------------|
| peaks                     | peaks in GRanges object              |
| distance                  | distance of peak to TSS              |
| tssRegion                 | tssRegion, default is -3kb to +3kb   |
| TxDb                      | TxDb object                          |
| level                     | one of gene or transcript            |
| genomicAnnotationPriority | genomic Annotation Priority          |
| sameStrand                | whether annotate gene in same strand |

**Value**

character vector

**Author(s)**

G Yu

---

|                     |                            |
|---------------------|----------------------------|
| getGEOgenomeVersion | <i>getGEOgenomeVersion</i> |
|---------------------|----------------------------|

---

**Description**

get genome version statistics collecting from GEO ChIPseq data

**Usage**

```
getGEOgenomeVersion()
```

**Value**

data.frame

**Author(s)**

G Yu

---

|            |                   |
|------------|-------------------|
| getGEOInfo | <i>getGEOInfo</i> |
|------------|-------------------|

---

**Description**

get subset of GEO information by genome version keyword

**Usage**

```
getGEOInfo(genome, simplify = TRUE)
```

**Arguments**

|          |                        |
|----------|------------------------|
| genome   | genome version         |
| simplify | simplify result or not |

**Value**

data.frame

**Author(s)**

G Yu

---

|               |                      |
|---------------|----------------------|
| getGEOSpecies | <i>getGEOSpecies</i> |
|---------------|----------------------|

---

**Description**

accessing species statistics collecting from GEO database

**Usage**

```
getGEOSpecies()
```

**Value**

data.frame

**Author(s)**

G Yu

---

|                                      |                                             |
|--------------------------------------|---------------------------------------------|
| getNearestFeatureIndicesAndDistances | <i>getNearestFeatureIndicesAndDistances</i> |
|--------------------------------------|---------------------------------------------|

---

**Description**

get index of features that closest to peak and calculate distance

**Usage**

```
getNearestFeatureIndicesAndDistances(  
  peaks,  
  features,  
  sameStrand = FALSE,  
  ignoreOverlap = FALSE,  
  ignoreUpstream = FALSE,  
  ignoreDownstream = FALSE,  
  overlap = "TSS"  
)
```

**Arguments**

|                  |                                                            |
|------------------|------------------------------------------------------------|
| peaks            | peak in GRanges                                            |
| features         | features in GRanges                                        |
| sameStrand       | logical, whether find nearest gene in the same strand      |
| ignoreOverlap    | logical, whether ignore overlap of TSS with peak           |
| ignoreUpstream   | logical, if True only annotate gene at the 3' of the peak. |
| ignoreDownstream | logical, if True only annotate gene at the 5' of the peak. |
| overlap          | one of "TSS" or "all"                                      |

**Value**

list

**Author(s)**

G Yu

---

|              |                     |
|--------------|---------------------|
| getPromoters | <i>getPromoters</i> |
|--------------|---------------------|

---

**Description**

prepare the promoter regions

**Usage**

```
getPromoters(TxDb = NULL, upstream = 1000, downstream = 1000, by = "gene")
```

**Arguments**

|            |                           |
|------------|---------------------------|
| TxDb       | TxDb                      |
| upstream   | upstream from TSS site    |
| downstream | downstream from TSS site  |
| by         | one of gene or transcript |

**Value**

GRanges object

---

|                |                       |
|----------------|-----------------------|
| getSampleFiles | <i>getSampleFiles</i> |
|----------------|-----------------------|

---

**Description**

get filenames of sample files

**Usage**

```
getSampleFiles()
```

**Value**

list of file names

**Author(s)**

G Yu

---

|              |                     |
|--------------|---------------------|
| getTagMatrix | <i>getTagMatrix</i> |
|--------------|---------------------|

---

**Description**

calculate the tag matrix

**Usage**

```
getTagMatrix(  
  peak,  
  upstream,  
  downstream,  
  windows,  
  type,  
  by,  
  TxDb = NULL,  
  weightCol = NULL,  
  nbin = NULL,  
  verbose = TRUE,  
  ignore_strand = FALSE  
)
```

## Arguments

|               |                                                                                      |
|---------------|--------------------------------------------------------------------------------------|
| peak          | peak peak file or GRanges object                                                     |
| upstream      | the distance of upstream extension                                                   |
| downstream    | the distance of downstream extension                                                 |
| windows       | a collection of region                                                               |
| type          | one of "start_site", "end_site", "body"                                              |
| by            | one of 'gene', 'transcript', 'exon', 'intron', '3UTR', '5UTR', or specified by users |
| TxDb          | TxDb or self-made granges object, served as txdb                                     |
| weightCol     | column name of weight, default is NULL                                               |
| nbin          | the amount of nbins                                                                  |
| verbose       | print message or not                                                                 |
| ignore_strand | ignore the strand information or not                                                 |

## Details

getTagMatrix() function can produce the matrix for visualization. peak stands for the peak file. window stands for a collection of regions that users want to look into. Users can use window to capture the peak of interest. There are two ways to input window.

The first way is that users can use getPromoters()/getBioRegion()/makeBioRegionFromGranges() to get window and put it into getTagMatrix().

The second way is that users can use getTagMatrix() to call getPromoters()/getBioRegion()/makeBioRegionFromGranges(). In this way users do not need to input window parameter but they need to input txdb.

txdb is a set of packages contained annotation of regions of different genomes. Users can get the regions of interest through specific functions. These specific functions are built in getPromoters()/getBioRegion(). Many regions can not be gain through txdb, like insulator and enhancer regions. Users can provide these regions in the form of granges object. These self-made granges object will be passed to TxDb parameter and they will be passed to makeBioRegionFromGranges() to produce the window. In a word, TxDb parameter is a reference information. Users can pass txdb object or self-made granges into it.

Details see [getPromoters](#), [getBioRegion](#) and [makeBioRegionFromGranges](#)

upstream and downstream parameter have different usages:

(1) window parameter is provided,

if type == 'body', upstream and downstream can use to extend the flank of body region.

if type == 'start\_site'/'end\_site', upstream and downstream do not play a role in getTagMatrix() function.

(2) window parameter is missing,

if type == 'body', upstream and downstream can use to extend the flank of body region.

if type == 'start\_site'/'end\_site', upstream and downstream refer to the upstream and downstream of the start\_site or the end\_site.

weightCol refers to column in peak file. This column acts as a weight vaule. Details see <https://github.com/YuLab-SMU/ChIPseeker/issues/15>

nbin refers to the number of bins. getTagMatrix() provide a binning method to get the tag matrix.

Value

tagMatrix

---

|                                      |
|--------------------------------------|
| getTagMatrix.binning.internal        |
| <i>getTagMatrix.binning.internal</i> |

---

Description

calculate the tagMatrix by binning the idea was derived from the function of deeptools <https://deeptools.readthedocs.io/en/dev>

Usage

```
getTagMatrix.binning.internal(  
  peak,  
  weightCol = NULL,  
  windows,  
  nbin = 800,  
  upstream = NULL,  
  downstream = NULL,  
  ignore_strand = FALSE  
)
```

Arguments

|               |                                                                                                |
|---------------|------------------------------------------------------------------------------------------------|
| peak          | peak peak file or GRanges object                                                               |
| weightCol     | weightCol column name of weight, default is NULL                                               |
| windows       | windows a collection of region with equal or not equal size, eg. promoter region, gene region. |
| nbin          | the amount of nbins needed to be splited and it should not be more than min_body_length        |
| upstream      | rel object, NULL or actual number                                                              |
| downstream    | rel object, NULL or actual number                                                              |
| ignore_strand | ignore the strand information or not                                                           |

Value

tagMatrix

---

```
getTagMatrix.internal  getTagMatrix.internal
```

---

**Description**

calculate the tag matrix

**Usage**

```
getTagMatrix.internal(peak, weightCol = NULL, windows, ignore_strand = FALSE)
```

**Arguments**

|               |                                                              |
|---------------|--------------------------------------------------------------|
| peak          | peak file or GRanges object                                  |
| weightCol     | column name of weight, default is NULL                       |
| windows       | a collection of region with equal size, eg. promoter region. |
| ignore_strand | ignore the strand information or not                         |

**Value**

tagMatrix

**Author(s)**

G Yu

---

```
getTagMatrix2          getTagMatrix2
```

---

**Description**

Nested function for getTagMatrix() to deal with multiple windows

**Usage**

```
getTagMatrix2(
  peak,
  upstream,
  downstream,
  windows_name,
  type,
  by,
  TxDb = NULL,
  weightCol = NULL,
  nbin = NULL,
```

```

    verbose = TRUE,
    ignore_strand = FALSE
)

```

### Arguments

|               |                                                                                      |
|---------------|--------------------------------------------------------------------------------------|
| peak          | peak peak file or GRanges object                                                     |
| upstream      | the distance of upstream extension                                                   |
| downstream    | the distance of downstream extension                                                 |
| windows_name  | the names of windows                                                                 |
| type          | one of "start_site", "end_site", "body"                                              |
| by            | one of 'gene', 'transcript', 'exon', 'intron', '3UTR', '5UTR', or specified by users |
| TxDb          | TxDb or self-made granges object, served as txdb                                     |
| weightCol     | column name of weight, default is NULL                                               |
| nbin          | the amount of nbins                                                                  |
| verbose       | print message or not                                                                 |
| ignore_strand | ignore the strand information or not                                                 |

### Details

This is an internal function.

### Value

tagMatrix

---

getTagMatrix2.binning.internal  
*internal function*

---

### Description

internal function

### Usage

```

getTagMatrix2.binning.internal(
  peak,
  weightCol = NULL,
  windows,
  windows_name,
  nbin = 800,
  upstream = NULL,
  downstream = NULL,
  ignore_strand = FALSE
)

```

**Arguments**

|               |                                        |
|---------------|----------------------------------------|
| peak          | peak peak file or GRanges object       |
| weightCol     | column name of weight, default is NULL |
| windows       | a collection of region                 |
| windows_name  | the name of windows                    |
| nbin          | the amount of nbins                    |
| upstream      | the distance of upstream extension     |
| downstream    | the distance of downstream extension   |
| ignore_strand | ignore the strand information or not   |

---

getTagMatrix2.internal

*getTagMatrix2.internal*


---

**Description**

getTagMatrix2.internal

**Usage**

```
getTagMatrix2.internal(
  peak,
  weightCol = NULL,
  windows,
  windows_name,
  ignore_strand = FALSE
)
```

**Arguments**

|               |                                        |
|---------------|----------------------------------------|
| peak          | peak peak file or GRanges object       |
| weightCol     | column name of weight, default is NULL |
| windows       | a collection of region                 |
| windows_name  | the name of windows                    |
| ignore_strand | ignore the strand information or not   |

---

info

*Information Datasets*


---

**Description**

ucsc genome version, precalculated data and gsm information

---

```
makeBioRegionFromGranges  
    makeBioRegionFromGranges
```

---

## Description

make windows from granges object

## Usage

```
makeBioRegionFromGranges(gr, by, type, upstream = 1000, downstream = 1000)
```

## Arguments

|            |                                                                           |
|------------|---------------------------------------------------------------------------|
| gr         | a grange object contain region of interest                                |
| by         | specify be users, e.g. gene, insulator, enhancer                          |
| type       | one of "start_site", "end_site", "body"                                   |
| upstream   | upstream from start site or end site, can be NULL if the type == 'body'   |
| downstream | downstream from start site or end site, can be NULL if the type == 'body' |

## Details

makeBioRegionFromGranges() function can make bioregion from granges object.

The differences between makeBioRegionFromGranges() and getBioRegion() is that getBioRegion() get the region object from txdb object but makeBioRegionFromGranges() get the region from the granges object provided by users. For example, txdb object do not contain insulator or enhancer regions. Users can provide these regions through self-made granges object

There are three kinds of regions, start\_site, end\_site and body.

We take enhancer region to explain the differences of these three regions. enhancer: chr1 1000 1400.

body region refers to the 1000-1400bp.

start\_site region with upstream = 100, downstream = 100 refers to 900-1100bp.

end\_site region with upstream = 100, downstream = 100 refers to 1300-1500bp.

In makeBioRegionFromGranges(), upstream and downstream can be NULL if the type == 'body'. by should be specified by users and can not be omitted. by parameter will be used to made labels. type should also be specified.

<https://github.com/YuLab-SMU/ChIPseeker/issues/189>

## Value

GRanges object

---

|            |                               |
|------------|-------------------------------|
| make_label | <i>make label for figures</i> |
|------------|-------------------------------|

---

**Description**

make label for figures

**Usage**

```
make_label(type, by)
```

**Arguments**

|      |                                                                      |
|------|----------------------------------------------------------------------|
| type | one of "start_site", "end_site", "body"                              |
| by   | one of 'gene', 'transcript', 'exon', 'intron', '3UTR', '5UTR', 'UTR' |

---

|         |                |
|---------|----------------|
| overlap | <i>overlap</i> |
|---------|----------------|

---

**Description**

calculate the overlap matrix, which is useful for vennplot

**Usage**

```
overlap(Sets)
```

**Arguments**

|      |                   |
|------|-------------------|
| Sets | a list of objects |
|------|-------------------|

**Value**

data.frame

**Author(s)**

G Yu

peakHeatmap

*peakHeatmap***Description**

plot the heatmap of peaks

**Usage**

```
peakHeatmap(
  peak,
  weightCol = NULL,
  TxDb = NULL,
  upstream = 1000,
  downstream = 1000,
  xlab = "",
  ylab = "",
  title = NULL,
  palette = NULL,
  verbose = TRUE,
  by = "gene",
  type = "start_site",
  nbin = NULL,
  ignore_strand = FALSE,
  windows,
  ncol = NULL,
  nrow = NULL
)
```

**Arguments**

|            |                                                                         |
|------------|-------------------------------------------------------------------------|
| peak       | peak file or GRanges object                                             |
| weightCol  | column name of weight                                                   |
| TxDb       | TxDb object                                                             |
| upstream   | upstream position                                                       |
| downstream | downstream position                                                     |
| xlab       | xlab                                                                    |
| ylab       | ylab                                                                    |
| title      | title                                                                   |
| palette    | palette to be filled in,details see <a href="#">scale_colour_brewer</a> |
| verbose    | print message or not                                                    |
| by         | one of 'gene', 'transcript', 'exon', 'intron', '3UTR', '5UTR', 'UTR'    |
| type       | one of "start_site", "end_site", "body"                                 |

|               |                                      |
|---------------|--------------------------------------|
| nbin          | the amount of nbins                  |
| ignore_strand | ignore the strand information or not |
| windows       | a collection of region               |
| ncol          | the ncol of plotting a list of peak  |
| nrow          | the nrow of plotting a list of peak  |

**Value**

figure

**Author(s)**

G Yu

---

peakHeatmap\_multiple\_Sets  
*peakHeatmap*

---

**Description**

plot the heatmap of peaks align to a sets of regions

**Usage**

```
peakHeatmap_multiple_Sets(
  peak,
  weightCol = NULL,
  TxDb = NULL,
  upstream = 1000,
  downstream = 1000,
  xlab = "",
  ylab = "",
  title = NULL,
  palette = NULL,
  verbose = TRUE,
  by = "gene",
  type = "start_site",
  nbin = NULL,
  ignore_strand = FALSE,
  windows_name = NULL,
  ncol = NULL,
  nrow = NULL,
  facet_label_text_size = 12
)
```

**Arguments**

|                       |                                                                              |
|-----------------------|------------------------------------------------------------------------------|
| peak                  | peak file or GRanges object                                                  |
| weightCol             | column name of weight                                                        |
| TxDb                  | TxDb object                                                                  |
| upstream              | upstream position                                                            |
| downstream            | downstream position                                                          |
| xlab                  | xlab                                                                         |
| ylab                  | ylab                                                                         |
| title                 | title                                                                        |
| palette               | palette to be filled in,details see <a href="#">scale_colour_brewer</a>      |
| verbose               | print message or not                                                         |
| by                    | one of 'gene', 'transcript', 'exon', 'intron', '3UTR', '5UTR', 'UTR'         |
| type                  | one of "start_site", "end_site", "body"                                      |
| nbin                  | the amount of nbins                                                          |
| ignore_strand         | ignore the strand information or not                                         |
| windows_name          | the name for each window, which will also be showed in the picture as labels |
| ncol                  | the ncol of plotting a list of peak                                          |
| nrow                  | the nrow of plotting a list of peak                                          |
| facet_label_text_size | the size of facet label text                                                 |

**Value**

figure

---

peak\_Profile\_Heatmap    *peak\_Profile\_Heatmap*

---

**Description**

plot peak heatmap and profile in a picture

**Usage**

```
peak_Profile_Heatmap(
  peak,
  weightCol = NULL,
  TxDb = NULL,
  upstream = 1000,
  downstream = 1000,
  xlab = "",
```

```

ylab = "",
title = NULL,
palette = NULL,
verbose = TRUE,
by = "gene",
type = "start_site",
nbin = NULL,
ignore_strand = FALSE,
windows_name = NULL,
ncol = NULL,
nrow = NULL,
facet_label_text_size = 12,
conf,
facet = "row",
free_y = TRUE,
height_proportion = 4
)

```

### Arguments

|                       |                                                                              |
|-----------------------|------------------------------------------------------------------------------|
| peak                  | peak file or GRanges object                                                  |
| weightCol             | column name of weight                                                        |
| TxDb                  | TxDb object                                                                  |
| upstream              | upstream position                                                            |
| downstream            | downstream position                                                          |
| xlab                  | xlab                                                                         |
| ylab                  | ylab                                                                         |
| title                 | title                                                                        |
| palette               | palette to be filled in,details see <a href="#">scale_colour_brewer</a>      |
| verbose               | print message or not                                                         |
| by                    | one of 'gene', 'transcript', 'exon', 'intron', '3UTR', '5UTR', 'UTR'         |
| type                  | one of "start_site", "end_site", "body"                                      |
| nbin                  | the amount of nbins                                                          |
| ignore_strand         | ignore the strand information or not                                         |
| windows_name          | the name for each window, which will also be showed in the picture as labels |
| ncol                  | the ncol of plotting a list of peak                                          |
| nrow                  | the nrow of plotting a list of peak                                          |
| facet_label_text_size | the size of facet label text                                                 |
| conf                  | confidence interval                                                          |
| facet                 | one of 'none', 'row' and 'column'                                            |
| free_y                | if TRUE, y will be scaled by AvgProf                                         |
| height_proportion     | the proportion of profiling picture and heatmap                              |

---

|             |                                    |
|-------------|------------------------------------|
| plotAnnoBar | <i>plotAnnoBar method generics</i> |
|-------------|------------------------------------|

---

**Description**

plotAnnoBar method for csAnno instance

**Usage**

```
plotAnnoBar(  
  x,  
  xlab = "",  
  ylab = "Percentage%",  
  title = "Feature Distribution",  
  ...  
)  
  
## S4 method for signature 'list'  
plotAnnoBar(  
  x,  
  xlab = "",  
  ylab = "Percentage%",  
  title = "Feature Distribution",  
  ...  
)  
  
plotAnnoBar(x, xlab="", ylab='Percentage(%)',title="Feature Distribution", ...)
```

**Arguments**

|       |                     |
|-------|---------------------|
| x     | csAnno instance     |
| xlab  | xlab                |
| ylab  | ylab                |
| title | title               |
| ...   | additional paramter |

**Value**

plot

**Author(s)**

Guangchuang Yu <https://guangchuangyu.github.io>

---

`plotAnnoBar.data.frame`*plotAnnoBar.data.frame*

---

## Description

plot feature distribution based on their chromosome region

## Usage

```
plotAnnoBar.data.frame(  
  anno.df,  
  xlab = "",  
  ylab = "Percentage%",  
  title = "Feature Distribution",  
  categoryColumn  
)
```

## Arguments

|                             |                  |
|-----------------------------|------------------|
| <code>anno.df</code>        | annotation stats |
| <code>xlab</code>           | xlab             |
| <code>ylab</code>           | ylab             |
| <code>title</code>          | plot title       |
| <code>categoryColumn</code> | category column  |

## Details

plot chromosome region features

## Value

bar plot that summarize genomic features of peaks

## Author(s)

Guangchuang Yu <https://yulab-smu.top>

## See Also

[annotatePeak](#) [plotAnnoPie](#)

---

|             |                                    |
|-------------|------------------------------------|
| plotAnnoPie | <i>plotAnnoPie method generics</i> |
|-------------|------------------------------------|

---

**Description**

plotAnnoPie method for csAnno instance

**Usage**

```
plotAnnoPie(  
  x,  
  ndigit = 2,  
  cex = 0.9,  
  col = NA,  
  legend.position = "rightside",  
  pie3D = FALSE,  
  radius = 0.8,  
  ...  
)
```

```
plotAnnoPie(x,ndigit=2,cex=0.9,col=NA,legend.position="rightside",pie3D=FALSE,radius=0.8,...)
```

**Arguments**

|                 |                          |
|-----------------|--------------------------|
| x               | csAnno instance          |
| ndigit          | number of digit to round |
| cex             | label cex                |
| col             | color                    |
| legend.position | topright or other.       |
| pie3D           | plot in 3D or not        |
| radius          | radius of the pie        |
| ...             | extra parameter          |

**Value**

plot

**Author(s)**

Guangchuang Yu <https://guangchuangyu.github.io>

---

plotAnnoPie.csAnno      *plotAnnoPie*

---

### Description

pieplot from peak genomic annotation

### Usage

```
plotAnnoPie.csAnno(  
  x,  
  ndigit = 2,  
  cex = 0.8,  
  col = NA,  
  legend.position = "rightside",  
  pie3D = FALSE,  
  radius = 0.8,  
  ...  
)
```

### Arguments

|                 |                          |
|-----------------|--------------------------|
| x               | csAnno object            |
| ndigit          | number of digit to round |
| cex             | label cex                |
| col             | color                    |
| legend.position | topright or other.       |
| pie3D           | plot in 3D or not        |
| radius          | radius of Pie            |
| ...             | extra parameter          |

### Value

pie plot of peak genomic feature annotation

### Author(s)

Guangchuang Yu <https://yulab-smu.top>

### See Also

[annotatePeak](#) [plotAnnoBar](#)

**Examples**

```
## Not run:
require(TxDb.Hsapiens.UCSC.hg19.knownGene)
txdb <- TxDb.Hsapiens.UCSC.hg19.knownGene
peakfile <- system.file("extdata", "sample_peaks.txt", package="chipseeker")
peakAnno <- annotatePeak(peakfile, TxDb=txdb)
plotAnnoPie(peakAnno)

## End(Not run)
```

---

|             |                    |
|-------------|--------------------|
| plotAvgProf | <i>plotAvgProf</i> |
|-------------|--------------------|

---

**Description**

plot the profile of peaks

**Usage**

```
plotAvgProf(
  tagMatrix,
  xlim,
  xlab = "Genomic Region (5'→3')",
  ylab = "Peak Count Frequency",
  conf,
  facet = "none",
  free_y = TRUE,
  origin_label = "TSS",
  verbose = TRUE,
  ...
)
```

**Arguments**

|              |                                      |
|--------------|--------------------------------------|
| tagMatrix    | tagMatrix or a list of tagMatrix     |
| xlim         | xlim                                 |
| xlab         | x label                              |
| ylab         | y label                              |
| conf         | confidence interval                  |
| facet        | one of 'none', 'row' and 'column'    |
| free_y       | if TRUE, y will be scaled by AvgProf |
| origin_label | label of the center                  |
| verbose      | print message or not                 |
| ...          | additional parameter                 |

**Value**

ggplot object

**Author(s)**

G Yu; Y Yan

---

plotAvgProf.binning     *plotAvgProf.binning*

---

**Description**

plot the profile of peaks by binning

**Usage**

```
plotAvgProf.binning(
  tagMatrix,
  xlab = "Genomic Region (5'→3')",
  ylab = "Peak Count Frequency",
  conf,
  facet = "none",
  free_y = TRUE,
  upstream = NULL,
  downstream = NULL,
  label,
  ...
)
```

**Arguments**

|            |                                                                                                                                                                                       |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| tagMatrix  | tagMatrix or a list of tagMatrix                                                                                                                                                      |
| xlab       | x label                                                                                                                                                                               |
| ylab       | y label                                                                                                                                                                               |
| conf       | confidence interval                                                                                                                                                                   |
| facet      | one of 'none', 'row' and 'column'                                                                                                                                                     |
| free_y     | if TRUE, y will be scaled                                                                                                                                                             |
| upstream   | rel object reflects the percentage of flank extension, e.g rel(0.2) integer reflects the actual length of flank extension or TSS region NULL reflects the gene body with no extension |
| downstream | rel object reflects the percentage of flank extension, e.g rel(0.2) integer reflects the actual length of flank extension or TSS region NULL reflects the gene body with no extension |
| label      | label                                                                                                                                                                                 |
| ...        | additional parameter                                                                                                                                                                  |

**Value**

ggplot object

plotAvgProf2

*plotAvgProf***Description**

plot the profile of peaks that align to flank sequences of TSS

**Usage**

```
plotAvgProf2(
  peak,
  weightCol = NULL,
  TxDb = NULL,
  upstream = 1000,
  downstream = 1000,
  xlab = "Genomic Region (5'->3')",
  ylab = "Peak Count Frequency",
  conf,
  facet = "none",
  free_y = TRUE,
  verbose = TRUE,
  ignore_strand = FALSE,
  ...
)
```

**Arguments**

|               |                                      |
|---------------|--------------------------------------|
| peak          | peak file or GRanges object          |
| weightCol     | column name of weight                |
| TxDb          | TxDb object                          |
| upstream      | upstream position                    |
| downstream    | downstream position                  |
| xlab          | xlab                                 |
| ylab          | ylab                                 |
| conf          | confidence interval                  |
| facet         | one of 'none', 'row' and 'column'    |
| free_y        | if TRUE, y will be scaled by AvgProf |
| verbose       | print message or not                 |
| ignore_strand | ignore the strand information or not |
| ...           | additional parameter                 |

**Details**

This function is the old function of plotPeakProf2. It can only plot the start site region of gene.

**Value**

ggplot object

**Author(s)**

G Yu, Ming L

---

|               |                                      |
|---------------|--------------------------------------|
| plotDistToTSS | <i>plotDistToTSS method generics</i> |
|---------------|--------------------------------------|

---

**Description**

plotDistToTSS method for csAnno instance

**Usage**

```
plotDistToTSS(
  x,
  distanceColumn = "distanceToTSS",
  xlab = "",
  ylab = "Binding sites (%) (5'→3')",
  title = "Distribution of transcription factor-binding loci relative to TSS",
  ...
)

## S4 method for signature 'list'
plotDistToTSS(
  x,
  distanceColumn = "distanceToTSS",
  xlab = "",
  ylab = "Binding sites (%) (5'→3')",
  title = "Distribution of transcription factor-binding loci relative to TSS",
  distanceBreaks = c(0, 1000, 3000, 5000, 10000, 1e+05),
  palette = NULL,
  ...
)

plotDistToTSS(x,distanceColumn="distanceToTSS", xlab="",
ylab="Binding sites (%) (5'→3')",
title="Distribution of transcription factor-binding loci relative to TSS",...)
```

**Arguments**

|                |                                                                                                                       |
|----------------|-----------------------------------------------------------------------------------------------------------------------|
| x              | csAnno instance                                                                                                       |
| distanceColumn | distance column name                                                                                                  |
| xlab           | xlab                                                                                                                  |
| ylab           | ylab                                                                                                                  |
| title          | title                                                                                                                 |
| ...            | additional parameter                                                                                                  |
| distanceBreaks | breaks of distance, default is 'c(0, 1000, 3000, 5000, 10000, 100000)'                                                |
| palette        | palette name for coloring different distances. Run 'RColorBrewer::display.brewer.all()' to see all applicable values. |

**Value**

plot

**Author(s)**

Guangchuang Yu <https://guangchuangyu.github.io>

---

plotDistToTSS.data.frame

*plotDistToTSS.data.frame*

---

**Description**

plot feature distribution based on the distances to the TSS

**Usage**

```
plotDistToTSS.data.frame(
  peakDist,
  distanceColumn = "distanceToTSS",
  distanceBreaks = c(0, 1000, 3000, 5000, 10000, 1e+05),
  palette = NULL,
  xlab = "",
  ylab = "Binding sites (%) (5'→3')",
  title = "Distribution of transcription factor-binding loci relative to TSS",
  categoryColumn = ".id"
)
```

**Arguments**

|                |                                                                                                                       |
|----------------|-----------------------------------------------------------------------------------------------------------------------|
| peakDist       | peak annotation                                                                                                       |
| distanceColumn | column name of the distance from peak to nearest gene                                                                 |
| distanceBreaks | default is 'c(0, 1000, 3000, 5000, 10000, 100000)'                                                                    |
| palette        | palette name for coloring different distances. Run 'RColorBrewer::display.brewer.all()' to see all applicable values. |
| xlab           | x label                                                                                                               |
| ylab           | y lable                                                                                                               |
| title          | figure title                                                                                                          |
| categoryColumn | category column, default is ".id"                                                                                     |

**Value**

bar plot that summarize distance from peak to TSS of the nearest gene.

**Author(s)**

Guangchuang Yu <https://guangchuangyu.github.io>

**See Also**

[annotatePeak](#)

**Examples**

```
## Not run:
require(TxDb.Hsapiens.UCSC.hg19.knownGene)
txdb <- TxDb.Hsapiens.UCSC.hg19.knownGene
peakfile <- system.file("extdata", "sample_peaks.txt", package="ChIPseeker")
peakAnno <- annotatePeak(peakfile, TxDb=txdb)
plotDistToTSS(peakAnno)

## End(Not run)
```

---

plotMultiProf

*internal function for plotPeakProf\_MultiWindows*

---

**Description**

internal function for plotPeakProf\_MultiWindows

**Usage**

```
plotMultiProf(
  tagMatrix,
  conf,
  xlab = "Genomic Region (5'→3')",
  ylab = "Peak Count Frequency",
  facet = "none",
  free_y = TRUE,
  ...
)
```

**Arguments**

|           |                                      |
|-----------|--------------------------------------|
| tagMatrix | tagMatrix                            |
| conf      | confidence interval                  |
| xlab      | xlab                                 |
| ylab      | ylab                                 |
| facet     | one of 'none', 'row' and 'column'    |
| free_y    | if TRUE, y will be scaled by AvgProf |
| ...       | additional parameter                 |

---

plotMultiProf.binning *internal function*

---

**Description**

internal function

**Usage**

```
plotMultiProf.binning(
  tagMatrix,
  xlab = "Genomic Region (5'→3')",
  ylab = "Peak Count Frequency",
  conf,
  facet = "none",
  free_y = TRUE,
  upstream = NULL,
  downstream = NULL,
  label,
  ...
)
```

**Arguments**

|            |                                      |
|------------|--------------------------------------|
| tagMatrix  | tagMatrix                            |
| xlab       | xlab                                 |
| ylab       | ylab                                 |
| conf       | confidence interval                  |
| facet      | one of 'none', 'row' and 'column'    |
| free_y     | if TRUE, y will be scaled by AvgProf |
| upstream   | the upstream extension               |
| downstream | the downstream extension             |
| label      | the label of the center              |
| ...        | additional parameter                 |

---

plotMultiProf.binning.internal  
*internal function*

---

**Description**

internal function

**Usage**

```
plotMultiProf.binning.internal(
  tagMatrix,
  conf,
  xlab = "Genomic Region (5'→3')",
  ylab = "Peak Count Frequency",
  facet = "none",
  free_y = TRUE,
  upstream = NULL,
  downstream = NULL,
  label,
  ...
)
```

**Arguments**

|           |                                   |
|-----------|-----------------------------------|
| tagMatrix | tagMatrix                         |
| conf      | confidence interval               |
| xlab      | xlab                              |
| ylab      | ylab                              |
| facet     | one of 'none', 'row' and 'column' |

|            |                                      |
|------------|--------------------------------------|
| free_y     | if TRUE, y will be scaled by AvgProf |
| upstream   | the upstream extension               |
| downstream | the downstream extension             |
| label      | the label of the center              |
| ...        | additional parameter                 |

---

plotMultiProf.normal    *internal function*

---

## Description

internal function

## Usage

```
plotMultiProf.normal(
  tagMatrix,
  xlim,
  xlab = "Genomic Region (5'→3')",
  ylab = "Peak Count Frequency",
  conf,
  facet = "none",
  free_y = TRUE,
  origin_label = "TSS",
  verbose = TRUE,
  ...
)
```

## Arguments

|              |                                      |
|--------------|--------------------------------------|
| tagMatrix    | tagMatrix                            |
| xlim         | xlim                                 |
| xlab         | xlab                                 |
| ylab         | ylab                                 |
| conf         | confidence interval                  |
| facet        | one of 'none', 'row' and 'column'    |
| free_y       | if TRUE, y will be scaled by AvgProf |
| origin_label | the label of the center              |
| verbose      | print message or not                 |
| ...          | additional parameter                 |

---

```
plotMultiProf.normal.internal
      internal function
```

---

### Description

internal function

### Usage

```
plotMultiProf.normal.internal(
  tagMatrix,
  conf,
  xlim = c(-3000, 3000),
  xlab = "Genomic Region (5'→3')",
  ylab = "Peak Count Frequency",
  facet = "row",
  free_y = TRUE,
  origin_label,
  ...
)
```

### Arguments

|              |                                      |
|--------------|--------------------------------------|
| tagMatrix    | tagMatrix                            |
| conf         | confidence interval                  |
| xlim         | xlim                                 |
| xlab         | xlab                                 |
| ylab         | ylab                                 |
| facet        | one of 'none', 'row' and 'column'    |
| free_y       | if TRUE, y will be scaled by AvgProf |
| origin_label | the label of the center              |
| ...          | additional parameter                 |

---

```
plotPeakProf      plotPeakProf_MultiWindows
```

---

### Description

plot the profile of peaks 'plotPeakProf\_MultiWindows()' is almost the same as plotPeakProf2(), having the main difference of accepting two or more granges objects. Accepting more granges objects can help compare the same peaks in different windows.

**Usage**

```

plotPeakProf(
  tagMatrix = NULL,
  peak,
  upstream,
  downstream,
  conf,
  by,
  type,
  windows_name = NULL,
  weightCol = NULL,
  TxDb = NULL,
  xlab = "Genomic Region (5'→3')",
  ylab = "Peak Count Frequency",
  facet = "row",
  free_y = TRUE,
  verbose = TRUE,
  nbin = NULL,
  ignore_strand = FALSE,
  ...
)

```

**Arguments**

|               |                                                                              |
|---------------|------------------------------------------------------------------------------|
| tagMatrix     | tagMatrix or a list of tagMatrix                                             |
| peak          | peak file or GRanges object                                                  |
| upstream      | upstream position                                                            |
| downstream    | downstream position                                                          |
| conf          | confidence interval                                                          |
| by            | feature of interest                                                          |
| type          | one of "start_site", "end_site", "body"                                      |
| windows_name  | the name for each window, which will also be showed in the picture as labels |
| weightCol     | column name of weight                                                        |
| TxDb          | TxDb object or self-made granges objects                                     |
| xlab          | xlab                                                                         |
| ylab          | ylab                                                                         |
| facet         | one of 'none', 'row' and 'column'                                            |
| free_y        | if TRUE, y will be scaled by AvgProf                                         |
| verbose       | print message or not                                                         |
| nbin          | the amount of bins                                                           |
| ignore_strand | ignore the strand information or not                                         |
| ...           | additional parameter                                                         |

## Details

TxDB parameter can accept txdb object. But many regions can not be obtained by txdb object. In this case, Users can provide self-made granges served the same role as txdb object and pass to TxDb object.

by the features of interest.

(1) if users use txdb, by can be one of 'gene', 'transcript', 'exon', 'intron', '3UTR', '5UTR', 'UTR'. These features can be obtained by functions from txdb object.

(2) if users use self-made granges object, by can be everything. Because this by will not pass to functions to get features, which is different from the case of using txdb object. This by is only used to made labels showed in picture.

type means the property of the region. one of the "start site", "end site" and "body".

upstream and downstream parameter have different usages:

(1) if type == 'body', upstream and downstream can use to extend the flank of body region.

(2) if type == 'start\_site'/'end\_site', upstream and downstream refer to the upstream and downstream of the start\_site or the end\_site.

weightCol refers to column in peak file. This column acts as a weight value. Details see <https://github.com/YuLab-SMU/ChIPseeker/issues/15>

nbin refers to the number of bins. getTagMatrix() provide a binning method to get the tag matrix.

There are two ways input a list of window.

(1) Users can input a list of self-made granges objects

(2) Users can input a list of by and only one type. In this way, plotPeakProf\_MultiWindows() can made a list of window from txdb object based on by and type.

Warning:

(1) All of these window should be the same type. It means users can only compare a list of "start site"/"end site"/"body region" with the same upstream and downstream.

(2) So it will be only one type and several by.

(3) Users can make window by txdb object or self-made granges object. Users can only choose one of 'gene', 'transcript', 'exon', 'intron', '3UTR', '5UTR' or 'UTR' in the way of using txdb object. User can input any by in the way of using self-made granges object.

(4) Users can mingle the by designed for the two ways. plotPeakProf\_MultiWindows can accpet the hybrid by. But the above rules should be followed.

<https://github.com/YuLab-SMU/ChIPseeker/issues/189>

## Value

ggplot object

---

|               |                      |
|---------------|----------------------|
| plotPeakProf2 | <i>plotPeakProf2</i> |
|---------------|----------------------|

---

## Description

plot the profile of peaks automatically

## Usage

```
plotPeakProf2(
  peak,
  upstream,
  downstream,
  conf,
  by,
  type,
  weightCol = NULL,
  TxDb = NULL,
  xlab = "Genomic Region (5'→3')",
  ylab = "Peak Count Frequency",
  facet = "none",
  free_y = TRUE,
  verbose = TRUE,
  nbin = NULL,
  ignore_strand = FALSE,
  ...
)
```

## Arguments

|            |                                                                            |
|------------|----------------------------------------------------------------------------|
| peak       | peak file or GRanges object                                                |
| upstream   | upstream position                                                          |
| downstream | downstream position                                                        |
| conf       | confidence interval                                                        |
| by         | e.g. 'gene', 'transcript', 'exon' or features of interest(e.g. "enhancer") |
| type       | one of "start_site", "end_site", "body"                                    |
| weightCol  | column name of weight                                                      |
| TxDb       | TxDb object, or self-made granges object                                   |
| xlab       | xlab                                                                       |
| ylab       | ylab                                                                       |
| facet      | one of 'none', 'row' and 'column'                                          |
| free_y     | if TRUE, y will be scaled by AvgProf                                       |
| verbose    | print message or not                                                       |

|               |                                      |
|---------------|--------------------------------------|
| nbin          | the amount of nbins                  |
| ignore_strand | ignore the strand information or not |
| ...           | additional parameter                 |

## Details

peak stands for the peak file.

by the features of interest.

(1) if users use txdb, by can be one of 'gene', 'transcript', 'exon', 'intron', '3UTR', '5UTR', 'UTR'. These features can be obtained by functions from txdb object.

(2) if users use self-made granges object, by can be everything. Because this by will not pass to functions to get features, which is different from the case of using txdb object. This by is only used to made labels showed in picture.

type means the property of the region. one of the "start site", "end site" and "body".

upstream and downstream parameter have different usages:

(1) if type == 'body', upstream and downstream can use to extend the flank of body region.

(2) if type == 'start\_site'/'end\_site', upstream and downstream refer to the upstream and downstream of the start\_site or the end\_site.

weightCol refers to column in peak file. This column acts as a weight vaule. Details see <https://github.com/YuLab-SMU/ChIPseeker/issues/15>

nbin refers to the number of bins, providing a binning method to get the tag matrix.

TxDB parameter can accept txdb object. But many regions can not be obtained by txdb object. In this case, Users can provide self-made granges served the same role as txdb object and pass to TxDb object.

plotPeakProf2() is different from the plotPeakProf(). plotPeakProf2() do not need to provide window parameter, which means plotPeakProf2() will call relevent functions to make window automatically.

## Value

ggplot object

## Author(s)

G Yu, Ming Li

---

```
plotPeakProf_MultiWindows
      plotPeakProf_MultiWindows
```

---

## Description

plot the profile of peaks in two or more windows

## Usage

```
plotPeakProf_MultiWindows(
  peak,
  upstream,
  downstream,
  conf,
  by,
  type,
  windows_name = NULL,
  weightCol = NULL,
  TxDb = NULL,
  xlab = "Genomic Region (5'→3')",
  ylab = "Peak Count Frequency",
  facet = "row",
  free_y = TRUE,
  verbose = TRUE,
  nbin = NULL,
  ignore_strand = FALSE,
  ...
)
```

## Arguments

|              |                                                                              |
|--------------|------------------------------------------------------------------------------|
| peak         | peak file or GRanges object                                                  |
| upstream     | upstream position                                                            |
| downstream   | downstream position                                                          |
| conf         | confidence interval                                                          |
| by           | feature of interest                                                          |
| type         | one of "start_site", "end_site", "body"                                      |
| windows_name | the name for each window, which will also be showed in the picture as labels |
| weightCol    | column name of weight                                                        |
| TxDb         | TxDb object or self-made granges objects                                     |
| xlab         | xlab                                                                         |
| ylab         | ylab                                                                         |
| facet        | one of 'none', 'row' and 'column'                                            |

|               |                                      |
|---------------|--------------------------------------|
| free_y        | if TRUE, y will be scaled by AvgProf |
| verbose       | print message or not                 |
| nbin          | the amount of bins                   |
| ignore_strand | ignore the strand information or not |
| ...           | additional parameter                 |

## Details

This function comes from <https://github.com/YuLab-SMU/ChIPseeker/issues/189> 'plotPeakProf\_MultiWindows()' is almost the same as plotPeakProf2(), having the main difference of accepting two or more granges objects. Accepting more granges objects can help compare the same peaks in different windows.

TxDb parameter can accept txdb object. But many regions can not be obtained by txdb object. In this case, Users can provide self-made granges served the same role as txdb object and pass to TxDb object.

by the features of interest.

(1) if users use txdb, by can be one of 'gene', 'transcript', 'exon', 'intron', '3UTR', '5UTR', 'UTR'. These features can be obtained by functions from txdb object.

(2) if users use self-made granges object, by can be everything. Because this by will not pass to functions to get features, which is different from the case of using txdb object. This by is only used to made labels showed in picture.

type means the property of the region. one of the "start site", "end site" and "body".

upstream and downstream parameter have different usages:

(1) if type == 'body', upstream and downstream can use to extend the flank of body region.

(2) if type == 'start\_site'/'end\_site', upstream and downstream refer to the upstream and downstream of the start\_site or the end\_site.

weightCol refers to column in peak file. This column acts as a weight value. Details see <https://github.com/YuLab-SMU/ChIPseeker/issues/15>

nbin refers to the number of bins. getTagMatrix() provide a binning method to get the tag matrix.

There are two ways input a list of window.

(1) Users can input a list of self-made granges objects

(2) Users can input a list of by and only one type. In this way, plotPeakProf\_MultiWindows() can made a list of window from txdb object based on by and type.

Warning:

(1) All of these window should be the same type. It means users can only compare a list of "start site"/"end site"/"body region" with the same upstream and downstream.

(2) So it will be only one type and several by.

(3) Users can make window by txdb object or self-made granges object. Users can only choose one of 'gene', 'transcript', 'exon', 'intron', '3UTR', '5UTR' or 'UTR' in the way of using txdb object. User can input any by in the way of using self-made granges object.

(4) Users can mingle the by designed for the two ways. plotPeakProf\_MultiWindows can accpet the hybrid by. But the above rules should be followed.

**Value**

ggplot object

---

|              |                     |
|--------------|---------------------|
| readPeakFile | <i>readPeakFile</i> |
|--------------|---------------------|

---

**Description**

read peak file and store in data.frame or GRanges object

**Usage**

```
readPeakFile(peakfile, as = "GRanges", ...)
```

**Arguments**

|          |                                                      |
|----------|------------------------------------------------------|
| peakfile | peak file                                            |
| as       | output format, one of GRanges or data.frame          |
| ...      | additional parameter (pass to 'utils::read.delim()') |

**Value**

peak information, in GRanges or data.frame object

**Author(s)**

G Yu

**Examples**

```
peakfile <- system.file("extdata", "sample_peaks.txt", package="ChIPseeker")
peak.gr <- readPeakFile(peakfile, as="GRanges")
peak.gr
```

---

|           |                                             |
|-----------|---------------------------------------------|
| reexports | <i>Objects exported from other packages</i> |
|-----------|---------------------------------------------|

---

**Description**

These objects are imported from other packages. Follow the links below to see their documentation.

**GenomicRanges** [GRangesList](#)

**ggplot2** [rel](#)

---

`seq2gene`*seq2gene*

---

**Description**

annotate genomic regions to genes in many-to-many mapping

**Usage**

```
seq2gene(seq, tssRegion, flankDistance, Txdb, sameStrand = FALSE)
```

**Arguments**

|                            |                                                              |
|----------------------------|--------------------------------------------------------------|
| <code>seq</code>           | genomic regions in GRanges object                            |
| <code>tssRegion</code>     | TSS region                                                   |
| <code>flankDistance</code> | flanking search radius                                       |
| <code>Txdb</code>          | TranscriptDb object                                          |
| <code>sameStrand</code>    | logical whether find nearest/overlap gene in the same strand |

**Details**

This function associates genomic regions with coding genes in a many-to-many mapping. It first maps genomic regions to host genes (either located in exon or intron), proximal genes (located in promoter regions) and flanking genes (located in upstream and downstream within user specify distance).

**Value**

gene vector

**Author(s)**

Guangchuang Yu

**Examples**

```
## Not run:
library(Txdb.Hsapiens.UCSC.hg19.knownGene)
TxDb <- Txdb.Hsapiens.UCSC.hg19.knownGene
file <- getSampleFiles()[[1]] # a bed file
gr <- readPeakFile(file)
genes <- seq2gene(gr, tssRegion=c(-1000, 1000), flankDistance = 3000, TxDb)

## End(Not run)
```

---

|      |                    |
|------|--------------------|
| show | <i>show method</i> |
|------|--------------------|

---

**Description**

show method for csAnno instance

**Usage**

show(object)

**Arguments**

object            A csAnno instance

**Value**

message

**Author(s)**

Guangchuang Yu <https://guangchuangyu.github.io>

---

|         |                |
|---------|----------------|
| shuffle | <i>shuffle</i> |
|---------|----------------|

---

**Description**

shuffle the position of peak

**Usage**

shuffle(peak.gr, TxDb)

**Arguments**

|         |                |
|---------|----------------|
| peak.gr | GRanges object |
| TxDb    | TxDb           |

**Value**

GRanges object

**Author(s)**

G Yu

---

|            |                   |
|------------|-------------------|
| tagHeatmap | <i>tagHeatmap</i> |
|------------|-------------------|

---

**Description**

plot the heatmap of tagMatrix

**Usage**

```
tagHeatmap(  
  tagMatrix,  
  xlab = "",  
  ylab = "",  
  title = NULL,  
  palette = "RdBu",  
  nrow = NULL,  
  ncol = NULL  
)
```

**Arguments**

|           |                                                                         |
|-----------|-------------------------------------------------------------------------|
| tagMatrix | tagMatrix or a list of tagMatrix                                        |
| xlab      | xlab                                                                    |
| ylab      | ylab                                                                    |
| title     | title                                                                   |
| palette   | palette to be filled in,details see <a href="#">scale_colour_brewer</a> |
| nrow      | the nrow of plotting a list of peak                                     |
| ncol      | the ncol of plotting a list of peak                                     |

**Value**

figure

**Author(s)**

G Yu

---

|           |                         |
|-----------|-------------------------|
| upsetplot | <i>upsetplot method</i> |
|-----------|-------------------------|

---

**Description**

upsetplot method generics

**Usage**

upsetplot(x, ...)

**Arguments**

|     |                      |
|-----|----------------------|
| x   | A csAnno instance    |
| ... | additional parameter |

**Value**

plot

**Author(s)**

Guangchuang Yu <https://guangchuangyu.github.io>

---

|         |                                |
|---------|--------------------------------|
| vennpie | <i>vennpie method generics</i> |
|---------|--------------------------------|

---

**Description**

vennpie method generics

**Usage**

vennpie(x, r = 0.2, cex = 1.2, ...)

vennpie(x, r = 0.2, cex=1.2, ...)

**Arguments**

|     |                        |
|-----|------------------------|
| x   | A csAnno instance      |
| r   | initial radius         |
| cex | value to adjust legend |
| ... | additional parameter   |

**Value**

plot

**Author(s)**

Guangchuang Yu <https://guangchuangyu.github.io>

---

|          |                 |
|----------|-----------------|
| vennplot | <i>vennplot</i> |
|----------|-----------------|

---

**Description**

plot the overlap of a list of object

**Usage**

```
vennplot(Sets, by = "gplots", ...)
```

**Arguments**

- Sets            a list of object, can be vector or GRanges object
- by             one of gplots, ggVennDiagram or Vennerable
- ...            extra parameters using ggVennDiagram. Details see [ggVennDiagram](#)

**Details**

There are two ways to plot, which users can specify through ‘by’.

The first way is to use ‘gplots’ packages, by setting ‘by = gplots’. This method is default method. The venn plot produced through this way has no color.

The second way is to use ‘ggVennDiagram’ packages, by setting ‘by = ggVennDiagram’. The venn plot produced through this way has colors which can be defined by users using ggplot2 grammar e.g.(scale\_fill\_distiller()). And users can specify any details, like digital number, text size and showing percentage or not, by inputting ‘...’ extra parameters.

**Value**

venn plot that summarize the overlap of peaks from different experiments or gene annotation from different peak files.

**Author(s)**

G Yu

**Examples**

```
## example not run
## require(TxDb.Hsapiens.UCSC.hg19.knownGene)
## txdb <- TxDb.Hsapiens.UCSC.hg19.knownGene
## peakfiles <- getSampleFiles()
## peakAnnoList <- lapply(peakfiles, annotatePeak)
## names(peakAnnoList) <- names(peakfiles)
## genes= lapply(peakAnnoList, function(i) as.data.frame(i)$geneId)
## vennplot(genes)
```

---

|                   |                          |
|-------------------|--------------------------|
| vennplot.peakfile | <i>vennplot.peakfile</i> |
|-------------------|--------------------------|

---

**Description**

vennplot for peak files

**Usage**

```
vennplot.peakfile(files, labels = NULL)
```

**Arguments**

|        |                       |
|--------|-----------------------|
| files  | peak files            |
| labels | labels for peak files |

**Value**

figure

**Author(s)**

G Yu

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