

# Package ‘r3Cseq’

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**Version** 1.55.1

**Title** Analysis of Chromosome Conformation Capture and Next-generation Sequencing (3C-seq)

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**Depends** GenomicRanges, Rsamtools, rtracklayer, VGAM, qvalue

**Imports** methods, Seqinfo, IRanges, Biostrings, data.table, sqldf, RColorBrewer

**Suggests** BSgenome.Mmusculus.UCSC.mm9.masked,  
BSgenome.Mmusculus.UCSC.mm10.masked,  
BSgenome.Hsapiens.UCSC.hg18.masked,  
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BSgenome.Rnorvegicus.UCSC.rm5.masked

**Description**

This package is used for the analysis of long-range chromatin interactions from 3C-seq assay.

**License** GPL-3

**URL** <http://r3cseq.genereg.net>, <https://github.com/supatt-lab/r3Cseq/>

**Collate** AllClasses.R AllGenerics.R Export.R FunctionInCommon.R  
FunctionsForBatchAnalysis.R RestrictionEnzymeFunctions.R  
FunctionsForNoReplicationAnalysis.R Report.R Visualize3Cseq.R  
Annotation.R

**biocViews** Preprocessing, Sequencing

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---

|                   |                                                                 |
|-------------------|-----------------------------------------------------------------|
| calculateBatchRPM | <i>calculate read per million (RPM) for replicates analysis</i> |
|-------------------|-----------------------------------------------------------------|

---

**Description**

Normalize 3C-Seq data by transforming raw reads to read per million per each region for replication analysis

**Usage**

```
calculateBatchRPM(object,normalized_method=c("powerlawFittedRPM","normalRPM"))
```

**Arguments**

|                   |                                                                |
|-------------------|----------------------------------------------------------------|
| object            | r3CseqInBatch object                                           |
| normalized_method | character. method of normalization (default=powerlawFittedRPM) |

**Author(s)**

S. Thongjuea

**See Also**

[calculateRPM](#), [expRPM](#) [contrRPM](#)

**Examples**

```
#See the vignette
```

---

|              |                                         |
|--------------|-----------------------------------------|
| calculateRPM | <i>calculate read per million (RPM)</i> |
|--------------|-----------------------------------------|

---

**Description**

Normalize 3C-Seq data by transforming raw reads to read per million per each region

**Usage**

```
calculateRPM(object,normalized_method=c("powerlawFittedRPM","normalRPM"))
```

**Arguments**

|                   |                                                                |
|-------------------|----------------------------------------------------------------|
| object            | r3Cseq object                                                  |
| normalized_method | character. method of normalization (default=powerlawFittedRPM) |

**Author(s)**

S. Thongjuea

**See Also**

[contrRPM](#), [expRPM](#), [calculateBatchRPM](#)

**Examples**

```
#See the vignette
```

---

|               |                                      |
|---------------|--------------------------------------|
| contrCoverage | <i>This method has been removed.</i> |
|---------------|--------------------------------------|

---

**Description**

This method has been removed.

---

|                         |                                                 |
|-------------------------|-------------------------------------------------|
| contrInteractionRegions | <i>get interaction regions from the control</i> |
|-------------------------|-------------------------------------------------|

---

**Description**

get all identified interaction regions from the control

**Usage**

```
contrInteractionRegions(object)
```

**Arguments**

|        |                                |
|--------|--------------------------------|
| object | r3Cseq or r3CseqInBatch object |
|--------|--------------------------------|

**Value**

The candidate interaction regions show in the IRange object

**Author(s)**

S. Thongjuea

**See Also**

[expInteractionRegions](#), [getInteractions](#)

**Examples**

```
#See the vignette
```

---

|              |                                                                  |
|--------------|------------------------------------------------------------------|
| contrRawData | <i>Accessors for the 'contrRawData' slot of a r3Cseq object.</i> |
|--------------|------------------------------------------------------------------|

---

**Description**

The 'contrRawData' slot of hold the raw aligned reads data in the GRanges object.

**Usage**

```
## S4 method for signature 'r3Cseq'  
contrRawData(object)  
## S4 replacement method for signature 'r3Cseq'  
contrRawData(object) <- value
```

**Arguments**

|        |                                   |
|--------|-----------------------------------|
| object | r3Cseq object                     |
| value  | a GRanges object of aligned reads |

**Author(s)**

S. Thongjuea

**See Also**

[expRawData](#)

**Examples**

```
#See the vignette
```

---

|                |                                                  |
|----------------|--------------------------------------------------|
| contrReadCount | <i>get read count per region for the control</i> |
|----------------|--------------------------------------------------|

---

**Description**

get the read count per region for the control

**Usage**

```
contrReadCount(object)
```

**Arguments**

|        |               |
|--------|---------------|
| object | r3Cseq object |
|--------|---------------|

**Author(s)**

S. Thongjuea

**See Also**

[expReadCount](#), [getReadCountPerRestrictionFragment](#)

**Examples**

```
#See the vignette
```

---

contrRPM

*get read per million (RPM) for the control*

---

**Description**

get the normalized 3C-seq data (RPM) for the control

**Usage**

```
contrRPM(object)
```

**Arguments**

object                    r3Cseq or r3CseqInBatch object

**Author(s)**

S. Thongjuea

**See Also**

[calculateRPM](#), [expRPM](#)

**Examples**

```
#See the vignette
```

---

enzymeDb

*Rebase The Restriction Enzyme Database*

---

**Description**

The database includes all restriction enzyme information from the REBASE database.

**References**

<http://rebase.neb.com/rebase/rebase.html>

---

|             |                                      |
|-------------|--------------------------------------|
| expCoverage | <i>This method has been removed.</i> |
|-------------|--------------------------------------|

---

**Description**

This method has been removed.

---

|                       |                                                    |
|-----------------------|----------------------------------------------------|
| expInteractionRegions | <i>get interaction regions from the experiment</i> |
|-----------------------|----------------------------------------------------|

---

**Description**

get identified interaction regions from the experiment

**Usage**

```
expInteractionRegions(object)
```

**Arguments**

|        |                                |
|--------|--------------------------------|
| object | r3Cseq or r3CseqInBatch object |
|--------|--------------------------------|

**Value**

The candidate interaction regions show in the IRange object

**Author(s)**

S. Thongjuea

**See Also**

[getInteractions](#), [contrInteractionRegions](#)

**Examples**

```
#See the vignette
```

---

export3Cseq2bedGraph    *export interaction regions to the 'bedGraph' format*

---

### Description

export interaction regions from RagedData to the bedGraph format, which suitable for uploading to the UCSC genome browser

### Usage

```
export3Cseq2bedGraph(object,datatype=c("rpm","read_count"))
```

### Arguments

|          |                                                                                                                       |
|----------|-----------------------------------------------------------------------------------------------------------------------|
| object   | r3Cseq object, The object might contain the interaction regions generated by function <a href="#">getInteractions</a> |
| datatype | read_count : read count per restriction fragment rpm : normalized read per million per restriction fragment           |

### Value

The text file in 'bedGraph' format

### Author(s)

S. Thongjuea

### See Also

[exportInteractions2text](#)

### Examples

```
#See the vignette
```

---

export3CseqRawReads2bedGraph  
                                   *export the interaction signal from the raw reads to the 'bedGraph' format*

---

### Description

export interaction regions signal to the bedGraph format, which suitable for uploading to the UCSC genome browser

### Usage

```
export3CseqRawReads2bedGraph(object)
```



**Arguments**

object                    r3Cseq object

**Value**

The text file in 'bedGraph' format

**Author(s)**

S. Thongjuea

**See Also**

[exportInteractions2text](#), [export3Cseq2bedGraph](#),

**Examples**

#See the vignette

---

exportBatchInteractions2text

*export identified interaction regions to the tab separated format for replicates analysis*

---

**Description**

export interaction regions from RagedData to the tab separated format for replicates analysis

**Usage**

exportBatchInteractions2text(object)

**Arguments**

object                    r3CseqInBatch object

**Value**

The text file in the tab separated format

**Author(s)**

S. Thongjuea

**See Also**

[export3Cseq2bedGraph](#), [exportInteractions2text](#)

**Examples**

#See the vignette

*export identified interaction regions to the tab separated format*

export interaction regions from RagedData to the tab separated format

```
exportInteractions2text(object)
```

|        |               |
|--------|---------------|
| object | r3Cseq object |
|--------|---------------|

The text file in the tab separated format

## S. Thongjuea

## export3Cseq2bedGraph

```
#See the vignette
```

*Accessors for the 'expRawData' slot of a r3Cseq object.*

The 'expRawData' slot of hold the raw aligned reads data in the GRanges object.

```
## S4 method for signature 'r3Cseq'
expRawData(object)
## S4 replacement method for signature 'r3Cseq'
expRawData(object) <- value
```

|        |                                   |
|--------|-----------------------------------|
| object | r3Cseq object                     |
| value  | a GRanges object of aligned reads |

**Author(s)**

S. Thongjuea

**See Also**

[expRawData](#)

**Examples**

#See the vignette

---

|                           |                                                     |
|---------------------------|-----------------------------------------------------|
| <code>expReadCount</code> | <i>get read count per region for the experiment</i> |
|---------------------------|-----------------------------------------------------|

---

**Description**

get the read count per region for the experiment

**Usage**

`expReadCount(object)`

**Arguments**

`object`            `r3Cseq`

**Author(s)**

S. Thongjuea

**See Also**

[contrReadCount](#), [getReadCountPerRestrictionFragment](#)

**Examples**

#See the vignette

---

|        |                                                      |
|--------|------------------------------------------------------|
| expRPM | <i>get read per million (RPM) for the experiment</i> |
|--------|------------------------------------------------------|

---

**Description**

get the normalized 3C-seq data (RPM) for the experiment

**Usage**

```
expRPM(object)
```

**Arguments**

|        |                         |
|--------|-------------------------|
| object | r3Cseq or r3CseqInBatch |
|--------|-------------------------|

**Author(s)**

S. Thongjuea

**See Also**

[calculateRPM](#), [contrRPM](#)

**Examples**

```
#See the vignette
```

---

|                     |                                                          |
|---------------------|----------------------------------------------------------|
| generate3CseqReport | <i>generate reports for analysis results from r3Cseq</i> |
|---------------------|----------------------------------------------------------|

---

**Description**

generate reports for analysis results from r3Cseq, the report contains all plots in one pdf file and a text separated out put file.

**Usage**

```
generate3CseqReport(obj)
```

**Arguments**

|     |                                |
|-----|--------------------------------|
| obj | r3Cseq or r3CseqInBatch object |
|-----|--------------------------------|

**Value**

The text file in the tab separated format and the pdf file of all plots

**Author(s)**

S. Thongjuea

**See Also**

[exportInteractions2text](#), [plotOverviewInteractions](#), [plotInteractionsPerChromosome](#), [plotInteractionsNearViewpoint](#)

**Examples**

```
#See the vignette
```

---

|                      |                                                                                                           |
|----------------------|-----------------------------------------------------------------------------------------------------------|
| getBatchInteractions | <i>calculate z-score, assign p-value and q-value for each interaction region for replicates data sets</i> |
|----------------------|-----------------------------------------------------------------------------------------------------------|

---

**Description**

Calculate z-score, assign p-value and q-value to each interaction regions for replicates data sets

**Usage**

```
getBatchInteractions(object,method=c("union","intersection"),smoothing.parameter=0.1,fdr=0.05)
```

**Arguments**

|                     |                                                                                                                                |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------|
| object              | r3Cseq object                                                                                                                  |
| method              | character. The method for combining biological replicates for 3C-Seq analysis (default = "union")                              |
| smoothing.parameter | A level at which cubic smoothing spline for the spar (see vsmooth.spline) input parameter. Must be in (0.06,0.4] (default=0.1) |
| fdr                 | A level at which to control the FDR. Must be in (0,1] (default=0.05)                                                           |

**Value**

The interaction regions show in the RangedData

**Author(s)**

S. Thongjuea

**See Also**

[getInteractions](#) [vsmooth.spline](#)

**Examples**

```
#See the vignette
```

---

|                  |                                                        |
|------------------|--------------------------------------------------------|
| getBatchRawReads | <i>Get aligned reads from the replicates BAM files</i> |
|------------------|--------------------------------------------------------|

---

**Description**

Reading in the input BAM files from the 3C-Seq replicates analysis and then save files as the local GRanged object .rData files

**Usage**

```
getBatchRawReads(object)
```

**Arguments**

|        |                      |
|--------|----------------------|
| object | r3CseqInBatch object |
|--------|----------------------|

**Value**

The GRangedData represents the aligned reads from the BAM file

**Author(s)**

S. Thongjuea

**See Also**

[getRawReads](#),

**Examples**

```
#See the vignette
```

---

|                                         |                                            |
|-----------------------------------------|--------------------------------------------|
| getBatchReadCountPerRestrictionFragment | <i>count reads for replicates analysis</i> |
|-----------------------------------------|--------------------------------------------|

---

**Description**

Counts the number of reads from 3C-Seq data per each restriction fragment for replicates analysis

**Usage**

```
getBatchReadCountPerRestrictionFragment(object, getReadsMethod = c("wholeReads", "adjacentFragment"),
  nFragmentExcludedReadsNearViewpoint=2)
```

**Arguments**

object            r3CseqInBatch object

getReadsMethod   character. To count all reads found in the particular restriction fragment uses wholeReads option. To count reads found around the edge of restriction fragment both 5'utr and 3'utr uses adjacentFragmentEndsReads option (default=wholeReads)

nFragmentExcludedReadsNearViewpoint  
                       Numeric. The number of excluded fragments around the viewpoint, reads found in these fragments will be removed from the analysis (default=2)

**Value**

The RangedData represents the number of reads per each restriction fragment

**Author(s)**

S. Thongjuea

**See Also**

[getReadCountPerWindow](#), [getReadCountPerRestrictionFragment](#)

**Examples**

```
#See the vignette
```

---

```
getBatchReadCountPerWindow
```

*count reads per window size for replicates analysis*

---

**Description**

Counts the number of reads from 3C-Seq data per each window size for replicates analysis

**Usage**

```
getBatchReadCountPerWindow(object, windowSize=5e3, nFragmentExcludedReadsNearViewpoint=2, mode=c("non-overlapping", "adjacent-fragment-ends"))
```

**Arguments**

object            r3CseqInBatch object

windowSize        Numeric. non-overlapping window size for counting reads (default=5e3)

nFragmentExcludedReadsNearViewpoint  
                       Numeric. The number of excluded fragments around the viewpoint, reads found in these fragments will be removed from the analysis (default=2)

mode               character. The window-based modes analysis (default="non-overlapping")

**Value**

The RangedData represents the number of reads per each window size

**Author(s)**

S. Thongjuea

**See Also**

[getReadCountPerRestrictionFragment](#), [getBatchReadCountPerRestrictionFragment](#), [getReadCountPerWindow](#),

**Examples**

```
#See the vignette
```

---

```
getContrInteractionsInRefseq
```

*identified significant interaction regions for RefSeq genes*

---

**Description**

Get a list of genes that contain strong interaction signals in the control

**Usage**

```
getContrInteractionsInRefseq(obj, cutoff.qvalue=0.05, expanded_upstream=50e3, expanded_downstream=10e3)
```

**Arguments**

`obj`                      `obj` is `r3Cseq` or `r3CseqInBatch` object

`cutoff.qvalue`    Numeric. The cutoff q-value (default=0.05)

`expanded_upstream`        Numeric. The expanded distance from the upstream of a gene start (default=50e3)

`expanded_downstream`      Numeric. The expanded distance from the downstream of a gene end (default=10e3)

**Value**

List of identified genes, which contain strong interaction signals

**Author(s)**

S. Thongjuea

**See Also**

[getContrInteractionsInRefseq](#)

**Examples**

```
# See the vignette
```



---

|             |                                      |
|-------------|--------------------------------------|
| getCoverage | <i>This method has been removed.</i> |
|-------------|--------------------------------------|

---

**Description**

This method has been removed.

---

|                            |                                                                    |
|----------------------------|--------------------------------------------------------------------|
| getExpInteractionsInRefseq | <i>identified significant interaction regions for RefSeq genes</i> |
|----------------------------|--------------------------------------------------------------------|

---

**Description**

Get a list of genes that contain strong interaction signals in the experiment

**Usage**

```
getExpInteractionsInRefseq(obj, cutoff.qvalue=0.05, expanded_upstream=50e3, expanded_downstream=10e3)
```

**Arguments**

|                     |                                                                                 |
|---------------------|---------------------------------------------------------------------------------|
| obj                 | obj is r3Cseq or r3CseqInBatch object                                           |
| cutoff.qvalue       | Numeric. The cutoff q-value (default=0.05)                                      |
| expanded_upstream   | Numeric. The expanded distance from the upstream of a gene start (default=50e3) |
| expanded_downstream | Numeric. The expanded distance from the downstream of a gene end (default=10e3) |

**Value**

List of identified genes, which contain strong interaction signals

**Author(s)**

S. Thongjuea

**See Also**

[getContrInteractionsInRefseq](#)

**Examples**

```
# See the vignette
```

---

|                 |                                                                                  |
|-----------------|----------------------------------------------------------------------------------|
| getInteractions | <i>calculate z-score, assign p-value and q-value for each interaction region</i> |
|-----------------|----------------------------------------------------------------------------------|

---

**Description**

Calculate z-score, assign p-value and q-value to each interaction regions

**Usage**

```
getInteractions(object,smoothing.parameter=0.1,fdr=0.05)
```

**Arguments**

|                     |                                                                                                                                |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------|
| object              | r3Cseq object                                                                                                                  |
| smoothing.parameter | A level at which cubic smoothing spline for the spar (see vsmooth.spline) input parameter. Must be in (0.06,0.4] (default=0.1) |
| fdr                 | A level at which to control the FDR. Must be in (0,1] (default=0.05)                                                           |

**Value**

The interaction regions show in the RangedData

**Author(s)**

S. Thongjuea

**See Also**

[getBatchInteractions vsmooth.spline](#)

**Examples**

```
#See the vignette
```

---

|             |                                            |
|-------------|--------------------------------------------|
| getRawReads | <i>Get aligned reads from the BAM file</i> |
|-------------|--------------------------------------------|

---

**Description**

Reading in the input BAM file and then store it in the GRanged object

**Usage**

```
getRawReads(object)
```

**Arguments**

|        |               |
|--------|---------------|
| object | r3Cseq object |
|--------|---------------|

**Value**

The GRangedData represents the aligned reads from the BAM file

**Author(s)**

S. Thongjuea

**See Also**

[getBatchRawReads](#),

**Examples**

#See the vignette

---

```
getReadCountPerRestrictionFragment
      count reads per resitrcition fragment
```

---

**Description**

Counts the number of reads from 3C-Seq data per each restriction fragment

**Usage**

```
getReadCountPerRestrictionFragment(object, getReadsMethod = c("wholeReads", "adjacentFragmentEndsR", "adjacentFragmentStartsR"),
  nFragmentExcludedReadsNearViewpoint=2)
```

**Arguments**

|                                     |                                                                                                                                                                                                                                                 |
|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| object                              | r3Cseq object                                                                                                                                                                                                                                   |
| getReadsMethod                      | character. To count all reads found in the particular restriction fragment uses wholeReads option. To count reads found around the edge of restriction fragment both 5'utr and 3'utr uses adjacentFragmentEndsReads option (default=wholeReads) |
| nFragmentExcludedReadsNearViewpoint | Numeric. The number of excluded fragments around the viewpoint, reads found in these fragments will be removed from the analysis (default=2)                                                                                                    |

**Value**

The RangedData represents the number of reads per each restriction fragment

**Author(s)**

S. Thongjuea

**See Also**

[getReadCountPerWindow](#), [getBatchReadCountPerRestrictionFragment](#)

**Examples**

#See the vignette

---

getReadCountPerWindow    *count reads per window size*

---

### Description

Counts the number of reads from 3C-Seq data per each window size

### Usage

```
getReadCountPerWindow(object, windowSize=5e3, nFragmentExcludedReadsNearViewpoint=2, mode=c("non-overlapping"))
```

### Arguments

|                                     |                                                                                                                                              |
|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| object                              | r3Cseq object                                                                                                                                |
| windowSize                          | Numeric. non-overlapping window size for counting reads (default=5e3)                                                                        |
| nFragmentExcludedReadsNearViewpoint | Numeric. The number of excluded fragments around the viewpoint, reads found in these fragments will be removed from the analysis (default=2) |
| mode                                | character. The window-based modes analysis (default="non-overlapping")                                                                       |

### Value

The RangedData represents the number of reads per each window size

### Author(s)

S. Thongjuea

### See Also

[getReadCountPerRestrictionFragment](#),

### Examples

```
#See the vignette
```

---

getViewpoint    *get the viewpoint of 3C-seq data*

---

### Description

The viewpoint is the bait of 3C method, which can be a promoter region of an interested gene, an enhancer, and a transcription factor binding region.

### Usage

```
getViewpoint(obj)
```

**Arguments**

obj                      r3Cseq or r3CseqInBatch object

**Value**

The viewpoint shows in the IRanges

**Author(s)**

S. Thongjuea

**Examples**

```
#See the vignette
```

---

|             |                        |
|-------------|------------------------|
| hg18refGene | <i>hg18's refGenes</i> |
|-------------|------------------------|

---

**Description**

The human (hg18) reference genes from UCSC

---

|             |                        |
|-------------|------------------------|
| hg19refGene | <i>hg19's refGenes</i> |
|-------------|------------------------|

---

**Description**

The human (hg19) reference genes from UCSC

---

|             |                        |
|-------------|------------------------|
| mm10refGene | <i>mm10's refGenes</i> |
|-------------|------------------------|

---

**Description**

The mouse (mm10) reference genes from UCSC

---

|            |                       |
|------------|-----------------------|
| mm9refGene | <i>mm9's refGenes</i> |
|------------|-----------------------|

---

**Description**

The mouse (mm9) reference genes from UCSC

Myb\_prom\_FB

*Myb\_prom\_FB a data set for the example of r3Cseq analysis***Description**

The example aligned reads generated by 3C-Seq protocol from fetal brain. The promoter region of the Myb's gene was selected as the viewpoint. This data was transformed from aligned reads shown in the BAM file to GRanged object by using Rsamtools.

Myb\_prom\_FL

*Myb\_prom\_FL a data set for the example of r3Cseq analysis***Description**

The example aligned reads generated by 3C-Seq protocol from fetal liver. The promoter region of the Myb's gene was selected as the viewpoint. This data was transformed from aligned reads shown in the BAM file to GRanged object by using Rsamtools.

plot3Cecdf

*This method has been removed.***Description**

This method has been removed.

plotDomainogramNearViewpoint

*Plot domainogram of interaction regions near the viewpoint***Description**

Plot domainogram of interaction regions near the viewpoint

**Usage**

```
plotDomainogramNearViewpoint(object,smoothing.parameter=0.1,distance=5e5,maximum_window=25e3,view
```

**Arguments**

|                     |                                                                                                                                                                                                                          |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| object              | r3Cseq or r3CseqInBatch object                                                                                                                                                                                           |
| smoothing.parameter | A level at which cubic smoothing spline for the spar (see vsmooth.spline) input parameter. Must be in (0.06,0.4] (default=0.1)                                                                                           |
| distance            | Numeric. The distance relative to the viewpoint (default=5e5)                                                                                                                                                            |
| maximum_window      | Numeric. The maximum windowing (default=25e3). We normally compute the interaction regions per window starting from 2Kb to maximum window (default=25kb) to make the interaction matrix for visualizing the domainogram. |
| view                | character. The selected view of data (default="experiment")                                                                                                                                                              |

**Value**

Plots of domainogram for interaction regions close to the viewpoint

**Author(s)**

S. Thongjuea

**See Also**

[plotOverviewInteractions](#), [plotInteractionsPerChromosome](#), [plotInteractionsNearViewpoint](#)

**Examples**

```
# See the vignette
```

---

```
plotInteractionsNearViewpoint
```

*Plot identified interaction regions near the viewpoint*

---

**Description**

Plot identified interaction regions near the viewpoint

**Usage**

```
plotInteractionsNearViewpoint(obj,distance=5e5,log2fc_cutoff=1,yLim=0)
```

**Arguments**

|               |                                                                               |
|---------------|-------------------------------------------------------------------------------|
| obj           | obj is r3Cseq or r3CseqInBatch object                                         |
| distance      | Numeric. The distance relative to the viewpoint (default=5e5)                 |
| log2fc_cutoff | Numeric. The log2 cutoff ratio between the experiment and control (default=1) |
| yLim          | Numeric. The limited height of y-axis (default=0)                             |

**Value**

Plots of identified interaction regions close to the viewpoint

**Author(s)**

S. Thongjuea

**See Also**

[plotOverviewInteractions](#), [plotInteractionsPerChromosome](#), [plotDomainogramNearViewpoint](#)

**Examples**

```
# See the vignette
```

---

plotInteractionsPerChromosome

*Plot interaction regions per each chromosome of interest*


---

### Description

Plot the distribution of interaction regions per each chromosome

### Usage

```
plotInteractionsPerChromosome(obj, chromosomeName)
```

### Arguments

obj                      obj is r3Cseq or r3CseqInBatch object.  
chromosomeName    Character. The input chromosome name (e.g. "chr1")

### Value

Plots of interaction regions per chromosome.

### Author(s)

S. Thongjuea

### See Also

[plotInteractionsNearViewpoint](#), [plotOverviewInteractions](#), [plotDomainogramNearViewpoint](#)

### Examples

```
# See the vignette
```

---

plotOverviewInteractions

*Plot overview of identified interaction regions for genome-wide*


---

### Description

Plot the distribution of identified interaction regions across genome

### Usage

```
plotOverviewInteractions(obj, cutoff.qvalue=0.05)
```

### Arguments

obj                      obj is r3Cseq or r3CseqInBatch object  
cutoff.qvalue    Numeric. The cutoff q-value (default=0.05)



**Value**

Plots of identified 3C-Seq interaction regions genome-wide

**Author(s)**

S. Thongjuea

**See Also**

[plotInteractionsNearViewpoint](#), [plotInteractionsPerChromosome](#), [plotDomainogramNearViewpoint](#)

**Examples**

```
# See the vignette
```

---

r3Cseq-class

*r3Cseq objects*


---

**Description**

The r3Cseq class is the extended class from r3CseqCommon class. It is a general container for storing and manipulating a set of input parameters, RangeData of interactions regions from r3Cseq analysis , and the raw reads GRanged data of the genome-wide interaction signal generated by next-generation sequencing.

**Extends**

Class r3CseqCommon, directly.

**Slots**

**organismName** Object of class "character" the version of particular assembly genome from UCSC (e.g. mm9, hg18, hg19) . The package supports three genome assemblies consisting of mouse (mm9), and human (hg18, hg19).

**restrictionEnzyme** Object of class "character" this is the primary restriction enzyme name using in 3C-Seq experiment

**viewpoint\_chromosome** Object of class "character" chromosome name of where is the viewpoint located eg. chr10, chrX etc.

**viewpoint\_primer\_forward** Object of class "character" the forward primer DNA sequences for the viewpoint amplification

**viewpoint\_primer\_reverse** Object of class "character" the reverse primer DNA sequences for the viewpoint amplification

**expReadCount** Object of class "RangedData" the read count in experiment

**contrReadCount** Object of class "RangedData" the read count in control

**expRPM** Object of class "RangedData" the normalized read read per million in experiment

**contrRPM** Object of class "RangedData" the normalized read read per million in control

**expInteractionRegions** Object of class "RangedData" the identified interaction regions in experiment

contrInteractionRegions Object of class "RangedData" the identified interaction regions in control  
 isControlInvolved Object of class "logical" the logical to ask whether the control is involved in the analysis or not  
 alignedReadsBamExpFile Object of class "character" the file name of experiment in BAM format  
 alignedReadsBamContrFile Object of class "character" the file name of control in BAM format  
 expLabel Object of class "character" the experiment name  
 contrLabel Object of class "character" the control name  
 expLibrarySize Object of class "integer" the library size of experiment  
 contrLibrarySize Object of class "integer" the library size of control  
 expReadLength Object of class "integer" the read length of experiment  
 contrReadLength Object of class "integer" the read length of experiment  
 expRawData Object of class "GRanges" the raw reads found in experiment  
 contrRawData Object of class "GRanges" the raw reads found in control

### Author(s)

S. Thongjuea

### See Also

[r3CseqCommon](#), [r3CseqInBatch](#)

### Examples

```
# See the vignette
```

---

|                    |                             |
|--------------------|-----------------------------|
| r3CseqCommon-class | <i>r3CseqCommon objects</i> |
|--------------------|-----------------------------|

---

### Description

The r3CseqCommon class is a general container for storing and manipulating a set of input parameters, RangeData of interactions regions from r3Cseq analysis. It is a root class for r3Cseq and r3CseqInBatch classes.

### Slots

organismName Object of class "character" the version of particular assembly genome from UCSC (e.g. mm9, hg18, hg19). The package supports three genome assemblies consisting of mouse (mm9), and human (hg18, hg19).  
 restrictionEnzyme Object of class "character" this is the primary restriction enzyme name using in 3C-Seq experiment  
 viewpoint\_chromosome Object of class "character" chromosome name of where is the view-point located eg. chr10, chrX etc.

viewpoint\_primer\_forward Object of class "character" the forward primer DNA sequences for the viewpoint amplification

viewpoint\_primer\_reverse Object of class "character" the reverse primer DNA sequences for the viewpoint amplification

expReadCount Object of class "RangedData" the read count in experiment

contrReadCount Object of class "RangedData" the read count in control

expRPM Object of class "RangedData" the normalized read read per million in experiment

contrRPM Object of class "RangedData" the normalized read read per million in control

expInteractionRegions Object of class "RangedData" the identified interaction regions in experiment

contrInteractionRegions Object of class "RangedData" the identified interaction regions in control

isControlInvolved Object of class "logical" the logical to ask whether the control is involved in the analysis or not

**Author(s)**

S. Thongjuea

**See Also**

[r3Cseq](#), [r3CseqInBatch](#)

**Examples**

```
# See the vignette
```

---

|                     |                              |
|---------------------|------------------------------|
| r3CseqInBatch-class | <i>r3CseqInBatch objects</i> |
|---------------------|------------------------------|

---

**Description**

The r3CseqInBatch class is the extended class from r3CseqCommon class. It is a general container for storing and manipulating a set of input parameters, RangeData of interactions regions from r3Cseq analysis for replicates data sets.

**Extends**

Class r3CseqCommon, directly.

**Slots**

organismName Object of class "character" the version of particular assembly genome from UCSC (e.g. mm9, hg18, hg19) . The package supports three genome assemblies consisting of mouse (mm9), and human (hg18, hg19).

restrictionEnzyme Object of class "character" this is the primary restriction enzyme name using in 3C-Seq experiment

viewpoint\_chromosome Object of class "character" chromosome name of where is the viewpoint located eg. chr10, chrX etc.

viewpoint\_primer\_forward Object of class "character" the forward primer DNA sequences for the viewpoint amplification

viewpoint\_primer\_reverse Object of class "character" the reverse primer DNA sequences for the viewpoint amplification

expReadCount Object of class "RangedData" the read count in experiment

contrReadCount Object of class "RangedData" the read count in control

expRPM Object of class "RangedData" the normalized read read per million in experiment

contrRPM Object of class "RangedData" the normalized read read per million in control

expInteractionRegions Object of class "RangedData" the identified interaction regions in experiment

contrInteractionRegions Object of class "RangedData" the identified interaction regions in control

isControlInvolved Object of class "logical" the logical to ask whether the control is involved in the analysis or not

bamFilesDirectory Object of class "character" the path name of directory that contains BAM files

BamExpFiles Object of class "vector" the file names of BAM files in the experiment

BamContrFiles Object of class "vector" the file names of BAM files in the control

expBatchLabel Object of class "vector" the labeled experiment names

contrBatchLabel Object of class "vector" the labeled control names

readCountTable Object of class "RangedData" the read count table

RPMsTable Object of class "RangedData" the normalized read per million table

expBatchLibrarySize Object of class "vector" the library size of each experiment

contrBatchLibrarySize Object of class "vector" the library size of each control

expBatchReadLength Object of class "vector" the read length of experiments

contrBatchReadLength Object of class "vector" the read length of controls

### Author(s)

S. Thongjuea

### See Also

[r3CseqCommon](#), [r3CseqInBatch](#)

### Examples

```
# See the vignette
```

---

rn5refGene

*rn5's refGenes*

---

### Description

The rat (rn5) reference genes from UCSC

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