Package ‘RiboCrypt’

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Type Package
Title Interactive visualization in genomics
Version 1.8.0
License MIT + file LICENSE
Description R Package for interactive visualization and browsing NGS data. It contains a browser for both transcript and genomic coordinate view. In addition a QC and general metaplots are included, among others differential translation plots and gene expression plots. The package is still under development.

biocViews Software, Sequencing, RiboSeq, RNASeq,
Encoding UTF-8
LazyData true

BugReports https://github.com/m-swirski/RiboCrypt/issues
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antisense

Description
Get antisense

Usage
antisense(grl)

Value
a GRangesList
createSeqPanelPattern

Create sequence panel for RiboCrypt

Description
Create sequence panel for RiboCrypt

Usage
createSeqPanelPattern(
  sequence,
  start_codons = "ATG",
  stop_codons = c("TAA", "TAG", "TGA"),
  frame = 1,
  custom_motif = NULL
)

Arguments
- start_codons: character vector, default "ATG"
- stop_codons: character vector, default c("TAA", "TAG", "TGA")
- custom_motif: character vector, default NULL.

Value
a ggplot object

DEG_plot

Differential expression plots (1D or 2D)

Description
Gives you interactive 1D or 2D DE plots

Usage
DEG_plot(
  dt,
  draw_non_regulated = FALSE,
  xlim = ifelse(two_dimensions, "bidir.max", "auto"),
  ylim = "bidir.max",
  xlab = ifelse(two_dimensions, "RNA fold change (log2)", "Mean counts (log2)")
  ylab = ifelse(two_dimensions, "RFP fold change (log2)", "Fold change (log2)")
  two_dimensions = ifelse("LFC" %in% colnames(dt), FALSE, TRUE),
  color.values = c("No change" = "black", Significant = "red", Buffering = "purple"),
)
**Arguments**

dt a data.table with results from a differential expression run. Normally from:
```
ORFik::DTEG.analysis(df1, df2)
```
draw_non_regulated logical, default FALSE. Should non-regulated rows be included in the plot? Will make the plot faster to render if skipped (FALSE)
xlim numeric vector or character preset, default: ifelse(two_dimensions, "bidir.max", "auto") (Equal in both +/ - direction, using max value + 0.5 of meanCounts(in 1d) / rna(in 2d) column of dt). If you want ggplot to decide limit, set to "auto". For numeric vector, specify min and max x limit: like c(-5, 5)
ylim numeric vector or character preset, default: "bidir.max" (Equal in both +/ - direction, using max value + 0.5 of LFC(in 1d) / rfp(in 2d) column of dt). If you want ggplot to decide limit, set to "auto". For numeric vector, specify min and max x limit: like c(-5, 5)
xlab character, default: ifelse(two_dimensions, "RNA fold change (log2)", "Mean counts (log2)")

ylab character, default: ifelse(two_dimensions, "RFP fold change (log2)", "Fold change (log2)")
two_dimensions logical, default: ifelse("LFC" %in% colnames(dt), FALSE, TRUE) Is this two dimensional, like: Ribo-seq vs RNA-seq. Alternative, FALSE: Then Log fold change vs mean counts

color.values named character vector, default: c("No change" = "black", "Significant" = "red", "Buffering" = "purple", "mRNA abundance" = "darkgreen", "Expression" = "blue", "Forwarded" = "yellow", "Inverse" = "aquamarine", "Translation" = "orange4")

**Value**

plotly object

**Examples**

```r
# Load experiment
df <- ORFik.template.experiment()

# 1 Dimensional analysis
dt <- DEG.analysis(df[df\$libtype == "RNA",])
dt\$Regulation[1] <- "Significant" # Fake sig level
DEG_plot(dt, draw_non_regulated = TRUE)

# 2 Dimensional analysis
dt_2d <- DTEG.analysis(df[df\$libtype == "RFP",], df[df\$libtype == "RNA",],
output.dir = NULL)
dt_2d\$Regulation[4] <- "Translation" # Fake sig level
dt_2d\$Regulation[5] <- "Buffering" # Fake sig level
DEG_plot(dt_2d, draw_non_regulated = TRUE)
```
distanceToFollowing  
*Distance to following range*

**Description**

Distance to following range

**Usage**

```r
distanceToFollowing(grl, grl2 = grl, ignore.strand = FALSE)
```

**Arguments**

- `grl`: a GRangesList
- `grl2`: a GRangesList, default 'grl'
- `ignore.strand`: logical, default FALSE

**Value**

numeric vector of distance

---

fetch_JS_seq  
*Fetch Javascript sequence*

**Description**

Fetch Javascript sequence

**Usage**

```r
fetch_JS_seq(
  target_seq,
  nplots,
  distance = 50,
  display_dist,
  aa_letter_code = "one_letter"
)
```

**Arguments**

- `target_seq`: the target sequence
- `nplots`: number of plots
- `distance`: numeric, default 50.
- `display_dist`: display distance
- `aa_letter_code`: "one_letter"
geneTrackLayer

Value

a list of 2 lists, the nt list (per frame, total 3) and AA list (per frame, total 3)

geneTrackLayer

Description

How many rows does the gene track need

Usage

geneTrackLayer(grl)

Arguments

grl a GRangesList

Value

numeric, the track row index

fetch_summary Fetch summary of uniprot id

Description

Fetch summary of uniprot id

Usage

fetch_summary(qualifier, provider = "alphafold")

Arguments

qualifier uniprot ids
provider "pdbe", alternatives: "alphafold", "all"

Value

a character of json
**getCoverageProfile**  
*Get coverage profile*

**Description**
Get coverage profile

**Usage**
getCoverageProfile(grl, reads, kmers = 1, kmers_type = "mean")

**Arguments**
- **grl**: a GRangesList
- **reads**: GRanges
- **kmers**: 1
- **kmers_type**: "mean"

**Value**
data.table of coverage

---

**getIndexes**  
*Get index*

**Description**
Get index

**Usage**
getIndexes(ref_granges)

**Arguments**
- **ref_granges**: a GRanges object

**Value**
integer vector, indices
ggplotlyHover  
*Call ggplotly with hoveron defined*

**Description**

Call ggplotly with hoveron defined

**Usage**

`ggplotlyHover(x, ...)`

**Arguments**

- `x`  a ggplot argument
- `...` additional arguments for ggplotly

**Value**

a ggplotly object

matchMultiplePatterns  
*Match multiple patterns*

**Description**

Match multiple patterns

**Usage**

`matchMultiplePatterns(patterns, Seq)`

**Arguments**

- `patterns` character
- `Seq` a DNAMap Set

**Value**

integer vector, indices (named with pattern hit)
**matchToGRanges**

**Description**
Match to GRanges

**Usage**
```
matchToGRanges(matches, ref_granges)
```

**Arguments**
- `matches` integer vector, indices
- `ref_granges` GRanges

**Value**
GRanges object

---

**multiOmicsPlot_animate**

*Multi-omics animation using list input*

**Description**
The animation will move with a play button, there is 1 transition per library given.

**Usage**
```
multiOmicsPlot_animate(
    display_range,
    annotation = display_range,
    reference_sequence,
    reads,
    viewMode = c("tx", "genomic")[1],
    custom_regions = NULL,
    leader_extension = 0,
    trailer_extension = 0,
    withFrames = NULL,
    frames_type = "lines",
    colors = NULL,
    kmers = NULL,
    kmers_type = c("mean", "sum")[1],
    ylabels = NULL,
)```
lib_to_annotation_proportions = c(0.8, 0.2),
lib_proportions = NULL,
annotation_proportions = NULL,
width = NULL,
height = NULL,
plot_name = "default",
plot_title = NULL,
display_sequence = c("both", "nt", "aa", "none")[1],
seq_render_dist = 100,
aa_letter_code = c("one_letter", "three_letters")[1],
annotation_names = NULL,
start_codons = "ATG",
stop_codons = c("TAA", "TAG", "TGA"),
custom_motif = NULL,
BPPARAM = BiocParallel::SerialParam()
)

Arguments

display_range  the whole region to visualize, a GRangesList or GRanges object
annotation    the whole annotation which your target region is a subset, a GRangesList or GRanges object
reference_sequence  the genome reference, a FaFile or FaFile convertible object
reads     the NGS libraries, as a list of GRanges with or without score column for replicates.
viewMode   character, default "tx" (transcript coordinates, first position is 1, exons are merged into a single sequence)
           Alternative: "genomic" (genomic coordinates, first position is first position in display_range argument. Introns are displayed).
custom_regions     a GRangesList or NULL, default: NULL. The alternative annotation, like self defined uORFs etc. The vertical annotation bars will have a different color.
leader_extension integer, default 0. (How much to extend view upstream)
trailer_extension integer, default 0. (How much to extend view downstream)
withFrames        a logical vector, default NULL. Alternative: a length 1 or same length as list length of "reads" argument.
frames_type       character, default "lines". Alternative: 
                   - columns
                   - stacks
                   - area
colors           character, default NULL (automatic colouring). If "withFrames" argument is TRUE, colors are set to to c("red", "green", "blue") for the 3 frames. Alternative:
                   Character vector of length 1 or length of "reads" list argument.
kmers            numeric (integer), bin positions into kmers.
multiOmicsPlot_animate

kmers_type character, function used for kmers sliding window. default: "mean", alternative: "sum"

ylables character, default NULL. Name of libraries in "reads" list argument.

lib_to_annotation_proportions numeric vector of length 2. relative sizes of profiles and annotation.

lib_proportions numeric vector of length equal to displayed libs. Relative sizes of profiles displayed.

annotation_proportions numeric vector of length 3 (seq displayed), or 2 (seq not displayed). Relative sizes of annotation tracks.

width numeric, default NULL. Width of plot.

height numeric, default NULL. Height of plot.

plot_name = character, default "default" (will create name from display_range name). Alternative: custom name for region.

plot_title = character, default NULL. A title for plot.

display_sequence character/logical, default c("both", "nt", "aa", "none")[1]. If TRUE or "both", display nucleotide and aa sequence in plot.

seq_render_dist integer, default 100. The sequences will appear after zooming below this threshold.

aa_letter_code character, when set to "three_letters", three letter amino acid code is used. One letter by default.

annotation_names character, default NULL. Alternative naming for annotation.

start_codons character vector, default "ATG"

stop_codons character vector, default c("TAA", "TAG", "TGA")

custom_motif character vector, default NULL.

BPPARAM how many cores/threads to use? default: BiocParallel::SerialParam(). To see number of threads used for multicores, do BiocParallel::bpparam()$workers. You can also add a time remaining bar, for a more detailed pipeline.

Value

the plot object

Examples

library(RiboCrypt)
df <- ORFik.template.experiment()[9:10,]
cds <- loadRegion(df, "cds")
mrna <- loadRegion(df, "mrna")
# multiOmmicsPlot_animate(mrna[1], annotation = cds[1], reference_sequence = findFa(df),
# frames_type = "columns", leader_extension = 30, trailer_extension = 30,
# reads = outputLibs(df, type = "pshifted", output.mode = "envirlist",
# naming = "full", BPPARAM = BiocParallel::SerialParam()))
multiOmicsPlot_list

Multi-omics plot using list input

Description

Customizable html plots for visualizing genomic data.

Usage

multiOmicsPlot_list(
  display_range,
  annotation = display_range,
  reference_sequence,
  reads,
  viewMode = c("tx", "genomic")[1],
  custom_regions = NULL,
  leader_extension = 0,
  trailer_extension = 0,
  withFrames = NULL,
  frames_type = "lines",
  colors = NULL,
  kmers = NULL,
  kmers_type = c("mean", "sum")[1],
  ylabels = NULL,
  lib_to_annotation_proportions = c(0.8, 0.2),
  lib_proportions = NULL,
  annotation_proportions = NULL,
  width = NULL,
  height = NULL,
  plot_name = "default",
  plot_title = NULL,
  display_sequence = c("both", "nt", "aa", "none")[1],
  seq_render_dist = 100,
  aa_letter_code = c("one_letter", "three_letters")[1],
  annotation_names = NULL,
  start_codons = "ATG",
  stop_codons = c("TAA", "TAG", "TGA"),
  custom_motif = NULL,
  AA_code = Biostrings::GENETIC_CODE,
  BPPARAM = BiocParallel::SerialParam(),
  summary_track = FALSE,
  summary_track_type = frames_type,
  export.format = "svg"
)

Arguments

display_range the whole region to visualize, a GRangesList or GRanges object
annotation: the whole annotation which your target region is a subset, a \texttt{GRangesList} or \texttt{GRanges} object.

reference_sequence: the genome reference, a \texttt{FaFile} or \texttt{FaFile} convertible object.

reads: the NGS libraries, as a list of \texttt{GRanges} with or without score column for replicates.

viewMode: character, default "tx" (transcript coordinates, first position is 1, exons are merged into a single sequence)
Alternative: "genomic" (genomic coordinates, first position is first position in \texttt{display_range} argument. Introns are displayed).

custom_regions: a \texttt{GRangesList} or NULL, default: NULL. The alternative annotation, like self defined uORFs etc. The vertical annotation bars will have a different color.

leader_extension: integer, default 0. (How much to extend view upstream)

trailer_extension: integer, default 0. (How much to extend view downstream)

withFrames: a logical vector, default NULL. Alternative: a length 1 or same length as list length of "reads" argument.

frames_type: character, default "lines". Alternative:
- columns
- stacks
- area

colors: character, default NULL (automatic colouring). If "withFrames" argument is TRUE, colors are set to to c("red", "green", "blue") for the 3 frames. Alternative: Character vector of length 1 or length of "reads" list argument.

kmers: numeric (integer), bin positions into kmers.

kmers_type: character, function used for kmers sliding window. default: "mean", alternative: "sum"

ylabels: character, default NULL. Name of libraries in "reads" list argument.

lib_to_annotation_proportions: numeric vector of length 2. relative sizes of profiles and annotation.

lib_proportions: numeric vector of length equal to displayed libs. Relative sizes of profiles displayed

annotation_proportions: numeric vector of length 3 (seq displayed), or 2 (seq not displayed). Relative sizes of annotation tracks.

width: numeric, default NULL. Width of plot.

height: numeric, default NULL. Height of plot.

plot_name: = character, default "default" (will create name from display_range name). Alternative: custom name for region.

plot_title: character, default NULL. A title for plot.
display_sequence
  character/logical, default c("both", "nt", "aa", "none")[1]. If TRUE or "both", display nucleotide and aa sequence in plot.

seq_render_dist
  integer, default 100. The sequences will appear after zooming below this threshold.

aa_letter_code
  character, when set to "three_letters", three letter amino acid code is used. One letter by default.

annotation_names
  character, default NULL. Alternative naming for annotation.

start_codons
  character vector, default "ATG"

stop_codons
  character vector, default c("TAA", "TAG", "TGA")

custom_motif
  character vector, default NULL.

AA_code
  Genetic code for amino acid display. Default is SGC0 (standard: Vertebrate). See Biostrings::GENETIC_CODE_TABLE for options. To change to bacterial, do: Biostrings::getGeneticCode("11")

BPPARAM
  how many cores/threads to use? default: BiocParallel::SerialParam(). To see number of threads used for multicores, do BiocParallel::bpparam()$workers. You can also add a time remaining bar, for a more detailed pipeline.

summary_track
  logical, default FALSE. Display a top track, that is the sum of all tracks.

summary_track_type
  character, default is same as 'frames_type' argument

export.format
  character, default: "svg". alternative: "png". when you click the top right image button export, what should it export as?

Value
  the plot object

Examples

library(RiboCrypt)
df <- ORFik.template.experiment()[9:10,]
cds <- loadRegion(df, "cds")
mrna <- loadRegion(df, "mrna")
multiOmicsPlot_list(mrna[1], annotation = cds[1], reference_sequence = findFa(df), frames_type = "columns", leader_extension = 30, trailer_extension = 30, reads = outputLibs(df, type = "pshifted", output.mode = "envirlist", naming = "full", BPPARAM = BiocParallel::SerialParam()))
**Description**

Customizable html plots for visualizing genomic data.

**Usage**

```r
multiOmicsPlot_ORFikExp(
    display_range,
    df,
    annotation = "cds",
    reference_sequence = findFa(df),
    reads = outputLibs(df, type = "pshifted", output.mode = "envirlist", naming = "full",
        BPPARAM = BiocParallel::SerialParam()),
    viewMode = c("tx", "genomic")[1],
    custom_regions = NULL,
    leader_extension = 0,
    trailer_extension = 0,
    withFrames = libraryTypes(df, uniqueTypes = FALSE) %in% c("RFP", "RPF", "LSU"),
    frames_type = "lines",
    colors = NULL,
    kmers = NULL,
    kmers_type = c("mean", "sum")[1],
    ylabels = bamVarName(df),
    lib_to_annotation_proportions = c(0.8, 0.2),
    lib_proportions = NULL,
    annotation_proportions = NULL,
    width = NULL,
    height = NULL,
    plot_name = "default",
    plot_title = NULL,
    display_sequence = c("both", "nt", "aa", "none")[1],
    seq_render_dist = 100,
    aa_letter_code = c("one_letter", "three_letters")[1],
    annotation_names = NULL,
    start_codons = "ATG",
    stop_codons = c("TAA", "TAG", "TGA"),
    custom_motif = NULL,
    BPPARAM = BiocParallel::SerialParam(),
    input_id = "",
    summary_track = FALSE,
    summary_track_type = frames_type,
    export.format = "svg"
)
```
multiOmicsPlot_ORFikExp

Arguments

display_range  the whole region to visualize, a GRangesList or GRanges object

df  an ORFik experiment or a list containing ORFik experiments. Usually a list when you have split Ribo-seq and RNA-seq etc.

annotation  the whole annotation which your target region is a subset, a GRangesList or GRanges object

reference_sequence  the genome reference, default ORFik::findFa(df)

reads  the NGS libraries, as a list of GRanges with or without 'score' column for replicates. Can also be a covRle object of precomputed coverage. Default: outputLibs(df, type = "pshifted", output.mode = "envirlist", naming = "full", BPPARAM = BiocParallel::SerialParam())

viewMode  character, default "tx" (transcript coordinates, first position is 1, exons are merged into a single sequence) Alternative: "genomic" (genomic coordinates, first position is first position in display_range argument. Introns are displayed).

custom_regions  a GRangesList or NULL, default: NULL. The alternative annotation, like self defined uORFs etc. The vertical annotation bars will have a different color.

leader_extension  integer, default 0. (How much to extend view upstream)

trailer_extension  integer, default 0. (How much to extend view downstream)

withFrames  a logical vector, default libraryTypes(df, uniqueTypes = FALSE) %in% c("RFP", "RPF", "LSU") Alternative: a length 1 or same length as list length of "reads" argument.

frames_type  character, default "lines". Alternative:
- columns
- stacks
- area

colors  character, default NULL (automatic colouring). If "withFrames" argument is TRUE, colors are set to to c("red", "green", "blue") for the 3 frames. Alternative: Character vector of length 1 or length of "reads" list argument.

kmers  numeric (integer), bin positions into kmers.

kmers_type  character, function used for kmer sliding window. default: "mean", alternative: "sum"

ylabels  character, default bamVarName(df). Name of libraries in "reads" list argument.

lib_to_annotation_proportions  numeric vector of length 2. relative sizes of profiles and annotation.

lib_proportions  numeric vector of length equal to displayed libs. Relative sizes of profiles displayed

annotation_proportions  numeric vector of length 3 (seq displayed), or 2 (seq not displayed). Relative sizes of annotation tracks.
multiOmicsPlot_ORFikExp

width: numeric, default NULL. Width of plot.
height: numeric, default NULL. Height of plot.
plot_name: character, default "default" (will create name from display_range name).
plot_title: character, default NULL. A title for plot.
display_sequence: character/logical, default c("both","nt","aa","none")[1]. If TRUE or "both", display nucleotide and aa sequence in plot.
seq_render_dist: integer, default 100. The sequences will appear after zooming below this threshold.
aa_letter_code: character, when set to "three_letters", three letter amino acid code is used. One letter by default.
annotation_names: character, default NULL. Alternative naming for annotation.
start_codons: character vector, default "ATG"
stop_codons: character vector, default c("TAA","TAG","TGA")
custom_motif: character vector, default NULL.
BPPARAM: how many cores/threads to use? default: BiocParallel::SerialParam(). To see number of threads used for multicores, do BiocParallel::bpparam()$workers. You can also add a time remaining bar, for a more detailed pipeline.
input_id: character path, default: ", id for shiny to display structures, should be "" for local users.
summary_track: logical, default FALSE. Display a top track, that is the sum of all tracks.
summary_track_type: character, default is same as 'frames_type' argument
export.format: character, default: "svg", alternative: "png". when you click the top right image button export, what should it export as?

Value

the plot object

Examples

library(RiboCrypt)
df <- ORFik.template.experiment()[9,] #Use third library in experiment only
cds <- loadRegion(df, "cds")
multiOmicsPlot_ORFikExp(extendLeaders(extendTrailers(cds[1], 30), 30), df = df, frames_type = "columns")
organism_input_select  Select box for organism

Description

Select box for organism

Usage

organism_input_select(genomes, ns)

Arguments

genomes    name of genomes, returned from list.experiments()
ns         the ID, for shiny session

Value

selectizeInput object

RiboCrypt_app  Create RiboCrypt app

Description

Create RiboCrypt app

Usage

RiboCrypt_app(
  validate.experiments = TRUE,
  options = list(launch.browser = ifelse(interactive(), TRUE, FALSE)),
  all_exp = list.experiments(validate = validate.experiments),
  browser_options = c(),
  init_tab_focus = "browser"
)

Arguments

validate.experiments
  logical, default TRUE, set to FALSE to allow starting the app with malformed experiments, be careful will crash if you try to load that experiment!

options
  list of arguments, default list("launch.browser" = ifelse(interactive(), TRUE, FALSE)))
trimOverlaps

Trim overlaps

Description

Trim overlaps

Usage

trimOverlaps(overlaps, display_range)

Arguments

overlaps FGRanges
display_range FGRanges

all_exp a data.table, default: list.experiments(validate = validate.experiments).
Which experiments do you want to allow your app to see, default is all in your
system config path.

browser_options named character vector of browser specific arguments:
- default_experiment : Which experiment to select, default: first one
- default_gene : Which genes to select, default: first one
- default_libs : Which libraries to select: first one, else a single string, where
  libs are separated by "|", like "RFP_WT_r1|RFP_WT_r2".
- default_kmer : K-mer windowing size, default: 1
- default_frame_type : Riboseq line type, default: "lines"
- plot_on_start : Plot when starting, default: "FALSE"

init_tab_focus character, default "browser". Which tab to open on init.

Value

RiboCrypt shiny app

Examples

## Default run
# RiboCrypt_app()
## Plot on start
# RiboCrypt_app(browser_options = c(plot_on_start = "TRUE"))
## Init with an experiment and gene (you must of course have the experiment)

#RiboCrypt_app(validate.experiments = FALSE,
#               browser_options = c(plot_on_start = "TRUE",
#               default_experiment = "human_all_merged_l50",
#               default_gene = "ATF4-ENSG00000128272")

trimOverlaps(overlaps, display_range)

trimOverlaps

Trim overlaps

Description

Trim overlaps

Usage

trimOverlaps(overlaps, display_range)

Arguments

overlaps FGRanges
display_range FGRanges
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