Package ‘psichomics’

March 23, 2024

**Title**  Graphical Interface for Alternative Splicing Quantification, Analysis and Visualisation

**Version**  1.28.1

**Encoding**  UTF-8

**Description**  Interactive R package with an intuitive Shiny-based graphical interface for alternative splicing quantification and integrative analyses of alternative splicing and gene expression based on The Cancer Genome Atlas (TCGA), the Genotype-Tissue Expression project (GTEx), Sequence Read Archive (SRA) and user-provided data. The tool interactively performs survival, dimensionality reduction and median- and variance-based differential splicing and gene expression analyses that benefit from the incorporation of clinical and molecular sample-associated features (such as tumour stage or survival). Interactive visual access to genomic mapping and functional annotation of selected alternative splicing events is also included.

**Depends**  R (>= 4.0), shiny (>= 1.7.0), shinyBS

**License**  MIT + file LICENSE

**LazyData**  true

**RoxygenNote**  7.3.1

**Imports**  AnnotationDbi, AnnotationHub, BiocFileCache, cluster, colourpicker, data.table, digest, dplyr, DT (>= 0.2), edgeR, fastICA, fastmatch, ggplot2, ggrepel, graphics, grDevices, highcharter (>= 0.5.0), htmltools, httr, jsonlite, limma, pairsD3, plyr, purrr, Rcpp (>= 0.12.14), recount, Rfast, R.utils, reshape2, shinyjs, stringr, stats, SummarizedExperiment, survival, tools, utils, XML, xtable, methods

**Suggests**  testthat, knitr, parallel, devtools, rmarkdown, gplots, covr, car, rstudioapi, spelling

**LinkingTo**  Rcpp

**VignetteBuilder**  knitr

**Collate**  'RcppExports.R' 'utils.R' 'globalAccess.R' 'app.R' 'analysis.R' 'analysis_correlation.R'
'analysis_diffExpression.R' 'analysis_diffExpression_event.R'
'analysis_diffExpression_table.R' 'analysis_diffSplicing.R'
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'analysis_dimReduction.R' 'analysis_dimReduction_ica.R'
'analysis_dimReduction_pca.R' 'analysis_information.R'
'analysis_survival.R' 'analysis_template.R' 'data.R'
'formats.R' 'data_firebrowse.R'
'data_geNormalisationFiltering.R' 'data_gtex.R'
'data_inclusionLevels.R' 'data_inclusionLevelsFilter.R'
'data_local.R' 'data_recount.R' 'events_suppa.R'
'events_vastTools.R' 'events_miso.R' 'events_mats.R' 'events.R'
'formats_SraRunTableSampleInfo.R'
'formats_firebrowseGeneExpression.R'
'formats_firebrowseJunctionReads.R'
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'utils_drawSplicingEvent.R' 'utils_eventParsing.R'
'utils_fileBrowserDialog.R' 'utils_interactiveGgplot.R'
'utils_interface.R'

biocViews Sequencing, RNASeq, AlternativeSplicing,
DifferentialSplicing, Transcription, GUI, PrincipalComponent,
Survival, BiomedicalInformatics, Transcriptomics,
ImmunoOncology, Visualization, MultipleComparison,
GeneExpression, DifferentialExpression

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BugReports https://github.com/nuno-agostinho/psichomics/issues

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.onAttach

Print startup message

Description
Print startup message

Usage
.onAttach(libname, pkgname)

Arguments

libname  Character: library name
pkgname  Character: package name

Value
Startup message

addObjectAttrs  Set attributes to an object

Description
Set attributes to an object

Usage
addObjectAttrs(object, ..., replace = TRUE)

Arguments

object  Object
...  Named parameters to convert to attributes
replace  Boolean: replace an attribute if already set?

Value
Object with attributes set

Examples
ll <- list(a="hey", b="there")
psichomics:::addObjectAttrs(ll, "words"=2, "language"="English")
addTCGAdata  
*Creates a UI set with options to add data from TCGA/FireBrowse*

**Description**

Creates a UI set with options to add data from TCGA/FireBrowse

**Usage**

```r
addTCGAdata(ns)
```

**Arguments**

- `ns` Namespace function

**Value**

A UI set that can be added to a UI definition

---

analysesTableSet  
*Set of functions to render differential analyses (plot and table)*

**Description**

Set of functions to render differential analyses (plot and table)
Set up environment and redirect user to a page based on click information

**Usage**

```r
analysesTableSet(
  session, input, output, analysesType, analysesID,
  getAnalysesData, getAnalysesFiltered, setAnalysesFiltered,
  getAnalysesSurvival, getAnalysesColumns, setAnalysesColumns,
  getResetPaging, setResetPaging
)
```
processClickRedirection(click, psi = NULL, survival = FALSE)

analysesPlotSet(
  session,
  input,
  output,
  analysesType,
  analysesID,
  getAnalysesData,
  getAnalysesFiltered,
  getAnalysesSurvival
)

Arguments

  session  Shiny session
  input    Shiny input
  output   Shiny output
  analysesType  Character: type of analyses (GE or PSI)
  analysesID   Character: identifier
  getAnalysesData  Function: get analyses data
  getAnalysesFiltered  Function: get filtered analyses data
  setAnalysesFiltered  Function: set filtered analyses data
  getAnalysesSurvival  Function: get survival data
  getAnalysesColumns  Function: get columns
  setAnalysesColumns  Function: set columns
  getResetPaging  Function: get toggle of reset paging
  setResetPaging  Function: set toggle of reset paging
  click      List: click information
  psi       Data frame or matrix: alternative splicing quantification
  survival  Boolean: redirect to survival page?

Value

  NULL (function is only used to modify the Shiny session’s state or internal variables)
appendNewGroups  

* Append new groups to already existing groups

**Description**

Retrieve previous groups, rename duplicated group names in the new groups and append new groups to the previous ones

**Usage**

```r
appendNewGroups(type, new, clearOld = FALSE)
```

**Arguments**

- `type`  
  Character: type of groups (either `Patients`, `Samples`, `ASevents` or `Genes`)

- `new`  
  Rows of groups to be added

- `clearOld`  
  Boolean: clear old groups?

**Value**

`NULL` (function is only used to modify the Shiny session's state or internal variables)

---

**appServer**  

* Server logic

**Description**

Instructions to build the Shiny app

**Usage**

```r
appServer(input, output, session)
```

analysesServer(input, output, session)

diffEventServer(ns, input, output, session, psi)

correlationServer(input, output, session)

diffExpressionServer(input, output, session)

diffExpressionEventServer(input, output, session)

diffExpressionTableServer(input, output, session)
appServer

diffSplicingServer(input, output, session)
diffSplicingEventServer(input, output, session)
diffSplicingTableServer(input, output, session)
dimReductionServer(input, output, session)
icaServer(input, output, session)
pcaServer(input, output, session)
infoServer(input, output, session)
survivalServer(input, output, session)
templateServer(input, output, session)
dataServer(input, output, session)
firebrowseServer(input, output, session)
geNormalisationFilteringServer(input, output, session)
gtexDataServer(input, output, session)
inclusionLevelsServer(input, output, session)
inclusionLevelsFilterServer(input, output, session)
localDataServer(input, output, session)
recountDataServer(input, output, session)
groupsServer(input, output, session)
helpServer(input, output, session)

Arguments

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>input</td>
<td>Shiny input</td>
</tr>
<tr>
<td>output</td>
<td>Shiny output</td>
</tr>
<tr>
<td>session</td>
<td>Shiny session</td>
</tr>
</tbody>
</table>

Value

NULL (function is only used to modify the Shiny session’s state or internal variables)
appUI

User interface

Description
The user interface (UI) controls the layout and appearance of the app. All CSS modifications are in the file shiny/www/styles.css

Usage

appUI()
analyseUI(id, tab)
diffEventUI(id, ns, psi = TRUE)
correlationUI(id)
diffExpressionUI(id, tab)
diffExpressionEventUI(id)
diffExpressionTableUI(id)
diffSplicingUI(id, tab)
diffSplicingEventUI(id)
diffSplicingTableUI(id)
dimReductionUI(id, tab)
icaUI(id)
pcaUI(id)
infoUI(id)
survivalUI(id)
templateUI(id)
dataUI(id, tab)
firebrowseUI(id, panel)
geNormalisationFilteringUI(id, panel)
**areSplicingEvents**

gtexDataUI(id, panel)
inclusionLevelsUI(id, panel)
inclusionLevelsFilterUI(id, panel)
localDataUI(id, panel)
recountDataUI(id, panel)
groupsUI(id, tab)
helpUI(id, tab)

**Arguments**

- **id** Character: identifier
- **tab** Function to process HTML elements
- **panel** Function to enclose interface

**Value**

HTML elements

---

**areSplicingEvents** Check if string identifies splicing events

**Description**

Check if string identifies splicing events

**Usage**

areSplicingEvents(char, data = NULL, num = 6)

**Arguments**

- **char** Character vector
- **data** Object containing event data
- **num** Integer: number of elements to check

**Value**

TRUE if first elements are splicing events; FALSE, otherwise
articleUI  
*Return the interface to display an article*

**Description**  
Return the interface to display an article

**Usage**  
articleUI(article)

**Arguments**  
- **article**  
  PubMed article

**Value**  
HTML to render an article's interface

---

assignColours  
*Assign colours to groups*

**Description**  
Assign colours to groups

**Usage**  
assignColours(new, groups = NULL)

**Arguments**  
- **new**  
  Matrix: groups to which colours will be assigned
- **groups**  
  Matrix: groups to check which colours are already assigned

**Value**  
Groups with an added column to state the colour
assignValuePerSubject

---

assignValuePerSubject Assign average sample values to their corresponding subjects

Description

Assign average sample values to their corresponding subjects

Usage

assignValuePerSubject(
  data,
  match,
  clinical = NULL,
  patients = NULL,
  samples = NULL
)

Arguments

data One-row data frame/matrix or vector: values per sample for a single gene
match Matrix: match between samples and subjects
clinical Data frame or matrix: clinical dataset (only required if the subjects argument is not handed)
patients Character: subject identifiers (only required if the clinical argument is not handed)
samples Character: samples to use when assigning values per subject (if NULL, all samples will be used)

Value

Values per subject

See Also

Other functions to analyse survival: getAttributesTime(), labelBasedOnCutoff(), optimalSurvivalCutoff(), plotSurvivalCurves(), plotSurvivalPvaluesByCutoff(), processSurvTerms(), survdiffTerms(), survfit.survTerms(), testSurvival()

Examples

# Calculate PSI for skipped exon (SE) and mutually exclusive (MXE) events
annot <- readFile("ex_splicing_annotation.RDS")
junctionQuant <- readFile("ex_junctionQuant.RDS")

psi <- quantifySplicing(annot, junctionQuant, eventType=c("SE", "MXE"))

# Match between subjects and samples
match <- rep(paste("Subject", 1:3), 2)
names(match) <- colnames(psi)

# Assign PSI values to each subject based on the PSI of their samples
assignValuePerSubject(psi[3, ], match)

---

### basicStats

**Basic statistics performed on data**

**Description**

Variance and median of each group. If data has 2 groups, also calculates the delta variance and delta median.

**Usage**

```
basicStats(data, groups)
```

**Arguments**

- `data`: Numeric, data frame or matrix: gene expression data or alternative splicing event quantification values (sample names are based on their names or `colnames`)
- `groups`: List of sample names or vector containing the group name per data value (read Details); if NULL or a character vector of length 1, data values are considered from the same group

**Value**

HTML elements

### blendColours

**Blend two HEX colours**

**Description**

Blend two HEX colours

**Usage**

```
blendColours(colour1, colour2, colour1Percentage = 0.5)
```

**Arguments**

- `colour1`: Character: HEX colour
- `colour2`: Character: HEX colour
- `colour1Percentage`: Character: percentage of colour 1 mixed in blended colour
**Value**
Character representing an HEX colour

**Source**
Code modified from [https://stackoverflow.com/questions/5560248](https://stackoverflow.com/questions/5560248)

**Examples**

```r
cpsychomics:::blendColours("#3f83a3", "#f48000")
```

**browseDownloadFolderInput**

_Browse download folder input_

**Description**
Browse download folder input

**Usage**
`browseDownloadFolderInput(id)`

**Arguments**
- **id** Character: element identifier

**Value**
HTML element in character

**browserHistory**

_Enable history navigation_

**Description**
Navigate app according to the location given by the navigation bar. Code and logic adapted from [https://github.com/daattali/advanced-shiny/blob/master/navigate-history](https://github.com/daattali/advanced-shiny/blob/master/navigate-history)

**Usage**
`browserHistory(navId, input, session)`
calculateInclusionLevels

Calculate inclusion levels using alternative splicing event annotation and junction quantification for many samples

Arguments

eventType Character: type of the alternative event to calculate
junctionQuant Matrix: junction quantification with samples as columns and junctions as rows
annotation Data.frame: alternative splicing annotation related to event type
minReads Integer: minimum of total reads required to consider the quantification as valid

Value

Matrix with inclusion levels
calculateLoadingsContribution

*Calculate the contribution of PCA loadings to the selected principal components*

**Description**

Total contribution of a variable is calculated as per \( \frac{(C_x \times E_x) + (C_y \times E_y)}{E_x + E_y} \), where:

- \( C_x \) and \( C_y \) are the contributions of a variable to principal components \( x \) and \( y \)
- \( E_x \) and \( E_y \) are the eigenvalues of principal components \( x \) and \( y \)

**Usage**

```r
calculateLoadingsContribution(pca, pcX = 1, pcY = 2)
```

**Arguments**

- **pca**: prcomp object
- **pcX**: Character: name of the X axis of interest from the PCA
- **pcY**: Character: name of the Y axis of interest from the PCA

**Value**

Data frame containing the correlation between variables and selected principal components and the contribution of variables to the selected principal components (both individual and total contribution)

**Source**


**See Also**

Other functions to analyse principal components: `performPCA()`, `plotPCA()`, `plotPCAvariance()`

**Examples**

```r
pca <- performPCA(USArrests)
calculateLoadingsContribution(pca)
```
checkFileFormat  Checks the format of a file

Description
Checks the format of a file

Usage
checkFileFormat(format, head, filename = "")

Arguments
format  Environment: format of the file
head    Data.frame: head of the file to check
filename Character: name of the file

Details
The name of the file may also be required to be considered of a certain format.

Value
TRUE if the file matches the given format’s attributes

checkFirebrowse  Return an user interface depending on the status of the FireBrowse API

Description
If the API is working, it’ll be loaded. Else, a message will appear warning the user that the API is down and that will let check again if the API is back online.

Usage
checkFirebrowse(ns)

Arguments
ns  Namespace function

Value
HTML elements
checkGroupType

Check type of groups within file

Description
Check type of groups within file

Usage
checkGroupType(file)

Arguments
file Character: file path

Value
Type of group: Samples, ASevents or NULL

checkIntegrity

Compute the 32-byte MD5 hashes of one or more files and check with given md5 file

Description
Compute the 32-byte MD5 hashes of one or more files and check with given md5 file

Usage
checkIntegrity(filesToCheck, md5file)

Arguments
filesToCheck Character: files to calculate and match MD5 hashes
md5file Character: file containing correct MD5 hashes

Value
Logical vector showing TRUE for files with matching md5sums and FALSE for files with non-matching md5sums
### checkSurvivalInput

**Description**

Prepare survival terms in case of valid input

**Usage**

```r
checkSurvivalInput(session, input, coxph = FALSE)
```

**Arguments**

- `session`: Shiny session
- `input`: Shiny input
- `coxph`: Boolean: prepare data for Cox models?

**Value**

`NULL` (function is only used to modify the Shiny session’s state or internal variables)

---

### clusterICAset

**Description**

Server logic for clustering ICA data

**Usage**

```r
clusterICAset(session, input, output)
```

**Arguments**

- `session`: Shiny session
- `input`: Shiny input
- `output`: Shiny output

**Value**

`NULL` (function is only used to modify the Shiny session’s state or internal variables)
clusterSet

Server logic for clustering PCA data

Description

Server logic for clustering PCA data

Usage

clusterSet(session, input, output)

Arguments

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>session</td>
<td>Shiny session</td>
</tr>
<tr>
<td>input</td>
<td>Shiny input</td>
</tr>
<tr>
<td>output</td>
<td>Shiny output</td>
</tr>
</tbody>
</table>

Value

NULL (function is only used to modify the Shiny session’s state or internal variables)

colourInputMod

Modified colour input with 100% width

Description

Modified colour input with 100% width

Usage

colourInputMod(...)

Arguments

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>...</td>
<td>Arguments passed on to <code>colourpicker::colourInput</code></td>
</tr>
<tr>
<td>inputId</td>
<td>The input slot that will be used to access the value.</td>
</tr>
<tr>
<td>label</td>
<td>Display label for the control, or ‘NULL for no label.</td>
</tr>
<tr>
<td>value</td>
<td>Initial value (can be a colour name or HEX code)</td>
</tr>
<tr>
<td>showColour</td>
<td>Whether to show the chosen colour as text inside the input, as the background colour of the input, or both (default).</td>
</tr>
<tr>
<td>palette</td>
<td>The type of colour palette to allow the user to select colours from. square (default) shows a square colour palette that allows the user to choose any colour, while limited only gives the user a predefined list of colours to choose from.</td>
</tr>
</tbody>
</table>
allowedCols  A list of colours that the user can choose from. Only applicable when palette = "limited". The limited palette uses a default list of 40 colours if allowedCols is not defined. If the colour specified in value is not in the list, the default colour will revert to black.

allowTransparent If TRUE, enables a slider to choose an alpha (transparency) value for the colour. When a colour with opacity is chosen, the return value is an 8-digit HEX code.

returnName If TRUE, then return the name of an R colour instead of a HEX value when possible.

closeOnClick If TRUE, then the colour selection panel will close immediately after selecting a colour.

width The width of the input, e.g. "400px" or "100%"

Value

HTML elements

colSums,EList-method  Sum columns using an EList-class object

Description

Sum columns using an EList-class object

Usage

## S4 method for signature 'EList'
colSums(x, na.rm = FALSE, dims = 1)

Arguments

  x         an array of two or more dimensions, containing numeric, complex, integer or logical values, or a numeric data frame. For .colSums() etc, a numeric, integer or logical matrix (or vector of length m * n).

  na.rm     logical. Should missing values (including NaN) be omitted from the calculations?

  dims      integer: Which dimensions are regarded as ‘rows’ or ‘columns’ to sum over. For row*, the sum or mean is over dimensions dims+1, ...; for col* it is over dimensions 1:dims.

Value

Numeric vector with the sum of the columns
convertGeneIdentifiers

Convert gene identifiers

**Description**

Convert gene identifiers

**Usage**

```r
convertGeneIdentifiers(
  annotation,
  genes,
  key = "ENSEMBL",
  target = "SYMBOL",
  ignoreDuplicatedTargets = TRUE
)
```

**Arguments**

- `annotation`: OrgDb with genome wide annotation for an organism or character with species name to query OrgDb, e.g. "Homo sapiens"
- `genes`: Character: genes to be converted
- `key`: Character: type of identifier used, e.g. ENSEMBL; read ?AnnotationDbi::columns
- `target`: Character: type of identifier to convert to; read ?AnnotationDbi::columns
- `ignoreDuplicatedTargets`: Boolean: if TRUE, identifiers that share targets with other identifiers will not be converted

**Value**

Character vector of the respective targets of gene identifiers. The previous identifiers remain other identifiers have the same target (in case `ignoreDuplicatedTargets = TRUE`) or if no target was found.

**See Also**

Other functions for gene expression pre-processing: `filterGeneExpr()`, `normaliseGeneExpression()`, `plotGeneExprPerSample()`, `plotLibrarySize()`, `plotRowStats()`

**Examples**

```r
# Use species name to automatically look for a OrgDb database
sp <- "Homo sapiens"
genes <- c("ENSG00000012048", "ENSG00000083093", "ENSG00000141510", "ENSG00000051180")
convertGeneIdentifiers(sp, genes)
```
convertGeneIdentifiers(sp, genes, key="ENSEMBL", target="UNIPROT")

# Alternatively, set the annotation database directly
ah <- AnnotationHub::AnnotationHub()
sp <- AnnotationHub::query(ah, c("OrgDb", "Homo sapiens"))[1]
columns(sp) # these attributes can be used to change the attributes

convertGeneIdentifiers(sp, genes)
convertGeneIdentifiers(sp, genes, key="ENSEMBL", target="UNIPROT")

correlateGEandAS

Correlate gene expression data against alternative splicing quantification

Description
Test for association between paired samples’ gene expression (for any genes of interest) and alternative splicing quantification.

Usage

```r
correlateGEandAS(geneExpr, psi, gene, ASevents = NULL, ...)
```

Arguments

- `geneExpr` Matrix or data frame: gene expression data
- `psi` Matrix or data frame: alternative splicing quantification data
- `gene` Character: gene symbol for genes of interest
- `ASevents` Character: alternative splicing events to correlate with gene expression of a gene (if NULL, the events will be automatically retrieved from the given gene)
- `...` Extra parameters passed to `cor.test`

Value

List of correlations where each element contains:

- `eventID` Alternative splicing event identifier
- `cor` Correlation between gene expression and alternative splicing quantification of one alternative splicing event
- `geneExpr` Gene expression for the selected gene
- `psi` Alternative splicing quantification for the alternative splicing event

See Also

Other functions to correlate gene expression and alternative splicing: \[ GEandAScorrelation() \]
createDataTab

**Examples**

```r
annot <- readFile("ex_splicing_annotation.RDS")
junctionQuant <- readFile("ex_junctionQuant.RDS")
psi <- quantifySplicing(annot, junctionQuant, eventType=c("SE", "MXE"))

geneExpr <- readFile("ex_gene_expression.RDS")
correlateGEandAS(geneExpr, psi, "ALDOA")
```

---

**createDataTab**

*Render a specific data tab (including data table and related interface)*

---

**Description**

Render a specific data tab (including data table and related interface)

**Usage**

```r
createDataTab(index, data, name, session, input, output)
```

**Arguments**

- `index`: Integer: index of the data to load
- `data`: Data frame: data with everything to load
- `name`: Character: name of the dataset
- `session`: Shiny session
- `input`: Shiny session input
- `output`: Shiny session output

**Value**

`NULL` (function is only used to modify the Shiny session’s state or internal variables)

---

**createDensitySparklines**

*Create density sparklines for inclusion levels*

---

**Description**

Create density sparklines for inclusion levels
Usage

createDensitySparklines(
    data,
    events,
    areSplicingEvents = TRUE,
    groups = NULL,
    geneExpr = NULL,
    inputID = "sparklineInput"
)

Arguments

data Character: HTML-formatted data series of interest

-events Character: event identifiers

-areSplicingEvents Boolean: are these splicing events (TRUE) or gene expression (FALSE)?

groups Character: name of the groups used for differential analyses

geneExpr Character: name of the gene expression dataset

-inputID Character: identifier of input to get attributes of clicked event (Shiny only)

Value

HTML element with sparkline data

createEventPlotting Create plot for events

Description

Create plot for events

Usage

createEventPlotting(
    df,
    x,
    y,
    params,
    highlightX,
    highlightY,
    highlightParams,
    selected,
    selectedParams,
    labelled,
    labelledParams,
    xlim,
    ylim
)
createGroup

Arguments

- **df**: Data frame
- **x**: Character: name of the variable used for the X axis
- **y**: Character: name of the variable used for the Y axis
- **params**: List of parameters to pass to `geom_point()` related to most points
- **highlightX**: Integer: region of points in X axis to highlight
- **highlightY**: Integer: region of points in Y axis to highlight
- **highlightParams**: List of parameters to pass to `geom_point()` related to highlighted points
- **selected**: Integer: index of rows/points to be coloured
- **selectedParams**: List of parameters to pass to `geom_point()` related to selected points
- **labelled**: Integer: index of rows/points to be labelled
- **labelledParams**: List of parameters to pass to `ggrepel::geom_label_repel` related to labelled points
- **xlim**: Numeric: limits of X axis
- **ylim**: Numeric: limits of Y axis

Value

List containing HTML elements and highlighted points

---

createGroup **Prepare to create group according to specific details**

Description

Prepare to create group according to specific details

Usage

```r
createGroup(
    session,
    input,
    output,
    id,
    type,
    selected = NULL,
    expr = NULL,
    groupNames = NULL
)
```
createGroupByAttribute

Split elements into groups based on a given column of a dataset

Description
Elements are identified by their respective row name.

Usage
createGroupByAttribute(col, dataset)

Arguments
- col Character: column name
- dataset Matrix or data frame: dataset

Value
Named list with each unique value from a given column and respective elements

See Also
Other functions for data grouping: getGeneList(), getSampleFromSubject(), getSubjectFromSample(), groupPerElem(), plotGroupIndependence(), testGroupIndependence()

Examples
```r
df <- data.frame(gender=c("male", "female"),
                 stage=paste("stage", c(1, 3, 1, 4, 2, 3, 2, 2)))
rownames(df) <- paste0("subject-", LETTERS[1:8])
createGroupByAttribute(col="stage", dataset=df)
```
createGroupId

Create groups based on given row indexes or identifiers

Description
Create groups based on given row indexes or identifiers

Usage
createGroupId(session, rows, identifiers)

Arguments
- session: Shiny session
- rows: Character: comma-separated row indexes or identifiers
- identifiers: Character: available identifiers

Value
Character: values based on given row indexes or identifiers

createGroupFromInput
Set new groups according to the user input

Description
Set new groups according to the user input

Usage
createGroupFromInput(
  session,
  input,
  output,
  dataset,
  id,
  type,
  selected = NULL,
  expr = NULL,
  groupNames = NULL
)
createJunctionsTemplate

Creates a template of alternative splicing junctions

Arguments

- `nrow`: Integer: row number
- `program`: Character: program used to get the junctions
- `event.type`: Character: event type
- `chromosome`: Character: chromosome
- `strand`: Character: positive-sense (+) or negative-sense (−) strand
- `id`: Character: event identifiers
Value

A data frame with the junctions coordinate names pre-filled with NA

Examples

```r
psichomics:::createJunctionsTemplate(nrow = 8)
```

createOptimalSurvData  Create survival data based on a PSI cutoff

Description

Data is presented in the table for statistical analyses

Usage

```r
createOptimalSurvData(
  eventPSI,
  clinical,
  censoring,
  event,
  timeStart,
  timeStop,
  match,
  patients,
  samples
)
```

Arguments

- **eventPSI**: Numeric: alternative splicing quantification for multiple samples relative to a single splicing event
- **clinical**: Data frame: clinical data
- **censoring**: Character: censor using left, right, interval or interval2
- **event**: Character: name of column containing time of the event of interest
- **timeStart**: Character: name of column containing starting time of the interval or follow up time
- **timeStop**: Character: name of column containing ending time of the interval (only relevant for interval censoring)
- **match**: Matrix: match between samples and subjects
- **patients**: Character: subject identifiers (only required if the clinical argument is not handed)
- **samples**: Character: samples to use when assigning values per subject (if NULL, all samples will be used)
createSparklines

Create sparkline charts to be used in a data table

Description

Create sparkline charts to be used in a data table

Usage

createSparklines(
  hc,
  data,
  events,
  groups = NULL,
  geneExpr = NULL,
  inputID = "sparklineInput",
  ...
)

Arguments

hc       highchart object
data      Character: HTML-formatted data series of interest
events   Character: event identifiers
groups   Character: name of the groups used for differential analyses
geneExpr Character: name of the gene expression dataset
inputID  Character: identifier of input to get attributes of clicked event (Shiny only)
id       Character: Shiny input identifier

Value

HTML element with sparkline data
customRowMeans

Calculate statistics for each row or column of a matrix

Description

Calculate statistics for each row or column of a matrix

Usage

customRowMeans(mat, na.rm = FALSE, fast = FALSE)
customRowMedians(mat, na.rm = FALSE, fast = FALSE)
customRowVars(mat, na.rm = FALSE, fast = FALSE)
customRowMins(mat, na.rm = FALSE, fast = FALSE)
customRowMaxs(mat, na.rm = FALSE, fast = FALSE)
customRowRanges(mat, na.rm = FALSE, fast = FALSE)
customColMedians(mat, na.rm = FALSE, fast = FALSE)

Arguments

mat Matrix
na.rm Boolean: remove missing values (NA)?
fast Boolean: use Rfast functions? They may return different results from R built-in functions

Value

Vector of selected statistic

Examples

df <- rbind("Gene 1"=c(3, 5, 7), "Gene 2"=c(8, 2, 4), "Gene 3"=c(9:11))
psychomics:::customRowMeans(df)
psychomics:::customRowVars(df, fast=TRUE)
diagramSplicingEvent  Prepare SVG diagram of alternative splicing events

Description

Prepare SVG diagram of alternative splicing events

Usage

diagramSplicingEvent(
    parsed,
    type,
    class = "pull-right",
    style = NULL,
    showText = TRUE,
    showPath = TRUE,
    showAlternative1 = TRUE,
    showAlternative2 = TRUE,
    constitutiveWidth = NULL,
    alternativeWidth = NULL,
    intronWidth = NULL,
    constitutiveFill = "lightgray",
    constitutiveStroke = "darkgray",
    alternative1Fill = "#ffbb15",
    alternative1Stroke = "#faa000",
    alternative2Fill = "#caa06c",
    alternative2Stroke = "#9d7039"
)

Arguments

parsed  Alternative splicing event

Type  Character: alternative splicing event type

Class  Character: class of SVG parent tag

Style  Character: style of SVG parent tag

Show Text  Boolean: display coordinates and length (if available)

Show Path  Boolean: display alternative splicing junctions

Show Alternative1  Boolean: show alternative exon 1 and respective splicing junctions and text?

Show Alternative2  Boolean: show alternative exon 2 and respective splicing junctions and text?

(only related with mutually exclusive exons)

Constitutive Width  Numeric: width of constitutive exon(s)
alternativeWidth Numeric: width of alternative exon(s)
intronWidth Numeric: width of intron’s representation
constitutiveFill Character: fill colour of constitutive exons
constitutiveStroke Character: stroke colour of constitutive exons
alternative1Fill Character: fill colour of alternative exon 1
alternative1Stroke Character: stroke colour of alternative exon 1
alternative2Fill Character: fill colour of alternative exon 2
alternative2Stroke Character: stroke colour of alternative exon 2

Value

Diagrams per alternative splicing event in SVG

---

diffAnalyses Perform statistical analyses

Description

Perform statistical analyses

Usage

diffAnalyses(
  data,
  groups = NULL,
  analyses = c("wilcoxRankSum", "ttest", "kruskal", "levene", "fligner"),
  pvalueAdjust = "BH",
  geneExpr = NULL,
  inputID = "sparklineInput"
)

Arguments

data Data frame or matrix: gene expression or alternative splicing quantification
groups Named list of characters (containing elements belonging to each group) or character vector (containing the group of each individual sample): if NULL, sample types are used instead when available, e.g. normal, tumour and metastasis
analyses Character: statistical tests to perform (see Details)
pvalueAdjust Character: method used to adjust p-values (see Details)
Details

The following statistical analyses may be performed simultaneously via the analysis argument:

- ttest - Unpaired t-test (2 groups)
- wilcoxRankSum - Wilcoxon Rank Sum test (2 groups)
- kruskal - Kruskal test (2 or more groups)
- levene - Levene’s test (2 or more groups)
- fligner - Fligner-Killeen test (2 or more groups)
- density - Sample distribution per group (only usable through the visual interface)

The following p-value adjustment methods are supported via the pvalueAdjust argument:

- none: do not adjust p-values
- BH: Benjamini-Hochberg’s method (false discovery rate)
- BY: Benjamini-Yekutieli’s method (false discovery rate)
- bonferroni: Bonferroni correction (family-wise error rate)
- holm: Holm’s method (family-wise error rate)
- hochberg: Hochberg’s method (family-wise error rate)
- hommel: Hommel’s method (family-wise error rate)

Value

Table of statistical analyses

See Also

Other functions to perform and plot differential analyses: `plotDistribution()`

Examples

```r
# Calculate PSI for skipped exon (SE) and mutually exclusive (MXE) events
eventType <- c("SE", "MXE")
annot <- readFile("ex_splicing_annotation.RDS")
junctionQuant <- readFile("ex_junctionQuant.RDS")

psi <- quantifySplicing(annot, junctionQuant, eventType=c("SE", "MXE"))

group <- c(rep("Normal", 3), rep("Tumour", 3))
diffAnalyses(psi, group)
```
**diffExpressionSet**  
*Set of functions to perform differential analyses*

**Description**
Set of functions to perform differential analyses

**Usage**
diffExpressionSet(session, input, output)

**Arguments**
- **session**: Shiny session
- **input**: Shiny input
- **output**: Shiny output

**Value**
NULL (function is only used to modify the Shiny session’s state or internal variables)

---

**diffSplicingSet**  
*Set of functions to perform differential analyses*

**Description**
Set of functions to perform differential analyses

**Usage**
diffSplicingSet(session, input, output)

**Arguments**
- **session**: Shiny session
- **input**: Shiny input
- **output**: Shiny output

**Value**
NULL (function is only used to modify the Shiny session’s state or internal variables)
**discardLowCoveragePSIvalues**

Remove alternative splicing quantification values based on coverage

**Description**

Remove alternative splicing quantification values based on coverage

**Usage**

```r
discardLowCoveragePSIvalues(
  psi,
  minReads = 10,
  vasttoolsScoresToDiscard = c("VLOW", "N")
)
```

**Arguments**

- **psi**
  - Data frame or matrix: alternative splicing quantification

- **minReads**
  - Currently this argument does nothing

- **vasttoolsScoresToDiscard**
  - Character: if you are using inclusion levels from VAST-TOOLS, filter the data based on quality scores for read coverage, e.g. use vasttoolsScoresToDiscard = c("SOK", "OK", "LOW") to only keep events with good read coverage (by default, events are not filtered based on quality scores); read [https://github.com/vastgroup/vast-tools](https://github.com/vastgroup/vast-tools) for more information on VAST-TOOLS quality scores

---

**disableTab**

Enable or disable a tab from the navbar

**Description**

Enable or disable a tab from the navbar

**Usage**

```r
disableTab(tab)

enableTab(tab)
```

**Arguments**

- **tab**
  - Character: tab

**Value**

NULL (function is only used to modify the Shiny session’s state or internal variables)
**discardOutsideSamplesFromGroups**

*Discard grouped samples if not within a sample vector*

**Description**

Discard grouped samples if not within a sample vector

**Usage**

discardOutsideSamplesFromGroups(groups, samples, clean = FALSE)

**Arguments**

- **groups**: Named list of samples
- **samples**: Character: vector with all available samples
- **clean**: Boolean: clean results?

**Value**

Groups without samples not found in samples

**display**

*Display characters in the command-line*

**Description**

Display characters in the command-line

**Usage**

display(char, timeStr = "Time difference of")

**Arguments**

- **char**: Character: message
- **timeStr**: Character: message when a difftime object is passed to the char argument

**Value**

NULL (display message in command-line)
**downloadFiles**  
*Download files to a given directory*

**Description**
Download files to a given directory

**Usage**
```
downloadFiles(url, folder, download = download.file, ...)```

**Arguments**
- `url` Character: download links
- `folder` Character: directory to store the downloaded archives
- `download` Function to use to download files
- `...` Extra parameters passed to the download function

**Value**
Invisible TRUE if every file was successfully downloaded

**Examples**
```
## Not run:
url <- paste0("https://unsplash.it/400/300/?image=", 570:572)
psichomics:::downloadFiles(url, "/Pictures")

# Download without printing to console
psichomics:::downloadFiles(url, "/Pictures", quiet = TRUE)

## End(Not run)
```

**ensemblToUniprot**  
*Convert from Ensembl to UniProt identifier*

**Description**
Convert from Ensembl to UniProt identifier

**Usage**
```
ensemblToUniprot(protein)```
escape

Arguments

protein Character: Ensembl identifier

Value

UniProt protein identifier

See Also

Other functions to retrieve external information: `plotProtein()`, `plotTranscripts()`, `queryEnsemblByGene()`

Examples

gene <- "ENSG00000173262"
ensemblToUniprot(gene)

protein <- "ENSP00000445929"
ensemblToUniprot(protein)

---

escape Escape symbols for use in regular expressions

Description

Escape symbols for use in regular expressions

Usage

escape(...)

Arguments

... Characters to be pasted with no space

Value

Escaped string
eventPlotOptions  
*Options for event plotting*

**Description**
Options for event plotting

**Usage**
eventPlotOptions(session, df, xAxis, yAxis, labelSortBy)

**Arguments**
- `session`: Shiny session
- `df`: Data frame
- `xAxis`: Character: currently selected variable for the X axis
- `yAxis`: Character: currently selected variable for the Y axis
- `labelSortBy`: Character: currently selected variable for the selectize element to sort differentially analysis

**Value**
HTML elements

---

exportGroupsToFile  *Export groups to a file*

**Description**
Export groups to a file

**Usage**
exportGroupsToFile(groups, file, match = NULL)

**Arguments**
- `groups`: Matrix with groups
- `file`: Character: path to output file
- `match`: Match between elements within groups

**Value**
Saves groups to file
export_highcharts

Add an exporting feature to a highcharts object

Description
Add an exporting feature to a highcharts object

Usage
export_highcharts(hc, fill = "transparent", text = "Export")

Arguments
hc
A highcharts object
fill
Character: colour fill
text
Character: button text

Value
A highcharts object with an export button

fileBrowser
Interactive folder selection using a native dialogue

Description
Interactive folder selection using a native dialogue

Usage
fileBrowser(
  default = NULL,
  caption = NULL,
  multiple = FALSE,
  directory = FALSE
)

Arguments
default
Character: path to initial folder
caption
Character: caption on the selection dialogue
multiple
Boolean: allow to select multiple files?
directory
Boolean: allow to select directories instead of files?
Details

Platform-dependent implementation:

- **Windows**: calls the `utils::choose.files` R function.
- **macOS**: uses AppleScript to display a folder selection dialogue. If `default = NA`, folder selection falls back to the default behaviour of the `choose folder` AppleScript command. Otherwise, paths are expanded with `path.expand()`.
- **Linux**: calls the `zenity` system command.

Value

A length one character vector, character NA if 'Cancel' was selected

Source

[https://github.com/wleepang/shiny-directory-input](https://github.com/wleepang/shiny-directory-input)
**filterGeneExpr**

**Arguments**

- **id**: Character: input identifier
- **label**: Character: input label (if NULL, no labels are displayed)
- **infoContent**: Character: text to show as content of information
- **clearable**: Boolean: allow to clear selected file or directory?
- **value**: Character: initial value (paths are expanded via `path.expand()`)
- **placeholder**: Character: placeholder when no file or folder is selected
- **info**: Boolean: add information icon for tooltips and pop-overs
- **infoFUN**: Function to use to provide information (e.g. `shinyBS::bsTooltip` and `shinyBS::bsPopover`)
- **infoPlacement**: Character: placement of the information (top, bottom, right or left)
- **infoTitle**: Character: text to show as title of information

**Details**

To show the dialog for file input, the `prepareFileBrowser()` function needs to be included in the server logic.

This widget relies on `fileBrowser()` to present an interactive dialogue to users for selecting a directory on the local filesystem. Therefore, this widget is intended for shiny apps that are run locally - i.e. on the same system that files/directories are to be accessed - and not from hosted applications (e.g. from [https://www.shinyapps.io](https://www.shinyapps.io)).

**Value**

HTML elements for a file browser input

**Source**

[https://github.com/wleepang/shiny-directory-input](https://github.com/wleepang/shiny-directory-input)

**See Also**

`updateFileBrowserInput()` and `prepareFileBrowser()`

---

**filterGeneExpr**

*Filter genes based on their expression*

**Description**

Uses `filterByExpr` to determine genes with sufficiently large counts to retain for statistical analysis.
Usage

filterGeneExpr(
    geneExpr,  # Gene expression data frame or matrix
    minMean = 0,  # Minimum of read count mean per gene
    maxMean = Inf,  # Maximum of read count mean per gene
    minVar = 0,  # Minimum of read count variance per gene
    maxVar = Inf,  # Maximum of read count variance per gene
    minCounts = 10,  # Minimum number of read counts per gene
    minTotalCounts = 15
)

Arguments

geneExpr    Data frame or matrix: gene expression
minMean     Numeric: minimum of read count mean per gene
maxMean     Numeric: maximum of read count mean per gene
minVar      Numeric: minimum of read count variance per gene
maxVar      Numeric: maximum of read count variance per gene
minCounts   Numeric: minimum number of read counts per gene for a worthwhile number
             of samples (check filterByExpr for more information)
minTotalCounts Numeric: minimum total number of read counts per gene

Value

Boolean vector indicating which genes have sufficiently large counts

See Also

Other functions for gene expression pre-processing: convertGeneIdentifiers(), normaliseGeneExpression(), plotGeneExprPerSample(), plotLibrarySize(), plotRowStats()

Examples

geneExpr <- readFileSync("ex_gene_expression.RDS")

# Add some genes with low expression
geneExpr <- rbind(geneExpr,
    lowReadGene1=c(rep(4:5, 10)),
    lowReadGene2=c(rep(5:1, 10)),
    lowReadGene3=c(rep(10:1, 10)),
    lowReadGene4=c(rep(7:8, 10)))

# Filter out genes with low reads across samples
geneExpr[filterGeneExpr(geneExpr, )]
filterGroups

Filter groups with less data points than the threshold

Description

Groups containing a number of non-missing values less than the threshold are discarded.

Usage

filterGroups(vector, group, threshold = 1)

Arguments

vector Character: elements
group Character: respective group of each elements
threshold Integer: number of valid non-missing values by group

Value

Named vector with filtered elements from valid groups. The group of the respective element is given as an attribute.

Examples

# Removes groups with less than two elements
vec <- 1:6
names(vec) <- paste("sample", letters[1:6])
filterGroups(vec, c("A", "B", "B", "C", "D", "D"), threshold=2)

filterPSI

Filter alternative splicing quantification

Description

Filter alternative splicing quantification

Usage

filterPSI(
  psi,
  eventType = NULL,
  eventSubtype = NULL,
  minPSI = -Inf,
  maxPSI = Inf,
  minMedian = -Inf,
Arguments

psi Data frame or matrix: alternative splicing quantification
eventType Character: filter data based on event type; check all event types available by using getSplicingEventTypes(psi), where psi is the alternative splicing quantification data; if eventType = NULL, events are not filtered by event type
eventSubtype Character: filter data based on event subtype; check all event subtypes available in your data by using unique(getSplicingEventData(psi)$subtype), where psi is the alternative splicing quantification data; if eventSubtype = NULL, events are not filtered by event subtype
minPSI Numeric: minimum PSI value
maxPSI Numeric: maximum PSI value
minMedian Numeric: minimum median PSI per splicing event
maxMedian Numeric: maximum median PSI per splicing event
minLogVar Numeric: minimum log10(PSI variance) per splicing event
maxLogVar Numeric: maximum log10(PSI variance) per splicing event
minRange Numeric: minimum PSI range across samples per splicing event
maxRange Numeric: maximum PSI range across samples per splicing event

Value

Boolean vector indicating which splicing events pass the thresholds

See Also

Other functions for PSI quantification: getSplicingEventTypes(), listSplicingAnnotations(), loadAnnotation(), plotRowStats(), quantifySplicing()

Examples

# Calculate PSI for skipped exon (SE) and mutually exclusive (MXE) events
annot <- readFile("ex_splicing_annotation.RDS")
junctionQuant <- readFile("ex_junctionQuant.RDS")

psi <- quantifySplicing(annot, junctionQuant, eventType=c("SE", "MXE"))
# Filter PSI
psi[filterPSI(psi, minMedian=0.05, maxMedian=0.95, minRange=0.15), ]
findASeventsFromGene  \textit{Find splicing events based on given genes}\normalsize

\textbf{Description}

Find splicing events based on given genes

\textbf{Usage}

\texttt{findASeventsFromGene(\texttt{psi, gene})}

\textbf{Arguments}

\begin{itemize}
  \item \texttt{psi} \hspace{1cm} Data frame or matrix: alternative splicing quantification
  \item \texttt{gene} \hspace{1cm} Character: gene
\end{itemize}

\textbf{Value}

Character vector containing alternative splicing events

\texttt{findEventData} \hspace{0.5cm} \textit{Look for event data in input}\normalsize

\textbf{Description}

Check if event data can be found in \texttt{data} and then \texttt{event}. Event data has to be an object of class \texttt{eventData}

\textbf{Usage}

\texttt{findEventData(event = \texttt{NULL}, data = \texttt{NULL})}

\textbf{Arguments}

\begin{itemize}
  \item \texttt{event} \hspace{1cm} Character: AS event that may contain event data in its attribute \texttt{eventData}
  \item \texttt{data} \hspace{1cm} Data frame or matrix: either event data or data containing event data in its attributes \texttt{rowData} or \texttt{eventData}
\end{itemize}

\textbf{Value}

Event data (or \texttt{NULL} if not found)
geneExprFileInput  
*File input for molecular data*

**Description**

File input for molecular data

**Usage**

```r
geneExprFileInput(id, clearable = FALSE)
ASquantFileInput(id, clearable = FALSE)
junctionQuantFileInput(id, clearable = FALSE)
sampleInfoFileInput(id, clearable = FALSE)
subjectInfoFileInput(id, clearable = FALSE)
```

**Arguments**

- `id` Character: identifier for gene expression input
- `clearable` Boolean: allow to clear selected file or directory?

**Value**

HTML elements

---

geneExprSurvSet  
*Logic set to perform survival analysis based on gene expression cutoffs*

**Description**

Logic set to perform survival analysis based on gene expression cutoffs

**Usage**

```r
geneExprSurvSet(session, input, output)
```

**Arguments**

- `session` Shiny session
- `input` Shiny input
- `output` Shiny output
**geNormalisationFilteringInterface**

*Interface to normalise and filter gene expression*

**Value**

NULL (function is only used to modify the Shiny session’s state or internal variables)

**getAttributesTime**

*Get time values for given columns in a clinical dataset*

**Description**

Get time values for given columns in a clinical dataset

**Usage**

```
getAttributesTime(
    clinical,
    event,
    timeStart,
    timeStop = NULL,
    followup = "days_to_last_followup"
)
```
getClinicalDataForSurvival

Arguments

clinical Data frame: clinical data
event Character: name of column containing time of the event of interest
timeStart Character: name of column containing starting time of the interval or follow up time
timeStop Character: name of column containing ending time of the interval (only relevant for interval censoring)
followup Character: name of column containing follow up time

Value

Data frame containing the time for the given columns

See Also

Other functions to analyse survival: assignValuePerSubject(), labelBasedOnCutoff(), optimalSurvivalCutoff(), plotSurvivalCurves(), plotSurvivalPvaluesByCutoff(), processSurvTerms(), survdiffTerms(), survfit.survTerms(), testSurvival()

Examples

df <- data.frame(followup=c(200, 300, 400), death=c(NA, 300, NA))
rownames(df) <- paste("subject", 1:3)
getAttributesTime(df, event="death", timeStart="death", followup="followup")

---

getClinicalDataForSurvival

Retrieve clinical data based on attributes required for survival analysis

Usage

getClinicalDataForSurvival(..., formulaStr = NULL)

Arguments

... Character: names of columns to retrieve
formulaStr Character: right-side of the formula for survival analysis

Value

Filtered clinical data
getClinicalMatchFrom

getClinicalMatchFrom  Get or set clinical matches from a given data type

Description
Get or set clinical matches from a given data type

Usage
getClinicalMatchFrom(dataset, category = getCategory())
setClinicalMatchFrom(dataset, matches, category = getCategory())

Arguments
- dataset: Character: data set name
- category: Character: data category
- matches: Vector of integers: clinical matches of dataset

Value
Getters return globally accessible data, whereas setters return NULL as they are only used to modify the Shiny session’s state

Note
Needs to be called inside a reactive function

See Also
Other functions to get and set global variables: getDifferentialExpression().getDifferentialSplicing(), getGlobal(), getGroups(), getHighlightedPoints(), getSelectedDataPanel()

dataGet

getData  Get global data

Description
Get global data

Usage
dataGet()

Value
Variable containing all data of interest
**getDifferentialExpression**

Get or set differential expression’ elements for a data category

**Description**

Get or set differential expression’ elements for a data category

**Usage**

getDifferentialExpression(category = getCategory())

setDifferentialExpression(differential, category = getCategory())

getDifferentialExpressionFiltered(category = getCategory())

setDifferentialExpressionFiltered(differential, category = getCategory())

**getDataRows**

Get rows of a data frame between two row indexes

**Description**

Get rows of a data frame between two row indexes

**Usage**

getDataRows(i, data, firstRow, lastRow)

**Arguments**

- i: Integer: current iteration
- data: Data.frame: contains the data of interest
- firstRow: Vector of integers: First row index of interest; value must be less than the respective last row index and less than the number of rows in the data frame
- lastRow: Vector of integers: Last row index of interest; value must be higher than the respective first row index and less than the number of rows in the data frame

**Details**

For a given iteration i, returns data from firstRow[i] to lastRow[i]

**Value**

Data frame subset from two row indexes (returns NA if the first row index is NA)
getDifferentialSplicing

getDifferentialExpressionSurvival(category = getCategory())
setDifferentialExpressionSurvival(survival, category = getCategory())
getDifferentialExpressionResetPaging(category = getCategory())
setDifferentialExpressionResetPaging(reset, category = getCategory())
getDifferentialExpressionColumns(category = getCategory())
setDifferentialExpressionColumns(columns, category = getCategory())

Arguments

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>category</td>
<td>Character: data category</td>
</tr>
<tr>
<td>differential</td>
<td>Data frame or matrix: differential analyses table</td>
</tr>
<tr>
<td>survival</td>
<td>Data frame or matrix: differential analyses’ survival data</td>
</tr>
<tr>
<td>reset</td>
<td>Character: reset paging of differential analyses table?</td>
</tr>
<tr>
<td>columns</td>
<td>Character: differential analyses’ column names</td>
</tr>
</tbody>
</table>

Value

Getters return globally accessible data, whereas setters return NULL as they are only used to modify the Shiny session’s state.

Note

Needs to be called inside a reactive function.

See Also

Other functions to get and set global variables: getClinicalMatchFrom(), getDifferentialSplicing(), getGlobal(), getGroups(), getHighlightedPoints(), getSelectedDataPanel()
Usage

getDifferentialSplicing(category = getCategory())
setDifferentialSplicing(differential, category = getCategory())
getDifferentialSplicingFiltered(category = getCategory())
setDifferentialSplicingFiltered(differential, category = getCategory())
getDifferentialSplicingSurvival(category = getCategory())
setDifferentialSplicingSurvival(survival, category = getCategory())
getDifferentialSplicingResetPaging(category = getCategory())
setDifferentialSplicingResetPaging(reset, category = getCategory())
getDifferentialSplicingColumns(category = getCategory())
setDifferentialSplicingColumns(columns, category = getCategory())

Arguments

category Character: data category
differential Data frame or matrix: differential analyses table
survival Data frame or matrix: differential analyses’ survival data
reset Character: reset paging of differential analyses table?
columns Character: differential analyses’ column names

Value

Getters return globally accessible data, whereas setters return NULL as they are only used to modify the Shiny session’s state

Note

Needs to be called inside a reactive function

See Also

Other functions to get and set global variables: getClinicalMatchFrom(), getDifferentialExpression(), getGlobal(), getGroups(), getHighlightedPoints(), getSelectedDataPanel()
**getDownloadsFolder**

*Get the path to the Downloads folder*

**Description**

Get the path to the Downloads folder

**Usage**

```r
getDownloadsFolder()
```

**Value**

Path to Downloads folder

**See Also**

Other functions associated with TCGA data retrieval: `getTCGAdataTypes()`, `isFirebrowseUp()`, `loadTCGAdata()`, `parseTCGAsampleTypes()`

Other functions associated with GTEx data retrieval: `getGtexDataTypes()`, `getGtexTissues()`, `loadGtexData()`

Other functions associated with SRA data retrieval: `loadSRAproject()`

**Examples**

```r
getDownloadsFolder()
```

---

**getFirebrowseDateFormat**

*Returns the date format used by the FireBrowse API*

**Description**

Returns the date format used by the FireBrowse API

**Usage**

```r
getFirebrowseDateFormat()
```

**Value**

Named list with date formats from FireBrowse API
Examples

```r
format <- psichomics:::getFirebrowseDateFormat()
# date format to use in a query to FireBrowse API
format$query
# date format to parse a date in a response from FireBrowse API
format$response
```

getGeneList  
Get curated, literature-based gene lists

Description

Available gene lists:

- **Sebestyen et al., 2016**: 1350 genes encoding RNA-binding proteins, 167 of which are splicing factors

Usage

```r
getGeneList(genes = NULL)
```

Arguments

- **genes**: Vector of characters: intersect lists with given genes (lists with no matching genes will not be returned)

Value

List of genes

See Also

Other functions for data grouping: `createGroupByAttribute()`, `getSampleFromSubject()`, `getSubjectFromSample()`, `groupPerElem()`, `plotGroupIndependence()`, `testGroupIndependence()`

Examples

```r
getGeneList()
```
getGlobal

Get or set globally accessible elements

Description

Get or set globally accessible elements

Usage

getGlobal(category = getCategory(), ..., sep = "-_")

setGlobal(category = getCategory(), ..., value, sep = "-_")

setData(data)

setDataTable(name, value, category = getCategory())

getAutoNavigation()

setAutoNavigation(auto)

getCores()

setCores(integer)

getSignificant()

setSignificant(integer)

getPrecision()

setPrecision(integer)

getASevents()

getAnnotationHub()

setAnnotationHub(ah)

getASevent()

setASevent(event, data = NULL)

getEvent()

setEvent(event, data = NULL)
getGenes()
getCategories()
getCategory()
setCategory(category)
getCategoryData()
getActiveDataset()
setActiveDataset(dataset)
getClinicalData(attrs = NULL)
getSubjectId()
getSubjectAttributes()
getSampleInfo()
setSampleInfo(value, category = getCategory())
getSampleId()
getSampleAttributes()
getJunctionQuantification(category = getCategory())
getGeneExpression(item = NULL, category = getCategory(), EList = FALSE)
setNormalisedGeneExpression(geneExpr, category = getCategory())
getInclusionLevels()
setInclusionLevels(incLevels, category = getCategory())
getInclusionLevelsSummaryStatsCache(category = getCategory())
setInclusionLevelsSummaryStatsCache(cache, category = getCategory())
getPCA(category = getCategory())
setPCA(pca, category = getCategory())
getICA(category = getCategory())
setICA(ica, category = getCategory())
getCorrelation(category = getCategory())
setCorrelation(correlation, category = getCategory())
getGroupIndependenceTesting(category = getCategory())
setGroupIndependenceTesting(groupIndependenceTesting, category = getCategory())
getSpecies(category = getCategory())
setSpecies(species, category = getCategory())
getAssemblyVersion(category = getCategory())
setAssemblyVersion(assembly, category = getCategory())
getAnnotationName(category = getCategory())
setAnnotationName(annotName, category = getCategory())
getURLtoDownload()
setURLtoDownload(url)

Arguments

category Character: data category
... Arguments to identify a variable
sep Character to separate identifiers
value Value to attribute to an element
data Matrix or data frame: alternative splicing information
name Character: data table name
auto Boolean: enable automatic navigation of browser history?
integer Integer: value of the setting
ah AnnotationHub
event Character: alternative splicing event
dataset Character: dataset name
attrs Character: name of attributes to retrieve (if NULL, the whole dataset is returned)
item Character: name of specific item to retrieve (if NULL, the whole list is returned)
EList Boolean: return gene expression datasets as EList if possible or as data frames?
geneExpr Data frame or matrix: normalised gene expression
incLevels Data frame or matrix: inclusion levels
getGroups

cache  List of summary statistics
pca   prcomp object (principal component analysis)
ica   Object containing independent component analysis
correlation  prcomp object (correlation analyses)
groupIndependenceTesting  Object containing group independence testing results
species  Character: species
assembly  Character: assembly version
annotName  Character: annotation name
url  Character: URL links to download

Value
Getters return globally accessible data, whereas setters return NULL as they are only used to modify the Shiny session’s state

Note
Needs to be called inside a reactive function

See Also
Other functions to get and set global variables: getClinicalMatchFrom(), getDifferentialExpression(), getDifferentialSplicing(), getGroups(), getHighlightedPoints(), getSelectedDataPanel()

getGroups  Get or set groups

Description
Get or set groups

Usage
getGroups(
  type = c("Patients", "Samples", "ASevents", "Genes"),
  complete = FALSE,
  category = getCategory()
)

setGroups(
  type = c("Patients", "Samples", "ASevents", "Genes"),
  groups,
  category = getCategory()
)
getGtexDataTypes

Arguments

type  Character: type of groups (either Patients, Samples, ASEvents or Genes)
complete  Boolean: return all the information on groups (TRUE) or just the group names and respective indexes (FALSE)?
category  Character: data category
groups  Matrix: groups of dataset

Value

Getters return globally accessible data, whereas setters return NULL as they are only used to modify the Shiny session’s state

Note

Needs to be called inside a reactive function

See Also

Other functions to get and set global variables: getClinicalMatchFrom(), getDifferentialExpression(), getDifferentialSplicing(), getGlobal(), getHighlightedPoints(), getSelectedDataPanel()

getGtexDataTypes  Get GTEx data information

Description

Get GTEx data information

Usage

getGtexDataTypes()
getGtexReleases()

Value

GTEx data information

See Also

Other functions associated with GTEx retrieval: getDownloadsFolder(), getGtexTissues(), loadGtexData()

Examples

getGtexDataTypes()
getGtexReleases()
getGtexDataURL

*Get links to download GTEx data*

**Description**

Get links to download GTEx data

**Usage**

```r
getGtexDataURL(
  release,
  domain = "https://storage.googleapis.com",
  offline = FALSE
)
```

**Arguments**

- `release` Numeric: GTEx data release
- `domain` Character: GTEx data storage domain
- `offline` Boolean: simulate offline behaviour

**Value**

Character with URLs to download GTEx data

getGtexTissues

*Get GTEx tissues from given GTEx sample attributes*

**Description**

Get GTEx tissues from given GTEx sample attributes

**Usage**

```r
getGtexTissues(folder = getDownloadsFolder(), release = getGtexReleases()[[1]])
```

**Arguments**

- `folder` Character: folder containing data
- `release` Numeric: GTEx data release to load

**Value**

Character: available tissues
**getHidden**

Get or set hidden globally accessible elements

### Description

Get or set hidden globally accessible elements

### Usage

getHidden()

setHidden(val)

### Arguments

val Value to attribute

### Value

Getters return hidden globally accessible data, whereas setters return NULL as they are only used to modify the state of hidden elements

---

**getHighlightedPoints**

Get or set points or regions for plots

### Description

Get or set points or regions for plots
Usage

getHighlightedPoints(id, category = getCategory())
setHighlightedPoints(id, events, category = getCategory())
getZoom(id, category = getCategory())
setZoom(id, zoom, category = getCategory())
getSelectedPoints(id, category = getCategory())
setSelectedPoints(id, events, category = getCategory())
getLabelledPoints(id, category = getCategory())
setLabelledPoints(id, events, category = getCategory())

Arguments

id Character: identifier
category Character: data category
events Integer: index of events
zoom Integer: range of X and Y coordinates for zooming

Value

Getters return globally accessible data, whereas setters return NULL as they are only used to modify the Shiny session’s state

Note

Needs to be called inside a reactive function

See Also

Other functions to get and set global variables: `getClinicalMatchFrom()`, `getDifferentialExpression()`, `getDifferentialSplicing()`, `getGlobal()`, `getGroups()`, `getSelectedDataPanel()

---

getNumerics

Convert a column to numeric if possible and ignore given columns composed of lists

Description

Convert a column to numeric if possible and ignore given columns composed of lists
**getSampleFromSubject**

Get samples matching the given subjects

**Description**

Get samples matching the given subjects

**Usage**

```r
getSampleFromSubject(
  patients, 
  samples, 
  clinical = NULL, 
  rm.NA = TRUE, 
  match = NULL, 
  showMatch = FALSE 
)
```
**getSelectedDataPanel**

Get or set selected panel in data section

### Arguments

- **patients**: Character or list of characters: subject identifiers
- **samples**: Character: sample identifiers
- **clinical**: Data frame or matrix: clinical dataset
- **rm.NA**: Boolean: remove missing values?
- **match**: Integer: vector of subject index with the sample identifiers as name to save time (optional)
- **showMatch**: Boolean: show matching subject index?

### Value

Names of the matching samples (if `showMatch` = TRUE, a character with the subjects as values and their respective samples as names is returned)

### See Also

Other functions for data grouping: `createGroupByAttribute()`, `getGeneList()`, `getSubjectFromSample()`, `groupPerElem()`, `plotGroupIndependence()`, `testGroupIndependence()`

### Examples

```r
subjects <- c("GTEX-ABC", "GTEX-DEF", "GTEX-GHI", "GTEX-JKL", "GTEX-MNO")
samples <- paste0(subjects, "-sample")
clinical <- data.frame(samples=samples)
rownames(clinical) <- subjects
gSampleFromSubject(subjects[c(1, 4)], samples, clinical)
```

---

**getSelectedDataPanel**  
Get or set selected panel in data section

### Description

Get or set selected panel in data section

### Usage

- `getSelectedDataPanel()`
- `setSelectedDataPanel(id)`

### Value

Getters return globally accessible data, whereas setters return NULL as they are only used to modify the Shiny session’s state
**getServerFunctions**  
*Matches server functions from a given loader*

**Description**
Matches server functions from a given loader

**Usage**
```r
genericFunctions(loader, ..., priority = NULL)
```

**Arguments**
- `loader` Character: loader to run the functions
- `...` Extra arguments to pass to server functions
- `priority` Character: name of functions to prioritise by the given order; for instance, `c("data", "analyses")` would load `data`, then `analyses` and finally the remaining functions

**Value**
- Invisible `TRUE`

---

**getSplicingEventCoordinates**  
*Returns the coordinates of interest for a given event type*

**Description**
Returns the coordinates of interest for a given event type

**Usage**
```r
genericSplicingEventCoordinates(type, sorting = FALSE)
```
getSplicingEventFromGenes

**Arguments**

- **type**: Character: alternative splicing event type
- **sorting**: Boolean: get coordinates used for sorting and comparison between different programs?

**Value**

Coordinates of interest according to the alternative splicing event type

---

getSplicingEventData

*Get splicing event information for given alternative splicing quantification data*

**Description**

Get splicing event information for given alternative splicing quantification data

**Usage**

```
getSplicingEventData(psi)
```

**Arguments**

- **psi**: Matrix or data frame: alternative splicing quantification data

**Value**

Matrix or data frame containing splicing event information for alternative splicing events in psi (if available)

---

getSplicingEventFromGenes

*Get alternative splicing events from genes or vice-versa*

**Description**

Get alternative splicing events from genes or vice-versa

**Usage**

```
getSplicingEventFromGenes(genes, ASevents, data = NULL)
getGenesFromSplicingEvents(ASevents, data = NULL)
```
getSplicingEventTypes

Arguments

genes Character: gene symbols (or TCGA-styled gene symbols)
ASevents Character: alternative splicing events
data Matrix or data frame: alternative splicing information

Details

A list of alternative splicing events is required to run getSplicingEventFromGenes

Value

Named character containing alternative splicing events or genes and their respective genes or alternative splicing events as names (depending on the function in use)

Examples

```r
ASevents <- c("SE_1_+_201763003_201763300_201763374_201763594_NAV1",
"SE_1_+_183515472_183516238_183516387_183518343_SMG7",
"SE_1_+_183441784_183471388_183471526_183481972_SMG7",
"SE_1_+_181019422_181022709_181022813_181024361_MR1",
"SE_1_+_181695298_181700311_181700367_181701520_CACNA1E")
genes <- c("NAV1", "SMG7", "MR1", "HELLO")

# Get splicing events from genes
matchedASevents <- getSplicingEventFromGenes(genes, ASevents)

# Names of matched events are the matching input genes
names(matchedASevents)
matchedASevents

# Get genes from splicing events
matchedGenes <- getGenesFromSplicingEvents (ASevents)

# Names of matched genes are the matching input alternative splicing events
names(matchedGenes)
matchedGenes
```

---

getSplicingEventTypes Get supported splicing event types

Description

Get supported splicing event types

Usage

```r
getSplicingEventTypes(psi = NULL, acronymsAsNames = FALSE)
```
getSubjectFromSample

Arguments

psi          Data frame or matrix: alternative splicing quantification data
acronymsAsNames  Boolean: return acronyms as names?

Value

Named character vector with splicing event types

See Also

Other functions for PSI quantification: filterPSI(), listSplicingAnnotations(), loadAnnotation(), plotRowStats(), quantifySplicing()

Examples

getSplicingEventTypes()

description

Get subjects from given samples

Usage

getSubjectFromSample(sampleId, patientId = NULL, na = FALSE, sampleInfo = NULL)

Arguments

sampleId          Character: sample identifiers
patientId         Character: subject identifiers to filter by (optional; if a matrix or data frame is given, its rownames will be used to infer the subject identifiers)
na                Boolean: return NA for samples with no matching subjects
sampleInfo        Data frame or matrix: sample information containing the sample identifiers as rownames and a column named "Subject ID" with the respective subject identifiers

Value

Character: subject identifiers corresponding to the given samples

See Also

Other functions for data grouping: createGroupByAttribute(), getGeneList(), getSampleFromSubject(), groupPerElem(), plotGroupIndependence(), testGroupIndependence()
getTCGAdataTypes

Examples

```r
samples <- paste0("GTEX-", c("ABC", "DEF", "GHI", "JKL", "MNO"), "-sample")
getSubjectFromSample(samples)

# Filter returned samples based on available subjects
subjects <- paste0("GTEX-", c("DEF", "MNO"))
getSubjectFromSample(samples, subjects)
```

---

**getTCGAdataTypes**  
*Get available parameters for TCGA data*

**Description**

Parameters obtained via FireBrowse

**Usage**

```r
getTCGAdataTypes()
getTCGAdates()
getTCGAcohorts(cohort = NULL)
```

**Arguments**

- **cohort**  
  Character: filter results by cohorts (optional)

**Value**

Parsed response

**See Also**

Other functions associated with TCGA data retrieval:  
`getDownloadsFolder()`, `isFirebrowseUp()`, `loadTCGAdataset()`, `parseTCGASampleTypes()`

**Examples**

```r
getTCGAdataTypes()
if (isFirebrowseUp()) getTCGAdates()
if (isFirebrowseUp()) getTCGAcohorts()
```
getUiFunctions  
*Matches user interface (UI) functions from a given loader*

**Description**  
Matches user interface (UI) functions from a given loader

**Usage**  
getUiFunctions(ns, loader, ..., priority = NULL)

**Arguments**
- **ns**: Shiny function to create IDs within a namespace
- **loader**: Character: loader to run the functions
- **...**: Extra arguments to pass to the user interface (UI) functions
- **priority**: Character: name of functions to prioritise by the given order; for instance, c("data", "analyses") would load data, then analyses and finally the remaining functions

**Value**  
List of functions related to the given loader

getValidEvents  
*Filters the events with valid elements according to the given validator*

**Description**  
Filters the events with valid elements according to the given validator

**Usage**  
getValidEvents(event, validator, areMultipleExonsValid = FALSE)

**Arguments**
- **event**: Data.frame containing only one event with at least 7 columns as retrieved from the alternative splicing annotation files from MISO (GFF3 files)
- **validator**: Character: valid elements for each event
- **areMultipleExonsValid**: Boolean: consider runs of exons as valid when comparing with the validator? Default is FALSE (see details)
Details

areMultipleExonsValid allows to consider runs of exons (i.e. sequences where exon occurs consecutively) as valid when comparing based on the validator. For example, if validator = c("gene", "mRNA", "exon") and areMultipleExonsValid = FALSE, the event c("gene", "mRNA", "exon", "exon") is not valid as it has one additional exon. If areMultipleExonsValid = TRUE, the same event would be valid.

Value

Data.frame with valid events

Examples

```r
event <- read.table(text = "
chr1 SE gene 17233 18061 . - .
chr1 SE dkfd 00000 30000 . - .
chr1 SE mRNA 17233 18061 . - .
chr1 SE exon 17233 17368 . - .
chr1 SE exon 17526 17742 . - .
chr1 SE exon 17915 18061 . - .
chr1 SE mRNA 17233 18061 . - .
chr1 SE exon 17233 17368 . - .
chr1 SE exon 17915 18061 . - .
chr1 SE gene 17233 18061 . - .
chr1 SE mRNA 17233 18061 . - .
chr1 SE exon 17233 17368 . - .
chr1 SE exon 17606 17742 . - .
chr1 SE mRNA 17233 18061 . - .
chr1 SE exon 17233 17368 . - .
chr1 SE exon 17915 18061 . - .
chr1 SE gene 17233 18061 . - .
chr1 SE mRNA 17233 18061 . - .
chr1 SE exon 17233 17368 . - .
chr1 SE exon 17915 18061 . - .
chr1 SE mRNA 17233 18061 . - .
chr1 SE exon 17233 17368 . - .
");
psychomics:::getValidEvents(event, validator)
```
Arguments

- **input**: Shiny input
- **output**: Shiny output
- **id**: Character: identifier
- **plot**: Character: plot expression (if NULL, no plots are rendered)
- **df**: Data frame
- **x**: Character: name of the variable used for the X axis
- **y**: Character: name of the variable used for the Y axis
- **eventData**: Alternative splicing event information (if available)

Value

NULL (function is only used to modify the Shiny session’s state or internal variables)

Note

Insert `ggplotAuxSet` outside any observer (so it is only run once)

---

**ggplotTooltip**

Create the interface for the tooltip of a plot

Description

Create the interface for the tooltip of a plot

Usage

`ggplotTooltip(df, hover, x, y, eventData = NULL)`

Arguments

- **df**: Data frame
- **hover**: Mouse hover information for a given plot as retrieved from `hoverOpt`
- **x**: Character: name of the variable used for the X axis
- **y**: Character: name of the variable used for the Y axis
- **eventData**: Alternative splicing event information (if available)
ggplotUI

Value
 HTML elements

Description
 Interface for interactive ggplot

Usage
 ggplotUI(id)

Arguments
 id Character: identifier

Value
 HTML elements

globalSelectize

Create a selectize input available from any page

Description
 Create a selectize input available from any page

Usage
 globalSelectize(id, placeholder, ASevent = FALSE)

Arguments
 id Character: input identifier
 placeholder Character: input placeholder
 ASevent Boolean: select alternative splicing events?

Value
 HTML element for a global selectize input
**groupByAttribute**  
*Data grouping interface*

**Description**

Data grouping interface

**Usage**

- `groupByAttribute(ns, cols, id, example)`
- `groupByPreMadeList(ns, data, id)`
- `groupId(ns, id)`
- `groupByExpression(ns, id)`
- `groupByGrep(ns, cols, id)`

**Arguments**

- `ns`  
  Namespace function
- `cols`  
  Character or list: name of columns to show
- `id`  
  Character: identifier
- `example`  
  Character: text to show as an example
- `data`  
  List: list of groups with elements

**Value**

HTML elements

---

**groupManipulation**  
*Logic server to manipulate data grouping*

**Description**

Logic server to manipulate data grouping

**Usage**

`groupManipulation(input, output, session, type)`
groupManipulationInput

Arguments

- **input**: Shiny input
- **output**: Shiny output
- **session**: Shiny session
- **type**: Character: type of data for each the interface is intended

Value

HTML elements

---

**groupManipulationInput**

*Interface to manipulate data grouping*

Description

Interface to manipulate data grouping

Usage

`groupManipulationInput(id, type)`

Arguments

- **id**: Character: identifier
- **type**: Character: type of data for each the interface is intended

Value

HTML elements

---

**groupPerElem**

*Assign one group to each element*

Description

Assign one group to each element

Usage

`groupPerElem(groups, elem = NULL, outerGroupName = NA)`
Arguments

- **groups**: List of integers: groups of elements
- **elem**: Character: all elements available
- **outerGroupName**: Character: name to give to outer group (if NULL, only show elements matched to their respective groups)

Value

Character vector where each element corresponds to the group of the respective element

See Also

Other functions for data grouping: `createGroupByAttribute()`, `getGeneList()`, `getSampleFromSubject()`, `getSubjectFromSample()`, `plotGroupIndependence()`, `testGroupIndependence()`

Examples

```r
groups <- list(1:3, 4:7, 8:10)
names(groups) <- paste("Stage", 1:3)

groupPerElem(groups)
```

Description

These functions only run once instead of running for every instance of groups

Usage

```r
groupsServerOnce(input, output, session)
```

Arguments

- **input**: Shiny input
- **output**: Shiny output
- **session**: Shiny session

Value

NULL (function is only used to modify the Shiny session’s state or internal variables)
hchart.survfit

Plot survival curves

Description

Plot survival curves

Usage

```r
## S3 method for class 'survfit'
hchart(
  object,
  ...,
  fun = NULL,
  markTimes = TRUE,
  symbol = "plus",
  markerColor = "black",
  ranges = FALSE,
  rangesOpacity = 0.3
)
```

Arguments

- `object`: survfit object as returned from `survfit.survTerms()` function
- `...`: Arguments passed on to `highcharter::hc_add_series`
- `fun`: Name of function or function used to transform the survival curve: log will put y axis on log scale, event plots cumulative events (f(y) = 1-y), cumhaz plots the cumulative hazard function (f(y) = -log(y)), and cloglog creates a complimentary log-log survival plot (f(y) = log(-log(y)) along with log scale for the x-axis.
- `markTimes`: Label curves marked at each censoring time?
- `symbol`: Symbol to use as marker
- `markerColor`: Colour of the marker; if NULL, the respective colour of each series are used
- `ranges`: Plot interval ranges?
- `rangesOpacity`: Opacity of the interval ranges

Value

highchart object to plot survival curves
Examples

```r
# Plot Kaplan-Meier curves
require("survival")
require("highcharter")
leukemia.surv <- survfit(Surv(time, status) ~ x, data = aml)
hchart(leukemia.surv)

# Plot the cumulative hazard function
lsurv2 <- survfit(Surv(time, status) ~ x, aml, type='fleming')
hchart(lsurv2, fun="cumhaz")

# Plot the fit of a Cox proportional hazards regression model
fit <- coxph(Surv(futime, fustat) ~ age, data = ovarian)
ovarian.surv <- survfit(fit, newdata=data.frame(age=60))
hchart(ovarian.surv, ranges = TRUE)
```

---

**hc_scatter**

Create scatter plot

**Description**

Create a scatter plot using highcharter

**Usage**

```r
hc_scatter(
  hc,
  x,
  y,
  z = NULL,
  label = NULL,
  showInLegend = FALSE,
  color = NULL,
  ...
)
```

**Arguments**

- `hc` Highchart object
- `x` Numeric: X axis
- `y` Numeric: Y axis
- `z` Numeric: Z axis to set the bubble size (optional)
- `label` Character: data label for each point (optional)
- `showInLegend` Boolean: show the data in the legend box?
- `color` Character: series colour
- `...` Arguments passed on to `highcharter::hc_add_series`
**HTMLfast**

**Value**

highcharter object containing information for a scatter plot

---

**Description**

Faster version of shiny::HTML

**Usage**

HTMLfast(text)

**Arguments**

text  Character: text

---

**Value**

HTML element

---

**importGroupsFrom**

Import groups from a file

**Description**

Import groups from a file

**Usage**

importGroupsFrom(
  file,
  uniqueElems = NULL,
  matchingElems = NULL,
  match = NULL,
  type = NULL
)

**Arguments**

file  Character: path to file

uniqueElems  Character: vector of unique elements (samples or alternative splicing events)

matchingElems  Character: vector of matching elements (subjects or genes)

match  Match between elements within groups
Value
Matrix with groups

---

**inclusionLevelsFilterInterface**

*Interface to filter alternative splicing*

**Description**
Interface to filter alternative splicing

**Usage**
inclusionLevelsFilterInterface(ns)

**Arguments**

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ns</td>
<td>Namespace function</td>
</tr>
</tbody>
</table>

**Value**
HTML elements

---

**inclusionLevelsInterface**

*Interface to quantify alternative splicing*

**Description**
Interface to quantify alternative splicing

**Usage**
inclusionLevelsInterface(ns)

**Arguments**

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ns</td>
<td>Namespace function</td>
</tr>
</tbody>
</table>

**Value**
HTML elements
Description

Alert in the style of a dialogue box with a button

Usage

inlineDialog(
  description,
  ..., 
  buttonLabel = NULL,
  buttonIcon = NULL,
  buttonId = NULL,
  id = NULL,
  type = c("error", "warning"),
  bigger = FALSE
)

errorDialog(description, ...)

warningDialog(description, ...)

Arguments

description Character: description

... Extra parameters when creating the alert

buttonLabel Character: button label

buttonIcon Character: button icon

buttonId Character: button identifier

id Character: identifier

type Character: type of alert (error or warning)

bigger Boolean: wrap the description in a h4 tag?

Value

HTML elements
insideFile

Get psichomics file inside a given directory

Description

Get psichomics file inside a given directory

Usage

insideFile(...)

Arguments

... character vectors, specifying subdirectory and file(s) within some package. The default, none, returns the root of the package. Wildcards are not supported.

Value

Loaded file

is.whole

Check if a number is whole

Description

Check if a number is whole

Usage

is.whole(x, tol = .Machine$double.eps^0.5)

Arguments

x Object to be tested
tol Numeric: tolerance used for comparison

Value

TRUE if number is whole; otherwise, FALSE
**isFile**

*Check if files exist*

**Description**

Check if files exist

**Usage**

```r
isFile(files)
```

**Arguments**

- `files` : Character: vector of filepaths to check

**Value**

Boolean vector stating whether each file exists or not

---

**isFirebrowseUp**

*Check if [FireBrowse API](http://firebrowse.org/api-docs) is running*

**Description**

Check if FireBrowse API is running

**Usage**

```r
isFirebrowseUp()
```

**Value**

Invisible `TRUE` if the FireBrowse API is working; otherwise, raises a warning with the status code and a brief explanation.

**See Also**

Other functions associated with TCGA data retrieval: `getDownloadsFolder()`, `getTCGADATA()`, `loadTCGAdataset()`, `parseTCGASampleTypes()`

**Examples**

```r
isFirebrowseUp()
```
### isRStudioServer

**Check if running in RStudio Server**

**Description**

Check if running in RStudio Server

**Usage**

```r
isRStudioServer()
```

**Value**

Boolean stating whether running in RStudio Server

### joinEventsPerType

**Full outer join all given events based on select columns**

**Description**

Full outer join all given events based on select columns

**Usage**

```r
joinEventsPerType(events, types = NULL)
```

**Arguments**

- `events`: Data frame or matrix: alternative splicing events
- `types`: Character: alternative splicing types

**Value**

List of events joined by alternative splicing event type
junctionString

String used to search for matches in a junction quantification file

Description
String used to search for matches in a junction quantification file

Usage
junctionString(chr, strand, junc5, junc3, showStrand)

Arguments
- chr: Character: chromosome
- strand: Character: strand
- junc5: Integer: 5' end junction
- junc3: Integer: 3' end junction
- showStrand: Boolean: include strand?

Value
Formatted character string

labelBasedOnCutoff
Label groups based on a given cutoff

Description
Label groups based on a given cutoff

Usage
labelBasedOnCutoff(data, cutoff, label = NULL, gte = TRUE)

Arguments
- data: Numeric: test data
- cutoff: Numeric: test cutoff
- label: Character: label to prefix group names
- gte: Boolean: test using greater than or equal than cutoff (TRUE) or less than or equal than cutoff (FALSE)?
leveneTest

Value

Labelled groups

See Also

Other functions to analyse survival: assignValuePerSubject(), getAttributesTime(), optimalSurvivalCutoff(), plotSurvivalCurves(), plotSurvivalPvaluesByCutoff(), processSurvTerms(), survdiffTerms(), survfit.survTerms(), testSurvival()

Examples

labelBasedOnCutoff(data=c(1, 0, 0, 1, 0, 1), cutoff=0.5)

labelBasedOnCutoff(data=c(1, 0, 0, 1, 0, 1), cutoff=0.5, "Ratio")

# Use "greater than" instead of "greater than or equal to"
labelBasedOnCutoff(data=c(1, 0, 0.5, 0, 1), cutoff=0.5, gte=FALSE)

leveneTest

Levene’s test

Description

Performs a Levene’s test to assess the equality of variances

Usage

leveneTest(x, g, centers = median)

Arguments

x Numeric vector or list of numeric vectors: non-numeric elements of a list will be coerced with a warning

g Vector or factor: groups of elements in x (ignored with a warning if x is a list)

centers Function used to calculate how much values spread; for instance, median (default) or mean

Details

The implementation of this function is based on car::leveneTest.default with a more standard result.
Value

A list with class "htest" containing the following components:

- statistic: the value of the test statistic with a name describing it.
- p.value: the p-value for the test.
- method: the type of test applied.
- data.name: a character string giving the names of the data.

Examples

```r
vals <- sample(30, replace=TRUE)
group <- lapply(list("A", "B", "C"), rep, 10)
group <- unlist(group)
psichomics:::leveneTest(vals, group)

## Using Levene's test based on the mean
psichomics:::leveneTest(vals, group, mean)
```

Description

psichomics article's link interface

Usage

```r
linkToArticles()
```

Value

HTML elements

Description

Link to run arbitrary JavaScript code

Usage

```r
linkToRunJS(text, code)
```
listSplicingAnnotations

Arguments

- text: Character: text label
- code: Character: JavaScript code

Value

HTML elements

---

listAllAnnotations  
*List alternative splicing annotation files available, as well as custom annotation*

---

Description

List alternative splicing annotation files available, as well as custom annotation

Usage

```r
listAllAnnotations(...)  
```

Arguments

...  
Custom annotation loaded

Value

Named character vector with splicing annotation files available

Examples

```r
psichomics::listAllAnnotations()  
```

---

listSplicingAnnotations  
*List alternative splicing annotations*

---

Description

List alternative splicing annotations
Usage

```r
listSplicingAnnotations(
  species = NULL,
  assembly = NULL,
  date = NULL,
  cache = getAnnotationHubOption("CACHE"),
  group = FALSE
)
```

Arguments

- `species` Character: filter results by species (regular expression)
- `assembly` Character: filter results by assembly (regular expression)
- `date` Character: filter results by date (regular expression)
- `cache` Character: path to AnnotationHub cache (used to load alternative splicing event annotation)
- `group` Boolean: group values based on data provider?

Value

Named character vector with splicing annotation names

See Also

Other functions for PSI quantification: `filterPSI()`, `getSplicingEventTypes()`, `loadAnnotation()`, `plotRowStats()`, `quantifySplicing()

Examples

```r
listSplicingAnnotations() # Return all alternative splicing annotations
listSplicingAnnotations(assembly="hg19") # Search for hg19 annotation
listSplicingAnnotations(assembly="hg38") # Search for hg38 annotation
listSplicingAnnotations(date="201(7|8)") # Search for 2017 or 2018 annotation
```
Arguments

- annotation: Character: annotation to load
- cache: Character: path to AnnotationHub cache (used to load alternative splicing event annotation)

Value

List of data frames containing the alternative splicing annotation per event type

See Also

Other functions for PSI quantification: `filterPSI()`, `getSplicingEventTypes()`, `listSplicingAnnotations()`, `plotRowStats()`, `quantifySplicing()`

Examples

```r
human <- listSplicingAnnotations(species="Homo sapiens")[[1]]
## Not run:
annot <- loadAnnotation(human)
## End(Not run)
```
loadBy

*Check if a given function should be loaded by the calling module*

**Description**

Check if a given function should be loaded by the calling module

**Usage**

```r
loadBy(loader, FUN)
```

**Arguments**

- `loader` Character: name of the file responsible to load such function
- `FUN` Function

**Value**

Boolean vector

---

loadCustomSplicingAnnotationSet

*Set of functions to load a custom alternative splicing annotation*

**Description**

Instructions to build the Shiny app

**Usage**

```r
loadCustomSplicingAnnotationSet(session, input, output)
```

**Arguments**

- `session` Shiny session
- `input` Shiny input
- `output` Shiny output

**Value**

NULL (function is only used to modify the Shiny session’s state or internal variables)
**loadDataModal**  
*Warn user about loaded data*

**Description**  
Warn user about loaded data

**Usage**  
```r
loadDataModal(session, modalId, replaceButtonId, keepButtonId)
```

**Arguments**
- `session`: Shiny session  
- `modalId`: Character: identifier of the modal  
- `replaceButtonId`: Character: identifier of the button to replace data  
- `keepButtonId`: Character: identifier of the button to append data

**Value**  
HTML elements for a warning modal reminding data is loaded

---

**loadFile**  
*Load file based on its format*

**Description**  
Tries to recognise the file format and parses the content of the given file accordingly.

**Usage**  
```r
loadFile(
  file,
  formats = loadFileFormats(),
  ...,
  verbose = FALSE,
  multiple = FALSE
)
```

**Arguments**
- `file`: Character: file to parse  
- `formats`: List of file formats to check  
- `...`: Extra parameters passed to `fread`  
- `verbose`: Boolean: detail steps while parsing  
- `multiple`: Boolean: expect more than one file?
**loadFileFormats**

**Details**

The resulting data frame includes the attribute `tablename` with the name of the data frame.

**Value**

Data frame with the contents of the given file if the file format is recognised; otherwise, returns `NULL`.

---

**loadFileFormats**  
*Load supported file formats*

**Description**

Load supported file formats.

**Usage**

```r
loadFileFormats()
```

**Value**

Supported file formats

---

**loadFirebrowseFolders**  
*Load FireBrowse folders*

**Description**

Loads the files present in each folder as a data.frame.

**Usage**

```r
loadFirebrowseFolders(folder, exclude = "")
```

**Arguments**

- `folder`  
  Character: folder(s) in which to look for FireBrowse files
- `exclude`  
  Character: files to exclude from the loading

**Value**

List with loaded data.frames

**Note**

For faster execution, this function uses the `readr` library. This function ignores subfolders of the given folder (which means that files inside subfolders are NOT loaded).
loadGeneExpressionSet  
Set of functions to load splicing quantification

Description

Instructions to build the Shiny app

Usage

loadGeneExpressionSet(session, input, output)

Arguments

session  
Shiny session

input  
Shiny input

output  
Shiny output

Value

NULL (function is only used to modify the Shiny session’s state or internal variables)

loadGtexData  
Download and load GTEx data

Description

Download and load GTEx data

Usage

loadGtexData(
    folder = getDownloadsFolder(),
    data = getGtexDataTypes(),
    tissue = NULL,
    release = getGtexReleases()[[1]],
    progress = TRUE
)

Arguments

folder  
Character: folder containing data

data  
Character: data types to load (see getGtexDataTypes)

tissue  
Character: tissues to load (if NULL, load all); tissue selection may speed up data loading

release  
Numeric: GTEx data release to load

progress  
Boolean: display progress?
loadGtexDataShiny

Value
List with loaded data

See Also
Other functions associated with GTEx data retrieval: `getDownloadsFolder()`, `getGtexDataTypes()`, `getGtexTissues()`
Other functions to load data: `loadLocalFiles()`, `loadSRaproject()`, `loadTCGAdata()`

Examples
```r
## Not run:
# Download and load all available GTEx data
data <- loadGtexData()

# Download and load only junction quantification and sample info from GTEx
data <- loadGtexData(data=c("sampleInfo", "junctionQuant"))

# Download and load only data for specific tissues
data <- loadGtexData(tissue=c("Stomach", "Small Intestine"))

# Download and load data from a specific GTEx data release
data <- loadGtexData(tissue=c("Stomach", "Small Intestine"), release=7)

## End(Not run)
```

loadGtexDataShiny   Shiny wrapper to load GTEx data

Description
Shiny wrapper to load GTEx data

Usage

```r
loadGtexDataShiny(session, input, replace = TRUE)
```

Arguments

```r
session      Shiny session
input        Shiny input
replace      Boolean: replace loaded data?
```

Value
NULL (function is only used to modify the Shiny session’s state or internal variables)
loadGtexFile  

*Load GTeX file*

**Description**

Load GTEX file

**Usage**

```r
loadGtexFile(path, pattern, samples = NULL)
```

**Arguments**

- `path`  
  Character: path to file
- `pattern`  
  Character: pattern of the format type to load file
- `samples`  
  Character: samples to filter datasets

**Value**

Loaded file as a data frame

loadLocalFiles  

*Load local files*

**Description**

Load local files

**Usage**

```r
loadLocalFiles(
  folder,
  ignore = c(".aux.", ".mage-tab."),
  name = "Data",
  verbose = FALSE
)
```

**Arguments**

- `folder`  
  Character: path to folder or ZIP archive
- `ignore`  
  Character: skip folders and filenames that match the expression
- `name`  
  Character: name
- `verbose`  
  Boolean: print steps?
loadRequiredData

**Value**

List of data frames from valid files

**See Also**

Other functions to load data: `loadGtexData()`, `loadSRAproject()`, `loadTCGAdataset()`

**Examples**

```r
## Not run:
folder <-˜/Downloads/ACC 2016"
data <- loadLocalFiles(folder)
ignore <- c(".aux.", ".mage-tab.", "junction quantification")
loadLocalFiles(folder, ignore)
## End(Not run)
```

---

**loadRequiredData**

*Missing information modal template*

**Description**

Missing information modal template

**Usage**

```r
loadRequiredData(modal = NULL)

missingDataModal(session, dataType, buttonId)

missingDataGuide(dataType)
```

**Arguments**

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>modal</td>
<td>Character: modal identifier</td>
</tr>
<tr>
<td>session</td>
<td>Shiny session</td>
</tr>
<tr>
<td>dataType</td>
<td>Character: type of data missing</td>
</tr>
<tr>
<td>buttonId</td>
<td>Character: identifier of button to take user to load missing data</td>
</tr>
</tbody>
</table>

**Value**

`NULL` (function is only used to modify the Shiny session’s state or internal variables)
Examples

```r
## Not run:
if (shiny::isRunning()) {
  session <- session$ns
  buttonInput <- "takeMeThere"
  buttonId <- ns(buttonInput)
  dataType <- "Inclusion levels"
  missingDataModal(session, buttonId, dataType)
  observeEvent(input[[buttonInput]], missingDataGuide(dataType))
}
## End(Not run)
```

loadSplicingQuantificationSet

*Set of functions to load splicing quantification*

Description

Instructions to build the Shiny app

Usage

```r
loadSplicingQuantificationSet(session, input, output)
```

Arguments

- `session`: Shiny session
- `input`: Shiny input
- `output`: Shiny output

Value

NULL (function is only used to modify the Shiny session’s state or internal variables)

loadSRAproject

*Download and load SRA projects via recount2*

Description

Download and load SRA projects via [recount2](https://jhubiostatistics.shinyapps.io/recount/recount2)

Usage

```r
loadSRAproject(project, outdir = getDownloadsFolder())
```
loadTCGAdata

Arguments

- `project` Character: SRA project identifiers (check `recount_abstract`)
- `outdir` Character: directory to store the downloaded files

Value

List with loaded projects

See Also

Other functions associated with SRA data retrieval: `getDownloadsFolder()`
Other functions to load data: `loadGtexData()`, `loadLocalFiles()`, `loadTCGAdata()`

Examples

```r
## Not run:
View(recount::recount_abstract)
sra <- loadSRAProject("SRP053101")
names(sra)
names(sra[[1]])
## End(Not run)
```

loadTCGAdata

Download and process TCGA data

Description

TCGA data obtained via FireBrowse

Usage

```r
loadTCGAdata(
    folder = getDownloadsFolder(),
    data = c("clinical", "junction_quantification", "RSEM_genes"),
    exclude = c(".aux.", ".mage-tab.", "MANIFEST.txt"),
    ...,
    download = TRUE
)
```

Arguments

- `folder` Character: directory to store the downloaded archives (by default, saves to `getDownloadsFolder()`)
- `data` Character: data to load (see `getTCGAdatasetTypes()`)
- `exclude` Character: files and folders to exclude from downloading and from loading into R (by default, exclude files containing `.aux.`, `.mage-tab.` and `MANIFEST.TXT`)
Arguments passed on to queryFirebrowseData

date Character: dates of the data retrieval by FireBrowse (by default, it uses the most recent data available)

cohort Character: abbreviation of the cohorts (by default, returns data for all cohorts)

data_type Character: data types (optional)

tool Character: data produced by the selected FireBrowse tools (optional)

platform Character: data generation platforms (optional)

center Character: data generation centres (optional)

level Integer: data levels (optional)

protocol Character: sample characterization protocols (optional)

page Integer: page of the results to return (optional)

page_size Integer: number of records per page of results (optional)

sort_by String: column used to sort the data (by default, sort by cohort)

download Boolean: download missing files

Value

A list with the loaded data, unless required files are unavailable and download = FALSE (if so, it returns the URL of files to download)

See Also

Other functions associated with TCGA data retrieval: getDownloadsFolder(), getTCGADATATypes(), isFirebrowseUp(), parseTCGASampleTypes()

Other functions to load data: loadGtexData(), loadLocalFiles(), loadSRAproject()

Examples

getTCGAcohorts()

getcgaDatatypes()

## Not run:
loadTCG ADA(cohort = "ACC", data_type = "Clinical")

## End(Not run)

loadTCGASampleMetadata

Prepare TCGA sample metadata from loaded datasets

Description

If no TCGA datasets apply, the input is returned
Usage
loadTCGAsampleMetadata(data)

Arguments
data List of list of data frames

Value
List of list of data frames

matchGroupASeventsAndGenes

Match AS events and genes in a group

Description
Match AS events and genes in a group

Usage
matchGroupASeventsAndGenes(id, group, ASevents)

Arguments
id Character: identifier
group Data frame: group

Value
Data frame with groups containing matching elements

matchGroupSubjectsAndSamples

Match subjects and samples in a group

Description
Match subjects and samples in a group

Usage
matchGroupSubjectsAndSamples(id, group)
Arguments

id Character: identifier

Arguments

group Data frame: group

Value

Data frame with groups containing matching elements

matchSplicingEventsWithGenes

Match splicing events with respective genes

Description

Match splicing events with respective genes

Usage

matchSplicingEventsWithGenes(ASEvents, data = NULL)

Arguments

ASEvents Character: alternative splicing events to be matched
data Matrix or data frame: alternative splicing information

Value

Named character vector containing the splicing events and their respective gene as their name

modTabPanel

Modified tabPanel function to show icon and title

Description

Modified tabPanel function to show icon and title

Usage

modTabPanel(title, ..., icon = NULL, menu = FALSE)

Arguments

title Character: title of the tab
... HTML elements to render
icon Character: name of the icon
menu Boolean: create a dropdown menu-like tab?
**navSelectize**

**Value**

HTML interface

**Note**

Icon is hidden at small viewports

---

**Description**

Create a special selectize input in the navigation bar

**Usage**

```r
clav-selectize(id, label, placeholder = label, ASevent = FALSE)
```

**Arguments**

- `id`: Character: input identifier
- `label`: Character: input label
- `placeholder`: Character: input placeholder
- `ASevent`: Boolean: select alternative splicing events?

**Value**

HTML element to be included in a navigation bar

---

**normaliseGeneExpression**

*Filter and normalise gene expression*

**Description**

Gene expression is filtered and normalised in the following steps:

- Filter gene expression;
- Normalise gene expression with `calcNormFactors`;
- If `performVoom = FALSE`, compute counts per million (CPM) using `cpm` and log2-transform values if `log2transform = TRUE`;
- If `performVoom = TRUE`, use `voom` to compute log2-CPM, quantile-normalise (if `method = "quantile"`) and estimate mean-variance relationship to calculate observation-level weights.
normaliseGeneExpression

Usage

normaliseGeneExpression(
  geneExpr,
  geneFilter = NULL,
  method = "TMM",
  p = 0.75,
  log2transform = TRUE,
  priorCount = 0.25,
  performVoom = FALSE
)

normalizeGeneExpression(
  geneExpr,
  geneFilter = NULL,
  method = "TMM",
  p = 0.75,
  log2transform = TRUE,
  priorCount = 0.25,
  performVoom = FALSE
)

Arguments

geneExpr Matrix or data frame: gene expression
geneFilter Boolean: filtered genes (if NULL, skip filtering)
method Character: normalisation method, including TMM, RLE, upperquartile, none or quantile (see Details)
p numeric value between 0 and 1 specifying which quantile of the counts should be used by method="upperquartile".
log2transform Boolean: perform log2-transformation?
priorCount Average count to add to each observation to avoid zeroes after log-transformation
performVoom Boolean: perform mean-variance modelling (using voom)?

Details

dgeR::calcNormFactors will be used to normalise gene expression if method is TMM, RLE, upperquartile or none. If performVoom = TRUE, voom will only normalise if method = "quantile".

Available normalisation methods:

- TMM is recommended for most RNA-seq data where more than half of the genes are believed not differentially expressed between any pair of samples;
- RLE calculates the median library from the geometric mean of all columns and the median ratio of each sample to the median library is taken as the scale factor;
- upperquartile calculates the scale factors from a given quantile of the counts for each library, after removing genes with zero counts in all libraries;
- quantile forces the entire empirical distribution of each column to be identical (only performed if performVoom = TRUE).
Value
Filtered and normalised gene expression

See Also
Other functions for gene expression pre-processing: convertGeneIdentifiers(), filterGeneExpr(), plotGeneExprPerSample(), plotLibrarySize(), plotRowStats()

Examples

geneExpr <- readFile("ex_gene_expression.RDS")
normaliseGeneExpression(geneExpr)

operateOnGroups Set operations on groups

Description
This function can be used on groups to merge, intersect, subtract, etc.

Usage

operateOnGroups(
  input,
  session,
  operation,
  buttonId,
  symbol = " ",
  type,
  sharedData = sharedData
)

Arguments

input Shiny input
session Shiny session
operation Character: set operation
buttonId Character: ID of the button to trigger operation
symbol Character: Unicode symbol to visually indicate the operation performed
type Character: type of group where set operations are to be performed
sharedData Shiny app’s global variable

Value
NULL (function is only used to modify the Shiny session’s state or internal variables)
optimalSurvivalCutoff - Calculate optimal data cutoff that best separates survival curves

Description

Uses stats::optim with the Brent method to test multiple cutoffs and to find the minimum log-rank p-value.

Usage

optimalSurvivalCutoff(
  clinical,  data,  censoring,  event,  timeStart,  timeStop = NULL,  followup = "days_to_last_followup",  session = NULL,  filter = TRUE,  survTime = NULL,  lower = NULL,  upper = NULL
)

Arguments

- clinical: Data frame: clinical data
- data: Numeric: data values
- censoring: Character: censor using left, right, interval or interval2
- event: Character: name of column containing time of the event of interest
- timeStart: Character: name of column containing starting time of the interval or follow up time
- timeStop: Character: name of column containing ending time of the interval (only relevant for interval censoring)
- followup: Character: name of column containing follow up time
- session: Shiny session (only used for the visual interface)
- filter: Boolean or numeric: elements to use (all are used by default)
- survTime: survTime object: times to follow up, time start, time stop and event (optional)
- lower, upper: Bounds in which to search (if NULL, bounds are set to lower = 0 and upper = 1 if all data values are within that interval; otherwise, lower = min(data, na.rm = TRUE) and upper = max(data, na.rm = TRUE))
Value

List containing the optimal cutoff (par) and the corresponding p-value (value)

See Also

Other functions to analyse survival: assignValuePerSubject(), getAttributesTime(), labelBasedOnCutoff(), plotSurvivalCurves(), plotSurvivalPvaluesByCutoff(), processSurvTerms(), survdiffTerms(), survfit.survTerms(), testSurvival()

Examples

clinical <- read.table(text = "2549 NA ii female
840 NA i female
NA 1204 iv male
NA 383 iv female
1293 NA iii male
NA 1355 ii male")

names(clinical) <- c("patient.days_to_last_followup",
"patient.days_to_death",
"patient.stage_event.pathologic_stage",
"patient.gender")

timeStart <- "days_to_death"
event <- "days_to_death"

psi <- c(0.1, 0.2, 0.9, 1, 0.2, 0.6)

opt <- optimalSurvivalCutoff(clinical, psi, "right", event, timeStart)

---

optimSurvDiffSet

Optimal survival difference given an inclusion level cutoff for a specific alternative splicing event

Description

Optimal survival difference given an inclusion level cutoff for a specific alternative splicing event

Usage

optimSurvDiffSet(session, input, output)

Arguments

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>session</td>
<td>Shiny session</td>
</tr>
<tr>
<td>input</td>
<td>Shiny input</td>
</tr>
<tr>
<td>output</td>
<td>Shiny output</td>
</tr>
</tbody>
</table>

Value

NULL (function is only used to modify the Shiny session’s state or internal variables)
parseCategoricalGroups

Parse categorical columns in a data frame

Description
Retrieve elements grouped by their unique group based on each categorical column

Usage
parseCategoricalGroups(df)

Arguments
- df: Data frame

Value
List of lists containing values based on rownames of df

See Also
testGroupIndependence() and plotGroupIndependence()

Examples
```r
df <- data.frame("race"=c("caucasian", "caucasian", "asian"),
"gender"=c("male", "female", "male"))
rownames(df) <- paste("subject", 1:3)
parseCategoricalGroups(df)
```

parseDateResponse
Parse the date from a response

Description
Parse the date from a response

Usage
parseDateResponse(string)

Arguments
- string: Character: dates

Value
Parsed date
parseFile

Parse file according to its format

Description

Parse file according to its format

Usage

parseFile(format, file, ..., verbose = FALSE)

Arguments

format Environment: format of the file
file Character: file to load
... Extra parameters passed to fread
verbose Boolean: detail step while parsing?

Details

The resulting data frame includes the attribute tablename with the name of the data frame

Value

Data frame with the loaded file

parseFirebrowseMetadata

Query the FireBrowse API for metadata

Description

Query the FireBrowse API for metadata

Usage

parseFirebrowseMetadata(type, ...)

Arguments

type Character: metadata to retrieve
... Character: parameters to pass to query (optional)

Value

List with parsed response
parseMatsEvent

parseMatsEvent ( Parse alternative splicing events from MATS )

Description

Parse alternative splicing events from MATS

Usage

parseMatsEvent(event, event_type)

Arguments

event: Data frame row: MATS splicing event

event_type: Character: Type of event to parse (see details)

Details

The following event types can be parsed:

- SE: Skipped exon
- MXE: Mutually exclusive exons
- RI: Retained intron
- A3SS: Alternative 3’ splice site
- A5SS: Alternative 5’ splice site

Value

List containing the event attributes and junctions

Examples

# MATS event (alternative 3’ splice site)
event <- read.table(text = "
  2 ENSG0000166012 TAF1D chr11 - 93466515 93466671 93466515 93466563 93467790 93467826
  5 ENSG0000166012 TAF1D chr11 - 93466515 93466671 93466515 93466585 93467790 93467826
  6 ENSG0000166012 TAF1D chr11 - 93466515 93466585 93466515 93466563 93467790 93467826
"
)
psichomics:::parseMatsEvent(event, "A3SS")
parseMatsGeneric

**parseMatsGeneric**

*Parse junctions of an alternative splicing event from MATS according to event type*

**Description**

Parse junctions of an alternative splicing event from MATS according to event type

**Usage**

```r
parseMatsGeneric(junctions, strand, coords, plus_pos, minus_pos)
parseMatsSE(junctions, strand)
parseMatsMXE(junctions, strand)
parseMatsRI(junctions, strand)
parseMatsA3SS(junctions, strand)
parseMatsA5SS(junctions, strand)
parseMatsAFE(junctions, strand)
parseMatsALE(junctions, strand)
```

**Arguments**

- `junctions` Integer: event’s junctions
- `strand` Character: strand of the event
- `coords` Character: names of the alternative splicing coordinates
- `plus_pos` Integer: match of each junction in the respective coordinate for the plus strand
- `minus_pos` Integer: match of each junction in the respective coordinate for the minus strand

**Details**

The following event types are ready to be parsed:

- **SE** (skipped exon)
- **MXE** (mutually exclusive exon)
- **RI** (retained intron)
- **A5SS** (alternative 5’ splice site)
- **A3SS** (alternative 3’ splice site)
- **AFE** (alternative first exon)
- **ALE** (alternative last exon)

You can use `parseMatsGeneric` to parse other event types.
Value

Data frame with parsed junctions

See Also

parseMatsEvent()

Examples

# Parse generic event (in this case, an exon skipping event)
junctions <- read.table(text =
"79685787 79685910 79685910 79685910 79679566 79679751")
coords <- c("A1.start", "A1.end",
"C1.start", "C1.end",
"C2.start", "C2.end")
plus <- c(1:6)
minus <- c(2:1, 6:3)
psichomics:::parseMatsGeneric(junctions, strand = "+", coords, plus, minus)

# Parse exon skipping event
junctions <- read.table(text =
"79685787 79685910 79685910 79685910 79679566 79679751")
psichomics:::parseMatsSE(junctions, strand = "+")

# Parse mutually exclusive exon event
junctions <- read.table(text =
"158282161 158282276 158282689 158282804 158281047 158281295 158283950 158284199")
psichomics:::parseMatsMXE(junctions, strand = "+")

# Parse retained intron event
junctions <- read.table(text =
"15929853 15932100 15929853 15930016 15930687 15932100")
psichomics:::parseMatsRI(junctions, strand = "+")

# Parse alternative 3' splicing site event
junctions <- read.table(text =
"79685787 79685910 79685910 79685910 79679566 79679751")
psichomics:::parseMatsA3SS(junctions, strand = "+")

# Parse alternative 5' splicing site event
junctions <- read.table(text =
"102884421 102884501 102884421 102884489 102884812 102885881")
psichomics:::parseMatsA5SS(junctions, strand = "+")

# Parse alternative first exon event
junctions <- read.table(text =
"16308723 16308879 16308967 16309119 16314269 16314426")
psichomics:::parseMatsAFE(junctions, strand = "+")

# Parse alternative last exon event
junctions <- read.table(text =
"111858645 111858828 111851063 111851921 111850441 111850543")
parseMisoEvent

Parse an alternative splicing event from MISO

Description

Parse an alternative splicing event from MISO

Usage

parseMisoEvent(event)

Arguments

event      Data.frame containing only one event with at least 7 columns as retrieved from the alternative splicing annotation files from MISO (GFF3 files)

Details

More information about MISO available at http://miso.readthedocs.org

Value

List with event attributes and junction positions for the exons (depends on the events)

Examples

# example of alternative splicing event: skipped exon (SE)
event <- read.table(text = "
  chr1 SE gene 16854 18061 . - .
  chr1 SE mRNA 16854 18061 . - .
  chr1 SE exon 16854 17055 . - .
  chr1 SE exon 17233 17742 . - .
  chr1 SE exon 17915 18061 . - .
  chr1 SE mRNA 16854 18061 . - .
  chr1 SE exon 16854 17955 . - .
  chr1 SE exon 17915 18061 . - .")
psichomics:::parseMisoEvent(event)
parseMisoEventID

Description

Match MISO’s splicing event IDs with the IDs present in the alternative splicing annotation file and get events in a data frame.

Usage

parseMisoEventID(eventID, annotation, IDcolumn)

Arguments

- eventID: Character: alternative event IDs
- annotation: Data.frame: alternative event annotation file
- IDcolumn: Integer: index of the column with the event ID’s in the alternative event annotation file

Details

For faster execution times, provide a vector of event IDs.
For more information about MISO, see [http://miso.readthedocs.org](http://miso.readthedocs.org).

Value

Data frame of the matching events (or NA when nothing matches)

Note

If possible, it’s recommend to use smaller subsets of the alternative events’ annotation instead of all data for faster runs. For example, when trying to match only skipped exons event IDs, only use the annotation of skipped exons instead of using a mega annotation with all event types.

Examples

eventID <- c("114785@uc001sok.1@uc001soj.1", "114784@uc001bxm.1@uc001bxn.1")
# the annotation is one of the GFF3 files needed to run MISO
gff3 <- system.file("extdata", "miso_AS_annot_example.gff3", package="psichomics")
annotation <- read.delim(gff3, header=FALSE, comment.char="#")
IDcolumn <- 9
psichomics:::parseMisoEventID(eventID, annotation, IDcolumn)
Parse junctions of an event from MISO according to event type

**Description**

Parse junctions of an event from MISO according to event type

**Usage**

```r
parseMisoGeneric(event, validator, eventType, coord, plusIndex, minusIndex)
parseMisoSE(event)
parseMisoMXE(event)
parseMisoRI(event, strand)
parseMisoA5SS(event)
parseMisoA3SS(event, plusIndex, minusIndex)
parseMisoTandemUTR(event, minusIndex)
parseMisoAFE(event)
parseMisoALE(event)
```

**Arguments**

- `event` Data.frame containing only one event with at least 7 columns as retrieved from the alternative splicing annotation files from MISO (GFF3 files)
- `validator` Character: valid elements for each event
- `eventType` Character: event type (see details for available events)
- `coord` Character: coordinate positions to fill
- `plusIndex` Integer: index of the coordinates for a plus strand event
- `minusIndex` Integer: index of the coordinates for a minus strand event
- `strand` Character: positive-sense (+) or negative-sense - strand

**Details**

The following event types are available to be parsed:

- **SE** (exon skipping)
- **MXE** (mutually exclusive exon)
- **RI** (retained intron)
• A5SS (alternative 5’ splice site)
• A3SS (alternative 3’ splice site)
• AFE (alternative first exon)
• ALE (alternative last exon)
• Tandem UTR

Value
List of parsed junctions

See Also
parseMisoEvent()

Examples

# skipped exon event (SE)
event <- read.table(text = "
  chr1 SE gene 16854 18061 . - .
  chr1 SE mRNA 16854 18061 . - .
  chr1 SE exon 16854 17055 . - .
  chr1 SE exon 17233 17742 . - .
  chr1 SE exon 17915 18061 . - .
  chr1 SE exon 16854 18061 . - .
  chr1 SE exon 16854 17955 . - .
  chr1 SE exon 17915 18061 . - .
)
pseudomics:::parseMisoSE(event)

# mutually exclusive exon (MXE) event
event <- read.table(text = "
  chr1 MXE gene 764383 788090 . + .
  chr1 MXE mRNA 764383 788090 . + .
  chr1 MXE exon 764383 764484 . + .
  chr1 MXE exon 776580 776753 . + .
  chr1 MXE exon 787307 788090 . + .
  chr1 MXE mRNA 764383 788090 . + .
  chr1 MXE exon 764383 764484 . + .
  chr1 MXE exon 783034 783186 . + .
  chr1 MXE exon 787307 788090 . + .
)
pseudomics:::parseMisoMXE(event)

# retained intron (RI) event
event <- read.table(text = "
  chr1 RI gene 17233 17742 . - .
  chr1 RI mRNA 17233 17742 . - .
  chr1 RI exon 17233 17742 . - .
  chr1 RI mRNA 17233 17742 . - .
  chr1 RI exon 17233 17364 . - .
  chr1 RI exon 17601 17742 . - .
)
pseudomics:::parseMisoRI(event)
# alternative 5' splice site (A5SS) event
event <- read.table(text = "
  chr1 A5SS gene 17233 17742 . - .
  chr1 A5SS mRNA 17233 17742 . - .
  chr1 A5SS exon 17233 17368 . - .
  chr1 A5SS exon 17526 17742 . - .
  chr1 A5SS mRNA 17233 17742 . - .
  chr1 A5SS exon 17233 17368 . - .
  chr1 A5SS exon 17606 17742 . - .")
psichomics:::parseMisoA5SS(event)

# alternative 3' splice site (A3SS) event
event <- read.table(text = "
  chr1 A3SS gene 15796 16765 . - .
  chr1 A3SS mRNA 15796 16765 . - .
  chr1 A3SS exon 15796 15947 . - .
  chr1 A3SS exon 16607 16765 . - .
  chr1 A3SS mRNA 15796 16765 . - .
  chr1 A3SS exon 15796 15942 . - .
  chr1 A3SS exon 16607 16765 . - .")
psichomics:::parseMisoA3SS(event)

# Tandem UTR event
event <- read.table(text = "
  chr19 TandemUTR gene 10663759 10664625 . - .
  chr19 TandemUTR mRNA 10663759 10664625 . - .
  chr19 TandemUTR exon 10663759 10664625 . - .
  chr19 TandemUTR mRNA 10664223 10666423 . - .")
psichomics:::parseMisoTandemUTR(event)

# alternative first exon (AFE) event
event <- read.table(text = "
  chr12 AFE gene 57916659 57920171 . + .
  chr12 AFE mRNA 57919131 57920171 . + .
  chr12 AFE exon 57919131 57920171 . + .
  chr12 AFE mRNA 57916659 57918199 . + .
  chr12 AFE exon 57916659 57916794 . + .
  chr12 AFE exon 57917812 57917875 . + .
  chr12 AFE exon 57918063 57918199 . + .")
psichomics:::parseMisoAFE(event)

# alternative last exon (ALE) event
event <- read.table(text = "
  chr6 ALE gene 30620579 30822593 . + .
  chr6 ALE mRNA 30822190 30822593 . + .
  chr6 ALE exon 30822190 30822593 . + .
  chr6 ALE mRNA 30620579 30620982 . + .
  chr6 ALE exon 30620579 30620982 . + .")
psichomics:::parseMisoALE(event)
parseMisoId | Parse MISO's alternative splicing event identifier

**Description**
Parse MISO's alternative splicing event identifier

**Usage**
parseMisoId(id)

**Arguments**
id | Character: MISO alternative splicing event identifier

**Value**
Character with the parsed ID

**Examples**
```r
id <- paste0("ID=ENSMUSG00000026150.chr1:82723803:82723911:+@chr1:82724642:82724813:",
          "+@chr1:82725791:82726011:+.B;Parent=ENSMUSG00000026150.chr1:82723803:"
          ",
          "82723911:+@chr1:82724642:82724813:+@chr1:82725791:82726011:+")
psychomics:::parseMisoId(id)
```

parseSplicingEvent | Parse alternative splicing event identifier

**Description**
Parse alternative splicing event identifier

**Usage**
parseSplicingEvent(
  event,
  char = FALSE,
  pretty = FALSE,
  extra = NULL,
  coords = FALSE,
  data = NULL
)
parseSuppaAnnotation

Parse events from alternative splicing annotation

Description

Parse events from alternative splicing annotation

Usage

parseSuppaAnnotation(
  folder,
  types = c("SE", "AF", "AL", "MX", "A5", "A3", "RI"),
  genome = "hg19"
)
parseVastToolsAnnotation(
  folder,
  types = c("ALT3", "ALT5", "COMBI", "IR", "MERGE3m", "MIC", "EXSK", "MULTI"),
  genome = "Hsa",
  complexEvents = FALSE
)

parseMisoAnnotation(
  folder,
  genome = "hg19"
)

parseMatsAnnotation(
  folder,
  types = c("SE", "AFE", "ALE", "MXE", "A5SS", "A3SS", "RI"),
  genome = "fromGTF",
  novelEvents = TRUE
)

Arguments

can be:

folder Character: path to folder

types Character: type of events to retrieve (depends on the program of origin; see
details)

gene Character: genome of interest (for instance, hg19; depends on the program of
origin)

compEvents Boolean: should complex events in A3SS and A5SS be parsed?

Details

Type of parsable events:

- Alternative 3' splice site
- Alternative 5' splice site
- Alternative first exon
- Alternative last exon
- Skipped exon (may include skipped micro-exons)
- Mutually exclusive exon
- Retained intron
- Tandem UTR

Value

Retrieve data frame with events based on a given alternative splicing annotation
parseSuppaEvent

Parses splicing events of a specific event type from SUPPA

Description

Parses splicing events of a specific event type from SUPPA

Usage

parseSuppaEvent(event)

Arguments

  event    Character vector: Splicing event attributes and junction positions

Details

More information about SUPPA available at https://bitbucket.org/regulatorygenomicsupf/suppa

The following event types are available to be parsed:
• **SE** (skipped exon)
• **RI** (retained intron)
• **MX** (mutually exclusive exons)
• **A5** (alternative 5’ splice site)
• **A3** (alternative 3’ splice site)
• **AL** (alternative last exon)
• **AF** (alternative first exon)

**Value**
List with the event attributes (chromosome, strand, event type and the position of the exon boundaries)

**Note**
It only allows to parse one event type at once.

**Examples**
```
event <- "ENSG00000000419;A3:20:49557492-49557642:49557470-49557642:-"
plicomics:::parseSuppaEvent(event)
```

---

**parseSuppaGeneric**  
*Parse junctions of an event from SUPPA*

**Description**
Parse junctions of an event from SUPPA

**Usage**
```
parsSuppaGeneric(junctions, strand, coords, plus_pos, minus_pos)
parsSuppaSE(junctions, strand)
parsSuppaRI(junctions, strand)
parsSuppaALE(junctions, strand)
parsSuppaAFE(junctions, strand)
parsSuppaMXE(junctions, strand)
parsSuppaA3SS(junctions, strand)
parsSuppaA5SS(junctions, strand)
```
parseSuppaGeneric

Arguments

- **junctions**: List of integers: exon-exon junctions of an event
- **strand**: Character: positive-sense (+) or negative-sense (−) strand
- **coords**: Character: coordinate positions to fill
- **plus_pos**: Integer: index of the coordinates for a plus strand event
- **minus_pos**: Integer: index of the coordinates for a minus strand event

Details

The following event types are available to be parsed:

- **SE** (exon skipping)
- **RI** (retained intron)
- **MXE** (mutually exclusive exons)
- **A5SS** (alternative 5' splice site)
- **A3SS** (alternative 3' splice site)
- **ALE** (alternative last exon)
- **AFE** (alternative first exon)

Value

Data frame of parsed junctions

See Also

parseSuppaEvent()

Examples

```r
# Parse generic event (in this case, an exon skipping event)
junctions <- read.table(text = "169768099 169770024 169770112 169771762")
plus <- 1:4
minus <- 1:4
psychomics::parseSuppaGeneric(junctions, strand = "+", coords, plus, minus)

junctions <- read.table(text = "169768099 169770024 169770112 169771762")
psychomics::parseSuppaSE(junctions, "+")

junctions <- read.table(text = "196709749 196709922 196711005 196711181")
psychomics::parseSuppaRI(junctions, "+")

junctions <- read.table(
    text = "24790610 24792494 24792800 24790610 24795476 24795797")
psychomics::parseSuppaALE(junctions, "+")

junctions <- read.table(
    text = "169763871 169764046 169767998 169764550 169765124 169767998")
```
parseTCGAsampleTypes

Parse sample information from TCGA sample identifiers

Description

Parse sample information from TCGA sample identifiers

Usage

parseTCGAsampleTypes(
  samples,
  filename = system.file("extdata", "TCGAsampleType.RDS", package = "psichomics")
)

parseTCGAsampleInfo(samples, match = NULL)

Arguments

samples Character: sample identifiers
filename Character: path to RDS file containing corresponding types
match Integer: match between samples and subjects (NULL by default; performs the match)

Value

Metadata associated with each TCGA sample

See Also

Other functions associated with TCGA data retrieval: getDownloadsFolder(), getTCGAdatasetTypes(), isFirebrowseUp(), loadTCGAdataset()
Examples

```r
parseTCGAsampleTypes(c("TCGA-01A-Tumour", "TCGA-10B-Normal"))
samples <- c("TCGA-3C-AAAU-01A-11R-A41B-07", "TCGA-3C-AALI-01A-11R-A41B-07",
"TCGA-3C-AALJ-01A-31R-A41B-07", "TCGA-3C-AALK-01A-11R-A41B-07",
"TCGA-4H-AAAK-01A-12R-A41B-07", "TCGA-5L-AAT0-01A-12R-A41B-07")
parseTCGAsampleInfo(samples)
```

---

**parseUniprotXML**  
*Parse XML from UniProt REST service*

**Description**  
Parse XML from UniProt REST service

**Usage**

```r
parseUniprotXML(xml)
```

**Arguments**

- `xml` response from UniProt

**Value**

List containing protein length and data frame of protein features

---

**parseUrlsFromFirebrowseResponse**  
*Retrieve URLs from a response to a FireBrowse data query*

**Description**  
Retrieve URLs from a response to a FireBrowse data query

**Usage**

```r
parseUrlsFromFirebrowseResponse(res)
```

**Arguments**

- `res` Response from `httr::GET` to a FireBrowse data query

**Value**

Named character with URLs
parseVastToolsEvent

Parses an alternative splicing event from VAST-TOOLS

Description

Parses an alternative splicing event from VAST-TOOLS

Usage

parseVastToolsEvent(event)

Arguments

event Data.frame: VAST-TOOLS event containing gene symbol, event ID, length, junctions coordinates, event type and inclusion levels for both samples

Details

Junctions are parsed from

Value

List with the event attributes (chromosome, strand, event type and the position of the exon boundaries)

Note

Only supports to parse one event at a time.

Examples

event <- read.table(text =
"NFYA HsaEX0042823 chr6:41046768-41046903 136 chr6:41040823,41046768-41046903,41051785 C2 0 N 0 N"
)
psichomics:::parseVastToolsEvent(event)
parseVastToolsSE  

Parse junctions of an event from VAST-TOOLS according to event type

Description
Parse junctions of an event from VAST-TOOLS according to event type

Usage

```r
parseVastToolsSE(junctions)
parseVastToolsRI(junctions, strand)
parseVastToolsA3SS(junctions)
parseVastToolsA5SS(junctions)
```

Arguments

- `junctions`: Data.frame or matrix: exon-exon junctions of alternative splicing events (it must have 4 columns)
- `strand`: Character: positive (+) or negative (-) strand

Details

The following event types are available to be parsed:

- **SE** (skipped exon)
- **RI** (retained intron)
- **A5SS** (alternative 5' splice site)
- **A3SS** (alternative 3' splice site)

Value
List of parsed junctions

See Also

`parseVastToolsEvent()`

Examples

```r
junctions <- read.table(text = "41040823 41046768 41046903 41051785")
psichomics::parseVastToolsSE(junctions)

# these functions are vectorised!
junctions <- read.table(text = "41040823 41046768 41046903 41051785")
```
performICA

Perform independent component analysis after processing missing values

Usage

performICA(
  data,
  n.comp = min(5, ncol(data)),
  center = TRUE,
  scale. = FALSE,
  missingValues = round(0.05 * nrow(data)),
  alg.typ = c("parallel", "defaltion"),
  fun = c("logcosh", "exp"),
  alpha = 1,
  ...
)

Arguments

data an optional data frame (or similar: see model.frame) containing the variables in the formula formula. By default the variables are taken from environment(formula).
n.comp number of components to be extracted
center a logical value indicating whether the variables should be shifted to be zero centered. Alternately, a vector of length equal the number of columns of x can be supplied. The value is passed to scale.
performPCA

scale.

missingValues

alg.typ

fun

alpha

...:

Value

ICA result in a prcomp object

See Also

Other functions to analyse independent components: plotICA()

Examples

performICA(USArrests)

Description

Perform principal component analysis after processing missing values

Usage

performPCA(
  data,
  center = TRUE,
  scale. = FALSE,
  missingValues = round(0.05 * nrow(data)),
  ...
)

Perform principal component analysis after processing missing values
**plotClusters**

**Arguments**

- **data**
  - an optional data frame (or similar: see `model.frame`) containing the variables in the formula `formula`. By default the variables are taken from `environment(formula)`.

- **center**
  - a logical value indicating whether the variables should be shifted to be zero centered. Alternately, a vector of length equal the number of columns of `x` can be supplied. The value is passed to `scale`.

- **scale**
  - a logical value indicating whether the variables should be scaled to have unit variance before the analysis takes place. The default is `FALSE` for consistency with S, but in general scaling is advisable. Alternatively, a vector of length equal the number of columns of `x` can be supplied. The value is passed to `scale`.

- **missingValues**
  - Integer: number of tolerated missing values per column to be replaced with the mean of the values of that same column...

- **...**
  - Arguments passed on to `stats::prcomp`

**Value**

PCA result in a `prcomp` object

**See Also**

Other functions to analyse principal components: `calculateLoadingsContribution()`, `plotPCA()`, `plotPCAvariance()`

**Examples**

```r
performPCA(USArrests)
```

---

**plotClusters**

*Add clusters to highchart object*

**Description**

Clusters are added as coloured polygons.

**Usage**

```r
plotClusters(hc, data, clustering)
```

**Arguments**

- **hc**
  - highchart object

- **data**
  - Data frame

- **clustering**
  - Character: group of each sample

**Value**

*highcharter object*
plotDistribution

Plot sample distribution

Description

The tooltip shows the median, variance, maximum, minimum and number of non-NA samples of each data series, as well as sample names if available.

Usage

plotDistribution(
  data,
  groups = NULL,
  rug = length(data) < 500,
  vLine = TRUE,
  ..., 
  title = NULL,
  subtitle = NULL,
  type = c("density", "boxplot", "violin"),
  invertAxes = FALSE,
  psi = NULL,
  rugLabels = FALSE,
  rugLabelsRotation = 0,
  legend = TRUE,
  valueLabel = NULL
)

Arguments

- **data**: Numeric, data frame or matrix: gene expression data or alternative splicing event quantification values (sample names are based on their names or colnames)
- **groups**: List of sample names or vector containing the group name per data value (read Details); if NULL or a character vector of length 1, data values are considered from the same group
- **rug**: Boolean: show rug plot?
- **vLine**: Boolean: plot vertical lines (including descriptive statistics for each group)?
- **...**: Arguments passed on to `stats::density.default`
- **bw**: the smoothing bandwidth to be used. The kernels are scaled such that this is the standard deviation of the smoothing kernel. (Note this differs from the reference books cited below, and from S-PLUS.)
- **psi**: The specified (or computed) value of `bw` is multiplied by `adjust`.

The default, "nrd0", has remained the default for historical and compatibility reasons, rather than as a general recommendation, where e.g., "SJ" would rather fit, see also Venables and Ripley (2002).

The specified (or computed) value of `bw` is multiplied by `adjust`.
adjust the bandwidth used is actually adjust*bw. This makes it easy to specify values like “half the default” bandwidth.

kernel, window a character string giving the smoothing kernel to be used. This must partially match one of "gaussian", "rectangular", "triangular", "epanechnikov", "biweight", "cosine" or "optcosine", with default "gaussian", and may be abbreviated to a unique prefix (single letter). "cosine" is smoother than "optcosine", which is the usual ‘cosine’ kernel in the literature and almost MSE-efficient. However, "cosine" is the version used by S.

weights numeric vector of non-negative observation weights, hence of same length as x. The default NULL is equivalent to weights = rep(1/nx, nx) where nx is the length of (the finite entries of) x[]. If na.rm = TRUE and there are NA’s in x, they and the corresponding weights are removed before computations. In that case, when the original weights have summed to one, they are re-scaled to keep doing so.

Note that weights are not taken into account for automatic bandwidth rules, i.e., when bw is a string. When the weights are proportional to true counts cn, density(x = rep(x, cn)) may be used instead of weights.

width this exists for compatibility with S; if given, and bw is not, will set bw to width if this is a character string, or to a kernel-dependent multiple of width if this is numeric.

give.Rkern logical; if true, no density is estimated, and the ‘canonical bandwidth’ of the chosen kernel is returned instead.

subdensity used only when weights are specified which do not sum to one.

When true, it indicates that a “sub-density” is desired and no warning should be signalled. By default, when false, a warning is signalled when the weights do not sum to one.

warnWbw logical, used only when weights are specified and bw is character, i.e., automatic bandwidth selection is chosen (as by default). When true (as by default), a warning is signalled to alert the user that automatic bandwidth selection will not take the weights into account and hence may be suboptimal.

n the number of equally spaced points at which the density is to be estimated. When n > 512, it is rounded up to a power of 2 during the calculations (as fft is used) and the final result is interpolated by approx. So it almost always makes sense to specify n as a power of two.

from, to the left and right-most points of the grid at which the density is to be estimated; the defaults are cut * bw outside of range(x).

cut by default, the values of from and to are cut bandwidths beyond the extremes of the data. This allows the estimated density to drop to approximately zero at the extremes.

title Character: plot title

subtitle Character: plot subtitle

type Character: density, boxplot or violin plot

invertAxes Boolean: plot X axis as Y and vice-versa?
plotGeneExprPerSample

Plot distribution of gene expression per sample

Description

Plot distribution of gene expression per sample

Usage

plotGeneExprPerSample(geneExpr, ...)

Details

Argument groups can be either:

- a list of sample names, e.g. list("Group 1"=c("Sample A", "Sample B"), "Group 2"=c("Sample C"))
- a character vector with the same length as data, e.g. c("Sample A", "Sample C", "Sample B").

Value

highchart object with density plot

See Also

Other functions to perform and plot differential analyses: diffAnalyses()

Examples

data <- sample(20, rep=TRUE)/20
groups <- paste("Group", c(rep("A", 10), rep("B", 10)))
names(data) <- paste("Sample", seq(data))
plotDistribution(data, groups)

# Using colours
attr(groups, "Colour") <- c("Group A"="pink", "Group B"="orange")
plotDistribution(data, groups)
plotGroupIndependence

**Arguments**

- `geneExpr` Data frame or matrix: gene expression
- ... Arguments passed on to `renderBoxplot`
- `data` Data frame or matrix
- `outliers` Boolean: draw outliers?
- `sortByMedian` Boolean: sort box plots based on ascending median?
- `showXlabels` Boolean: show labels in X axis?

**Value**

Gene expression distribution plots

**See Also**

Other functions for gene expression pre-processing: `convertGeneIdentifiers()`, `filterGeneExpr()`, `normaliseGeneExpression()`, `plotLibrarySize()`, `plotRowStats()`

**Examples**

```r
df <- data.frame(geneA=c(2, 4, 5),
                 geneB=c(20, 3, 5),
                 geneC=c(5, 10, 21))
colnames(df) <- paste("Sample", 1:3)
plotGeneExprPerSample(df)
```

---

**Description**

Plot $-\log_{10}(p$-values$)$ of the results obtained after multiple group independence testing

**Usage**

```r
plotGroupIndependence(
    groups,
    top = 50,
    textSize = 10,
    colourLow = "lightgrey",
    colourMid = "blue",
    colourHigh = "orange",
    colourMidpoint = 150
)
```
plotICA

Create multiple scatterplots from ICA

Arguments

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>groups</td>
<td>multiGroupIndependenceTest object (obtained after running <code>testGroupIndependence()</code>)</td>
</tr>
<tr>
<td>top</td>
<td>Integer: number of attributes to render</td>
</tr>
<tr>
<td>textSize</td>
<td>Integer: size of the text</td>
</tr>
<tr>
<td>colourLow</td>
<td>Character: name or HEX code of colour for lower values</td>
</tr>
<tr>
<td>colourMid</td>
<td>Character: name or HEX code of colour for middle values</td>
</tr>
<tr>
<td>colourHigh</td>
<td>Character: name or HEX code of colour for higher values</td>
</tr>
<tr>
<td>colourMidpoint</td>
<td>Numeric: midpoint to identify middle values</td>
</tr>
</tbody>
</table>

Value

`ggplot` object

See Also

`parseCategoricalGroups()` and `testGroupIndependence()`

Other functions for data grouping: `createGroupByAttribute()`, `getGeneList()`, `getSampleFromSubject()`, `getSubjectFromSample()`, `groupPerElem()`, `testGroupIndependence()`

Examples

```r
elements <- paste("subjects", 1:50)
ref <- elements[10:50]
groups <- list(race=list(asian=elements[1:3],
                         white=elements[4:7],
                         black=elements[8:10]),
               region=list(european=elements[c(4, 5, 9)],
                          african=elements[c(6:8, 10:50)]))
groupTesting <- testGroupIndependence(ref, groups, elements)
plotGroupIndependence(groupTesting)
```

plotICA

Create multiple scatterplots from ICA

Description

Create multiple scatterplots from ICA

Usage

```r
plotICA(ica, components = seq(10), groups = NULL, ...)
```
Arguments

- **ica**: Object resulting from `performICA()`
- **components**: Numeric: independent components to plot
- **groups**: Matrix: groups to plot indicating the index of interest of the samples (use clinical or sample groups)
- ... Arguments passed on to `pairsD3::pairsD3`

  - **group**: a optional vector specifying the group each observation belongs to. Used for tooltips and colouring the observations.
  - **subset**: an optional vector specifying a subset of observations to be used for plotting. Useful when you have a large number of observations, you can specify a random subset.
  - **labels**: the names of the variables (column names of x used by default).
  - **cex**: the magnification of the plotting symbol (default=3)
  - **width**: the width (and height) of the plot when viewed externally.
  - **col**: an optional (hex) colour for each of the levels in the group vector.
  - **big**: a logical parameter. Prevents inadvertent plotting of huge data sets. Default limit is 10 variables, to plot more than 10 set big=TRUE.
  - **theme**: a character parameter specifying whether the theme should be colour (default) or black and white bw.
  - **opacity**: numeric between 0 and 1. The opacity of the plotting symbols (default 0.9).
  - **tooltip**: an optional vector with the tool tip to be displayed when hovering over an observation. You can include basic html.
  - **leftmar**: space on the left margin
  - **topmar**: space on the bottom margin
  - **diag**: logical, whether or not the main diagonal is plotted (scatter plot of variables against themselves).

Value

Multiple scatterplots as a `pairsD3` object

See Also

Other functions to analyse independent components: `performICA()`

Examples

data <- scale(USArrests)
ica <- fastICA::fastICA(data, n.comp=4)
plotICA(ica)

# Colour by groups
groups <- NULL
groups$sunny <- c("California", "Hawaii", "Florida")
groups$ozEntrance <- c("Kansas")
groups$novel <- c("New Mexico", "New York", "New Hampshire", "New Jersey")
plotICA(ica, groups=groups)

---

plotLibrarySize  

**Plot library size**

---

### Description

Plot library size

### Usage

```r
plotLibrarySize(
  data, 
  log10 = TRUE, 
  title = "Library size distribution across samples", 
  subtitle = "Library size: total number of mapped reads", 
  colour = "orange"
)
```

### Arguments

- `data`: Data frame or matrix: gene expression
- `log10`: Boolean: log10-transform data?
- `title`: Character: plot title
- `subtitle`: Character: plot subtitle
- `colour`: Character: data colour

### Value

Library size distribution

### See Also

Other functions for gene expression pre-processing: `convertGeneIdentifiers()`, `filterGeneExpr()`, `normaliseGeneExpression()`, `plotGeneExprPerSample()`, `plotRowStats()`

### Examples

```r
def <- data.frame(geneA=c(2, 4, 5),
  geneB=c(20, 3, 5),
  geneC=c(5, 10, 21))
colnames(df) <- paste("Sample", 1:3)
plotLibrarySize(df)
```
plotPCA

Create a scatterplot from a PCA object

Description

Create a scatterplot from a PCA object

Usage

plotPCA(
  pca,
  pcX = 1,
  pcY = 2,
  groups = NULL,
  individuals = TRUE,
  loadings = FALSE,
  nLoadings = NULL
)

Arguments

pca  prcomp object
pcX  Character: name of the X axis of interest from the PCA
pcY  Character: name of the Y axis of interest from the PCA
groups  Matrix: groups to plot indicating the index of interest of the samples (use clinical or sample groups)
individuals  Boolean: plot PCA individuals
loadings  Boolean: plot PCA loadings/rotations
nLoadings  Integer: Number of variables to plot, ordered by those that most contribute to selected principal components (this allows for faster performance as only the most contributing variables are rendered); if NULL, all variables are plotted

Value

Scatterplot as an highchart object

See Also

Other functions to analyse principal components: calculateLoadingsContribution(), performPCA(), plotPCAvariance()
**plotPCAvariance**

Create the explained variance plot from a PCA

---

**Description**

Create the explained variance plot from a PCA

**Usage**

```r
plotPCAvariance(pca)
```

**Arguments**

- `pca` 
  - `prcomp` object

**Value**

Plot variance as an `highchart` object

**See Also**

Other functions to analyse principal components: `calculateLoadingsContribution()`, `performPCA()`, `plotPCA()`

**Examples**

```r
pca <- prcomp(USArrests)
pca <- prcomp(USArrests, scale=TRUE)
plotPCAvariance(pca)
plotPCAvariance(pca, pcX=2, pcY=3)

# Plot both individuals and loadings
plotPCAvariance(pca, pcX=2, pcY=3, loadings=TRUE)

# Only plot loadings
plotPCAvariance(pca, pcX=2, pcY=3, loadings=TRUE, individuals=FALSE)
```
plotPointsStyle  
*Interface to modify the style of the plot points*

**Description**

Interface to modify the style of the plot points

**Usage**

```r
plotPointsStyle(
  ns,
  id,
  description,
  help = NULL,
  size = 2,
  colour = "black",
  alpha = 1
)
```

**Arguments**

- `ns`  
  Namespace function
- `id`  
  Character: identifier
- `description`  
  Character: display text for user
- `help`  
  Character: extra text to help the user
- `size`  
  Integer: default size
- `colour`  
  Character: default colour
- `alpha`  
  Numeric: default transparency value

**Value**

HTML elements

---

plotProtein  
*Plot protein features*

**Description**

Plot protein features

**Usage**

```r
plotProtein(molecule)
```
\texttt{plotRowStats}

Arguments

\texttt{molecule} \hspace{1cm} \text{Character: UniProt protein or Ensembl transcript identifier}

Value

\texttt{highcharter} object

See Also

Other functions to retrieve external information: \texttt{ensemblToUniprot()}, \texttt{plotTranscripts()}, \texttt{queryEnsemblByGene()}

Examples

```r
protein <- "P38398"
plotProtein(protein)

transcript <- "ENST00000488540"
plotProtein(transcript)
```

\texttt{plotRowStats} \hspace{1cm} \textit{Plot row-wise statistics}

Description

Scatter plot to compare between the row-wise mean, median, variance or range from a data frame or matrix. Also supports transformations of those variables, such as $\log_{10}(\text{mean})$. If $y = \text{NULL}$, a density plot is rendered instead.

Usage

```r
plotRowStats(
    data,
    x,
    y = \text{NULL},
    subset = \text{NULL},
    xmin = \text{NULL},
    xmax = \text{NULL},
    ymin = \text{NULL},
    ymax = \text{NULL},
    xlim = \text{NULL},
    ylim = \text{NULL},
    cache = \text{NULL},
    verbose = \text{FALSE},
    data2 = \text{NULL},
    legend = \text{FALSE},
    legendLabels = c("Original", "Highlighted")
)```
Arguments

- **data**
  Data frame or matrix containing samples per column and, for instance, gene or alternative splicing event per row.

- **x, y**
  Character: statistic to calculate and display in the plot per row; choose between `mean`, `median`, `var` or range (or transformations of those variables, e.g. `log10(var)`); if `y = NULL`, the density of `x` will be plot instead.

- **subset**
  Boolean or integer: data points to highlight.

- **xmin, xmax, ymin, ymax**
  Numeric: minimum and maximum X and Y values to draw in the plot.

- **xlim, ylim**
  Numeric: X and Y axis range.

- **cache**
  List of summary statistics for `data` previously calculated to avoid repeating calculations (output also returns cache in attribute named `cache` with appropriate data).

- **verbose**
  Boolean: print messages of the steps performed.

- **data2**
  Same as `data` argument but points in `data2` are highlighted (unless `data2 = NULL`).

- **legend**
  Boolean: show legend?

- **legendLabels**
  Character: legend labels.

Value

Plot of `data`

See Also

Other functions for gene expression pre-processing: `convertGeneIdentifiers()`, `filterGeneExpr()`, `normaliseGeneExpression()`, `plotGeneExprPerSample()`, `plotLibrarySize()`.

Other functions for PSI quantification: `filterPSI()`, `getSplicingEventTypes()`, `listSplicingAnnotations()`, `loadAnnotation()`, `quantifySplicing()`.

Examples

```r
library(ggplot2)

# Plotting gene expression data
geneExpr <- readFile("ex_gene_expression.RDS")
plotRowStats(geneExpr, "mean", "var^((1/4))") +
  ggtitle("Mean-variance plot") +
  labs(y="Square Root of the Standard Deviation")

# Plotting alternative splicing quantification
annot <- readFile("ex_splicing_annotation.RDS")
junctionQuant <- readFile("ex_junctionQuant.RDS")
psi <- quantifySplicing(annot, junctionQuant, eventType=c("SE", "MXE"))
medianVar <- plotRowStats(psi, x="median", y="var", xlim=c(0, 1)) +
  labs(x="Median PSI", y="PSI variance")
```
medianVar

rangeVar <- plotRowStats(psi, x="range", y="log10(var)", xlim=c(0, 1)) +
  labs(x="PSI range", y="log10(PSI variance)")
rangeVar

plotSingleICA

Create a scatterplot for ICA

Description

Create a scatterplot for ICA

Usage

plotSingleICA(ica, icX = 1, icY = 2, groups = NULL)

Arguments

ica Object containing an ICA
icX Character: name of the X axis
icY Character: name of the Y axis
groups Matrix: groups to plot indicating the index of interest of the samples (use clinical or sample groups)

Value

Scatterplot as an highcharter object

Examples

ica <- performICA(USArrests, scale=TRUE)
psichomics::plotSingleICA(ica)
psichomics::plotSingleICA(ica, icX=2, icY=3)

# Colour by groups
groups <- NULL
groups$sunny <- c("California", "Hawaii", "Florida")
groups$ozEntrance <- c("Kansas")
groups$novel <- c("New Mexico", "New York", "New Hampshire", "New Jersey")
psichomics::plotSingleICA(ica, groups=groups)
**Description**

Plot diagram of alternative splicing events

**Usage**

```r
plotSplicingEvent(
  ASevent,
  data = NULL,
  showText = TRUE,
  showPath = TRUE,
  showAlternative1 = TRUE,
  showAlternative2 = TRUE,
  constitutiveWidth = NULL,
  alternativeWidth = NULL,
  intronWidth = NULL,
  constitutiveFill = "lightgray",
  constitutiveStroke = "darkgray",
  alternative1Fill = "#ff8b3c",
  alternative1Stroke = "#faa000",
  alternative2Fill = "#b39d70",
  alternative2Stroke = "#9d7039",
  class = NULL,
  style = NULL
)
```

**Arguments**

- **ASevent**: Character: alternative splicing event identifiers
- **data**: Matrix or data frame: alternative splicing information
- **showText**: Boolean: display coordinates and length (if available)
- **showPath**: Boolean: display alternative splicing junctions
- **showAlternative1**: Boolean: show alternative exon 1 and respective splicing junctions and text? (only related with mutually exclusive exons)
- **showAlternative2**: Boolean: show alternative exon 2 and respective splicing junctions and text? (only related with mutually exclusive exons)
- **constitutiveWidth**: Numeric: width of constitutive exon(s)
- **alternativeWidth**: Numeric: width of alternative exon(s)
- **intronWidth**: Numeric: width of intron’s representation
constitutiveFill
  Character: fill colour of constitutive exons
constitutiveStroke
  Character: stroke colour of constitutive exons
alternative1Fill
  Character: fill colour of alternative exon 1
alternative1Stroke
  Character: stroke colour of alternative exon 1
alternative2Fill
  Character: fill colour of alternative exon 2
alternative2Stroke
  Character: stroke colour of alternative exon 2
class
  Character: class of SVG parent tag
style
  Character: style of SVG parent tag

Value

List of SVG (one for each alternative splicing event)

Examples

```r
events <- c(
  "A3SS_15_+_63353138_63353912_63353397_TPM1",
  "A3SS_11_+_61118463_61117115_61117894_CYB561A3",
  "A5SS_21_+_48055675_48056459_48056808_PRMT2",
  "A5SS_1_+_1274742_1274667_1274033_DVL1",
  "AFE_9_+_131902430_131901928_131904724_PPP2R4",
  "AFE_5_+_134686513_134688636_134681747_H2AFY",
  "ALE_12_+_56554104_56554410_5655171_MYL6",
  "ALE_8_+_38314874_38287466_38285953_FGFR1",
  "SE_9_+_6486925_6492303_6492401_6493826_UHRF2",
  "SE_19_+_5218431_5216778_5216731_5215606_PTPRS",
  "MXE_15_+_63335142_63335905_63336030_63336226_63336351_63349184_TPM1",
  "MXE_17_+_74090495_74087316_74087224_74086478_74086410_74085401_EXOC7"
)
diagram <- plotSplicingEvent(events)
```

## Not run:
```
diagram[["A3SS_3_+_145796903_145794682_145795711_PLOD2"]]
diagram[[6]]
diagram
```

## End(Not run)

---

**plotSurvivalCurves**

*Plot survival curves*

**Description**

Plot survival curves
Usage

plotSurvivalCurves(
  surv,
  mark = TRUE,
  interval = FALSE,
  pvalue = NULL,
  title = "Survival analysis",
  scale = NULL,
  auto = TRUE
)

Arguments

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>surv</td>
<td>Survival object</td>
</tr>
<tr>
<td>mark</td>
<td>Boolean: mark times?</td>
</tr>
<tr>
<td>interval</td>
<td>Boolean: show interval ranges?</td>
</tr>
<tr>
<td>pvalue</td>
<td>Numeric: p-value of the survival curves</td>
</tr>
<tr>
<td>title</td>
<td>Character: plot title</td>
</tr>
<tr>
<td>scale</td>
<td>Character: time scale (default is days)</td>
</tr>
<tr>
<td>auto</td>
<td>Boolean: return the plot automatically prepared (TRUE) or only the bare minimum (FALSE)?</td>
</tr>
</tbody>
</table>

Value

Plot of survival curves

See Also

Other functions to analyse survival: assignValuePerSubject(), getAttributesTime(), labelBasedOnCutoff(), optimalSurvivalCutoff(), plotSurvivalPvaluesByCutoff(), processSurvTerms(), survdiffTerms(), survfit.survTerms(), testSurvival()

Examples

```r
require("survival")
fit <- survfit(Surv(time, status) ~ x, data = aml)
plotSurvivalCurves(fit)
```

Description

Plot p-values of survival difference between groups based on multiple cutoffs
Usage
plotSurvivalPvaluesByCutoff(
  clinical,
  data,
  censoring,
  event,
  timeStart,
  timeStop = NULL,
  followup = "days_to_last_followup",
  significance = 0.05,
  cutoffs = seq(0, 0.99, 0.01)
)

Arguments
clinical   Data frame: clinical data
data        Numeric: elements of interest to test against the cutoff
censoring   Character: censor using left, right, interval or interval2
event       Character: name of column containing time of the event of interest
timeStart   Character: name of column containing starting time of the interval or follow up time
timeStop    Character: name of column containing ending time of the interval (only relevant for interval censoring)
followup    Character: name of column containing follow up time
significance Numeric: significance threshold
cutoffs     Numeric: cutoffs to test

Value
p-value plot

See Also
Other functions to analyse survival: assignValuePerSubject(), getAttributesTime(), labelBasedOnCutoff(), optimalSurvivalCutoff(), plotSurvivalCurves(), processSurvTerms(), survdiffTerms(), survfit.survTerms(), testSurvival()

Examples
clinical <- read.table(text = "2549 NA ii female
840 NA i female
NA 1204 iv male
NA 383 iv female
1293 NA iii male")
names(clinical) <- c("patient.days_to_last_followup",
                     "patient.days_to_death",
                     "patient.stage_event.pathologic_stage",
                     "patient.stage_event.clinical_stage")
plottableXranges

HTML code to plot a X-ranges series

Description

HTML code to plot a X-ranges series

Usage

plottableXranges(hc, shiny = FALSE)

Arguments

hc highcharter object
shiny Boolean: is the function running in a Shiny session?

Value

HTML elements
Description

Plot transcripts

Usage

plotTranscripts(
  info,
  eventPosition = NULL,
  event = NULL,
  eventData = NULL,
  shiny = FALSE
)

Arguments

- **info**: Information retrieved from Ensembl
- **eventPosition**: Numeric: coordinates of the alternative splicing event (ignored if event is set)
- **event**: Character: identifier of the alternative splicing event to plot
- **eventData**: Object containing event information to be parsed
- **shiny**: Boolean: is the function running in a Shiny session?

Value

NULL (function is only used to modify the Shiny session’s state or internal variables)

See Also

Other functions to retrieve external information: `ensemblToUniprot()`, `plotProtein()`, `queryEnsemblByGene()`

Examples

```r
event <- "SE_12_-7985318_7984360_7984200_7982602_SLC2A14"
info <- queryEnsemblByEvent(event, species="human", assembly="hg19")
## Not run:
plotTranscripts(info, event=event)
## End(Not run)
```
prepareAnnotationFromEvents

Prepare annotation from alternative splicing events

Description

In case more than one data frame with alternative splicing events is given, the events are cross-referenced according to the chromosome, strand and relevant coordinates per event type (see details).

Usage

prepareAnnotationFromEvents(...)

Arguments

... Data frame(s) of alternative splicing events to include in the annotation

Details

Events from two or more data frames are cross-referenced based on each event’s chromosome, strand and specific coordinates relevant for each event type:

- Skipped exon: constitutive exon 1 end, alternative exon (start and end) and constitutive exon 2 start
- Mutually exclusive exon: constitutive exon 1 end, alternative exon 1 and 2 (start and end) and constitutive exon 2 start
- Alternative 5’ splice site: constitutive exon 1 end, alternative exon 1 end and constitutive exon 2 start
- Alternative first exon: same as alternative 5’ splice site
- Alternative 3’ splice site: constitutive exon 1 end, alternative exon 1 start and constitutive exon 2 start
- Alternative last exon: same as alternative 3’ splice site

Value

List of data frames with the annotation from different data frames joined by event type

Note

When cross-referencing events, gene information is discarded.

See Also

Other functions to prepare alternative splicing annotations: parseSuppaAnnotation()
Examples

# Load sample files (SUPPA annotation)
folder <- "extdata/eventsAnnotSample/suppa_output/suppaEvents"
suppaOutput <- system.file(folder, package="psichomics")

# Parse and prepare SUPPA annotation
suppa <- parseSuppaAnnotation(suppaOutput)
annot <- prepareAnnotationFromEvents(suppa)

# Load sample files (rMATS annotation)
folder <- "extdata/eventsAnnotSample/mats_output/ASEvents/"
matsOutput <- system.file(folder, package="psichomics")

# Parse rMATS annotation and prepare combined annotation from rMATS and SUPPA
mats <- parseMatsAnnotation(matsOutput)
annot <- prepareAnnotationFromEvents(suppa, mats)

---

prepareEventPlotOptions

Prepare event plot options

Description

Prepare event plot options

Usage

prepareEventPlotOptions(id, ns, labelsPanel = NULL)

Arguments

id Character: identifier
ns Namespace identifier
labelsPanel Tab panel containing options to label points

Value

HTML elements
### prepareFileBrowser

*Prepare file browser dialogue and update the input’s value accordingly to selected file or directory*

**Description**

Prepare file browser dialogue and update the input’s value accordingly to selected file or directory

**Usage**

```r
prepareFileBrowser(session, input, id, modalId = "modal", ...)
```

**Arguments**

- `session`: Shiny session
- `input`: Shiny input
- `id`: Character: input identifier
- `modalId`: Character: modal window identifier
- `...`: Arguments passed on to `fileBrowser`
  - `default`: Character: path to initial folder
  - `caption`: Character: caption on the selection dialogue
  - `multiple`: Boolean: allow to select multiple files?
  - `directory`: Boolean: allow to select directories instead of files?

**Value**

`NULL` (function is only used to modify the Shiny session’s state or internal variables)

### prepareFirebrowseArchives

*Prepares FireBrowse archives in a given directory*

**Description**

Checks FireBrowse archives’ integrity using the MD5 files, extracts the content of the archives, moves the content to newly-created folders and removes the original downloaded archives.

**Usage**

```r
prepareFirebrowseArchives(archive, md5, folder, outdir)
```
**prepareGenePresentation**

Prepare presentation of multiple genes for the same splicing event

**Arguments**

- **archive**  Character: path to downloaded archives
- **md5**  Character: path to MD5 files of each archive
- **folder**  Character: master directory where every archive will be extracted
- **outdir**  Character: subdirectories where to move the extracted content

**Value**

Invisible TRUE if successful

**Examples**

```r
file <- paste0(
  "~/Downloads",
  "ACC/20151101/gdac.broadinstitute.org_ACC.",
  "Merge_Clinical.Level_1.2015110100.0.0.tar.gz")
md5 <- paste0(file, ".md5")
## Not run:
prepareFirebrowseArchives(archive = file, md5 = paste0(file, ".md5"))
## End(Not run)
```

**Description**

Prepare presentation of multiple genes for the same splicing event

**Usage**

```r
prepareGenePresentation(gene, collapse = "/")
```

**Arguments**

- **gene**  Character: gene
- **collapse**  Character: character string to separate in case of more than one gene

**Value**

Same object with items collapsed
prepareJunctionQuantSTAR

Prepare user-provided files to be loaded into psichomics

Description

Prepare user-provided files to be loaded into psichomics

Usage

prepareJunctionQuantSTAR(..., startOffset = -1, endOffset = +1)

prepareGeneQuantSTAR(...,
  strandedness = c("unstranded", "stranded", "stranded (reverse)")
)

Arguments

... Character: path of (optionally named) input files (see Examples)
startOffset Numeric: value to offset start position
endOffset Numeric: value to offset end position
strandedness Character: strandedness of RNA-seq protocol; may be one of the following: unstratedd, stranded or stranded (reverse)

Value

Prepared file (if output != NULL) and object

Examples

## Not run:
prepareJunctionQuant("Control rep1"=junctionFile1,
  "Control rep2"=junctionFile2,
  "KD rep1"=junctionFile3,
  "KD rep2"=junctionFile4)

## End(Not run)
## Not run:
prepareGeneQuant("Control rep1"=geneCountFile1,
  "Control rep2"=geneCountFile2,
  "KD rep1"=geneCountFile3,
  "KD rep2"=geneCountFile4)

## End(Not run)
**preparePreMadeGroupForSelection**  
*Prepare list of pre-made groups for a selectize element*

**Description**

Prepare list of pre-made groups for a selectize element

**Usage**

```r
classicPREMadeGroupForSelection(groups)
```

**Arguments**

- **groups**: List of list of characters

**Value**

List

---

**prepareSRAmetadata**  
*Prepare user-provided files to be loaded into psichomics*

**Description**

Prepare user-provided files to be loaded into psichomics

**Usage**

```r
classicPREAmetadata(file, output = "psichomics_metadata.txt")
```

```r
classicPREJunctionQuant(  
  ...,  
  output = "psichomics_junctions.txt",  
  startOffset = NULL,  
  endOffset = NULL
)  
```

```r
classicPREGeneQuant(  
  ...,  
  output = "psichomics_gene_counts.txt",  
  strandedness = c("unstranded", "stranded", "stranded (reverse)")
)  
```
prepareWordBreak

Arguments

file Character: path to file
output Character: path of output file (if NULL, only returns the data without saving it to a file)
... Character: path of (optionally named) input files (see Examples)
startOffset Numeric: value to offset start position
endOffset Numeric: value to offset end position
strandedness Character: strandedness of RNA-seq protocol; may be one of the following: unstraded, stranded or stranded (reverse)

Value

Prepared file (if output != NULL) and object

Examples

```r
## Not run:
prepareJunctionQuant("Control rep1"=junctionFile1,
                      "Control rep2"=junctionFile2,
                      "KD rep1"=junctionFile3,
                      "KD rep2"=junctionFile4)

## Not run
## Not run:
prepareGeneQuant("Control rep1"=geneCountFile1,
                 "Control rep2"=geneCountFile2,
                 "KD rep1"=geneCountFile3,
                 "KD rep2"=geneCountFile4)

## End(Not run)
## End(Not run)
```

prepareWordBreak Create word break opportunities (for HTML) using given characters

Description

Create word break opportunities (for HTML) using given characters

Usage

```r
prepareWordBreak(
  str,
  pattern = c(".", "-", "/", "/", "/", "/", "/", "+", "+"),
  html = TRUE
)
```
**Arguments**

- **str**: Character: text
- **pattern**: Character: pattern(s) of interest to be used as word break opportunities
- **html**: Boolean: convert to HTML?

**Value**

String containing HTML elements

---

```r
preserveAttributes
```

*Preserve attributes when extracting values*

---

**Description**

Add object to class sticky

**Usage**

```r
preserveAttributes(x)
```

**Arguments**

- **x**: Object

**Value**

Object with class sticky

---

```r
processButton
```

*Style button used to initiate a process*

---

**Description**

Style button used to initiate a process

**Usage**

```r
processButton(id, label, ..., class = "btn-primary")
```

**Arguments**

- **id**: Character: button identifier
- **label**: Character: label
- **...**: Arguments passed on to `shiny::actionButton`
  - **icon**: An optional `icon()` to appear on the button.
  - **width**: The width of the input, e.g. '400px', or '100%'; see `validateCssUnit()`.
- **class**: Character: class
Value

HTML for a button

---

**processDatasetNames**  
*Process dataset names*

**Description**

Process dataset names

**Usage**

```r
processDatasetNames(data)
```

**Arguments**

- `data`  
  List of lists of data frames

**Details**

Avoid duplicated names and append the technology used for junction quantification

**Value**

Processed list of lists of data frames

---

**processSRAdata**  
*Process SRA quantification data*

**Description**

Process SRA quantification data

**Usage**

```r
processSRAdata(files, data, IDcolname)
```

**Arguments**

- `files`  
  Character: path to SRA quantification files
- `data`  
  Data frame: processed quantification data
- `IDcolname`  
  Character: name of the column containing the identifiers

**Value**

Process file
**processSurvData**

**Process survival data to calculate survival curves**

**Description**

Process survival data to calculate survival curves

**Usage**

```r
processSurvData(
  event,
  timeStart,
  timeStop,     # Only relevant for interval censoring
  followup,
  group,
  clinical,    # Data frame: clinical data
  survTime = NULL
)
```

**Arguments**

- `event`: Character: name of column containing time of the event of interest
- `timeStart`: Character: name of column containing starting time of the interval or follow up time
- `timeStop`: Character: name of column containing ending time of the interval (only relevant for interval censoring)
- `followup`: Character: name of column containing follow up time
- `group`: Character: group relative to each subject
- `clinical`: Data frame: clinical data
- `survTime`: `survTime` object: Times to follow up, time start, time stop and event (optional)

**Details**

The event time is only used to determine whether the event has occurred (1) or not (0) in case of missing values.

If `survTime = NULL`, survival times are obtained from the clinical dataset according to the names given in `timeStart`, `timeStop`, `event` and `followup`. This may become quite slow when used in a loop. If the aforementioned variables are constant, consider running `getAttributesTime()` outside the loop and using its output via the `survTime` argument of this function (see Examples).

**Value**

Data frame with terms needed to calculate survival curves
processSurvTerms

Description

Process survival curves terms to calculate survival curves

Arguments

session
  Shiny session

...  Arguments passed on to processSurvTerms

censoring Character: censor using left, right, interval or interval2

scale Character: rescale the survival time to days, weeks, months or years

formulaStr Character: formula to use

coxph Boolean: fit a Cox proportional hazards regression model?

survTime survTime object: times to follow up, time start, time stop and event (optional)

group Character: group relative to each subject

clinical Data frame: clinical data

event Character: name of column containing time of the event of interest

timeStart Character: name of column containing starting time of the interval or follow up time

timeStop Character: name of column containing ending time of the interval (only relevant for interval censoring)

followup Character: name of column containing follow up time

Value

List with survival analysis results

processSurvTerms

Description

Check if survival analyses successfully completed or returned errors

Usage

processSurvival(session, ...)

Arguments

session Shiny session

... Arguments passed on to processSurvTerms

censoring Character: censor using left, right, interval or interval2

scale Character: rescale the survival time to days, weeks, months or years

formulaStr Character: formula to use

coxph Boolean: fit a Cox proportional hazards regression model?

survTime survTime object: times to follow up, time start, time stop and event (optional)

group Character: group relative to each subject

clinical Data frame: clinical data

event Character: name of column containing time of the event of interest

timeStart Character: name of column containing starting time of the interval or follow up time

timeStop Character: name of column containing ending time of the interval (only relevant for interval censoring)

followup Character: name of column containing follow up time

Value

List with survival analysis results
Usage

processSurvTerms(
  clinical,  
  censoring,  
  event,  
  timeStart,  
  timeStop = NULL,  
  group = NULL,  
  formulaStr = NULL,  
  coxph = FALSE,  
  scale = "days",  
  followup = "days_to_last_followup",  
  survTime = NULL  
)

Arguments

clinical  Data frame: clinical data

censoring  Character: censor using left, right, interval or interval2

event  Character: name of column containing time of the event of interest

timeStart  Character: name of column containing starting time of the interval or follow up time

timeStop  Character: name of column containing ending time of the interval (only relevant for interval censoring)

group  Character: group relative to each subject

formulaStr  Character: formula to use

coxph  Boolean: fit a Cox proportional hazards regression model?

scale  Character: rescale the survival time to days, weeks, months or years

followup  Character: name of column containing follow up time

survTime  survTime object: times to follow up, time start, time stop and event (optional)

Details

The event time is only used to determine whether the event has occurred (1) or not (0) in case of missing values.

If survTime = NULL, survival times are obtained from the clinical dataset according to the names given in timeStart, timeStop, event and followup. This may become quite slow when used in a loop. If the aforementioned variables are constant, consider running getAttributesTime() outside the loop and using its output via the survTime argument of this function (see Examples).

Value

A list with a formula object and a data frame with terms needed to calculate survival curves
See Also

Other functions to analyse survival: assignValuePerSubject(), getAttributesTime(), labelBasedOnCutoff(), optimalSurvivalCutoff(), plotSurvivalCurves(), plotSurvivalPvaluesByCutoff(), survdiffTerms(), survfit.survTerms(), testSurvival()

Examples

clinical <- read.table(text = "2549 NA ii female
840 NA i female
1204 iv male
383 iv female
1293 NA iii male
1355 ii male")
names(clinical) <- c("patient.days_to_last_followup",
"patient.days_to_death",
"patient.stage_event.pathologic_stage",
"patient.gender")
timeStart <- "days_to_death"
event <- "days_to_death"
formulaStr <- "patient.stage_event.pathologic_stage + patient.gender"
survTerms <- processSurvTerms(clinical, censoring="right", event, timeStart,
formulaStr=formulaStr)

# If running multiple times, consider calculating survTime only once
survTime <- getAttributesTime(clinical, event, timeStart)
for (i in seq(5)) {
  survTerms <- processSurvTerms(clinical, censoring="right", event,
  timeStart, formulaStr=formulaStr,
  survTime=survTime)
}

---

**psychomics**

Start graphical interface of psychomics

---

**Description**

Start graphical interface of psychomics

**Usage**

psychomics(
  ...
  launch.browser = TRUE,
  shinyproxy = FALSE,
  testData = FALSE,
  cache = getAnnotationHubOption("CACHE")
)
Arguments

Arguments passed on to `shiny::runApp`

port  The TCP port that the application should listen on. If the port is not specified, and the `shiny.port` option is set (with `options(shiny.port = XX)`), then that port will be used. Otherwise, use a random port between 3000:8000, excluding ports that are blocked by Google Chrome for being considered unsafe: 3659, 4045, 5060, 5061, 6000, 6566, 6665:6669 and 6697. Up to twenty random ports will be tried.

host  The IPv4 address that the application should listen on. Defaults to the `shiny.host` option, if set, or "127.0.0.1" if not. See Details.

workerId  Can generally be ignored. Exists to help some editions of Shiny Server Pro route requests to the correct process.

quiet  Should Shiny status messages be shown? Defaults to FALSE.

display.mode  The mode in which to display the application. If set to the value "showcase", shows application code and metadata from a DESCRIPTION file in the application directory alongside the application. If set to "normal", displays the application normally. Defaults to "auto", which displays the application in the mode given in its DESCRIPTION file, if any.

test.mode  Should the application be launched in test mode? This is only used for recording or running automated tests. Defaults to the `shiny.testmode` option, or FALSE if the option is not set.

launch.browser  If true, the system’s default web browser will be launched automatically after the app is started. Defaults to true in interactive sessions only. The value of this parameter can also be a function to call with the application’s URL.

shinyproxy  Boolean: prepare visual interface to run in Shinyproxy?

testData  Boolean: load with test data

cache  Character: path to AnnotationHub cache (used to load alternative splicing event annotation)

Value

NULL (function is only used to modify the Shiny session’s state or internal variables)

Examples

```r
## Not run:
psichomics()
```
pubmedUI

Return the interface of relevant PubMed articles for a given gene

Description

Return the interface of relevant PubMed articles for a given gene

Usage

pubmedUI(ns, gene, ...)

Arguments

ns

Namespace function
gene

Character: gene

... Arguments passed on to queryPubMed
top Numeric: number of articles to retrieve
field Character: field of interest where to look for terms (abstract by default)
sort Character: sort by a given parameter (relevance by default)

Value

HTML interface of relevant PubMed articles

quantifySplicing

Quantify alternative splicing events

Description

Quantify alternative splicing events

Usage

quantifySplicing(
    annotation,
    junctionQuant,
    eventType = c("SE", "MXE", "ALE", "AFE", "A3SS", "A5SS"),
    minReads = 10,
    genes = NULL
)
Arguments

- **annotation**: List of data frames: annotation for each alternative splicing event type
- **junctionQuant**: Data frame: junction quantification
- **eventType**: Character: splicing event types to quantify
- **minReads**: Integer: values whose number of total supporting read counts is below minReads are returned as NA
- **genes**: Character: gene symbols for which to quantify splicing events (if NULL, events from all genes are quantified)

Value

Data frame with the quantification of the alternative splicing events

See Also

Other functions for PSI quantification: `filterPSI()`, `getSplicingEventTypes()`, `listSplicingAnnotations()`, `loadAnnotation()`, `plotRowStats()`

Examples

```r
# Calculate PSI for skipped exon (SE) and mutually exclusive (MXE) events
annot <- readFile("ex_splicing_annotation.RDS")
junctionQuant <- readFile("ex_junctionQuant.RDS")

quantifySplicing(annot, junctionQuant, eventType=c("SE", "MXE"))
```

---

**quantifySplicingSet**

*Set of functions to quantify alternative splicing*

**Description**

Instructions to build the Shiny app

**Usage**

`quantifySplicingSet(session, input)`

**Arguments**

- **session**: Shiny session
- **input**: Shiny input

**Value**

NULL (function is only used to modify the Shiny session’s state or internal variables)
**queryEnsembl**

*Query the Ensembl REST API*

**Description**

Query the Ensembl REST API

**Usage**

```r
queryEnsembl(path, query, grch37 = TRUE)
```

**Arguments**

- **path** Character: API path
- **query** Character: API query
- **grch37** Boolean: query the Ensembl GRCh37 API? if FALSE, query the most recent API

**Value**

Parsed response or NULL if no response

**Examples**

```r
path <- "overlap/region/human/7:140424943-140624564"
query <- list(feature = "gene")
psychomics:::queryEnsembl(path, query, grch37 = TRUE)

path <- "lookup/symbol/human/BRCA2"
query <- list(expand=1)
psychomics:::queryEnsembl(path, query, grch37 = TRUE)
```

---

**queryEnsemblByGene**

*Query information from Ensembl*

**Description**

Query information from Ensembl

**Usage**

```r
queryEnsemblByGene(gene, species = NULL, assembly = NULL)
queryEnsemblByEvent(event, species = NULL, assembly = NULL, data = NULL)
```
queryFirebrowseData

Query the FireBrowse API for TCGA data

Description

Query the FireBrowse API for TCGA data

Usage

queryFirebrowseData(
  format = "json",
  date = NULL,
  cohort = NULL,
  data_type = NULL,
  tool = NULL,
  platform = NULL,
  center = NULL,
  level = NULL,
  protocol = NULL,
  page = NULL,
  page_size = NULL,
  sort_by = NULL
)
Arguments

- **format**: Character: response format as JSON, CSV or TSV
- **date**: Character: dates of the data retrieval by FireBrowse (by default, it uses the most recent data available)
- **cohort**: Character: abbreviation of the cohorts (by default, returns data for all cohorts)
- **data_type**: Character: data types (optional)
- **tool**: Character: data produced by the selected FireBrowse tools (optional)
- **platform**: Character: data generation platforms (optional)
- **center**: Character: data generation centres (optional)
- **level**: Integer: data levels (optional)
- **protocol**: Character: sample characterization protocols (optional)
- **page**: Integer: page of the results to return (optional)
- **page_size**: Integer: number of records per page of results (optional)
- **sort_by**: String: column used to sort the data (by default, sort by cohort)

Value

Response from the FireBrowse API (it needs to be parsed)

Examples

```r
cohort <- getTCGAcohorts()[1]
psichomics:::queryFirebrowseData(cohort = names(cohort),
                                 data_type = "mRNASeq")

# Querying for data from a specific date
dates <- getTCGAdates()
dates <- format(dates, psichomics:::getFirebrowseDateFormat()$query)

psichomics:::queryFirebrowseData(date = dates[2], cohort = names(cohort))
```

---

**queryPubMed**

*Query the PubMed REST API*

**Description**

Query the PubMed REST API

**Usage**

```r
queryPubMed(primary, ..., top = 3, field = "abstract", sort = "relevance")
```
queryUniprot

Arguments

- primary: Character: primary search term
- ...: Character: other relevant search terms
- top: Numeric: number of articles to retrieve
- field: Character: field of interest where to look for terms (abstract by default)
- sort: Character: sort by a given parameter (relevance by default)

Value

Parsed response

Examples

```r
publish::queryPubMed("BRCA1", "cancer", "adrenocortical carcinoma")
```

---

queryUniprot

Query the UniProt REST API

Description

Query the UniProt REST API

Usage

```r
queryUniprot(molecule, format = "xml")
```

Arguments

- molecule: Character: protein or transcript to query
- format: Character: format of the response

Value

Parsed response

Examples

```r
protein <- "P51587"
format <- "xml"
publish::queryUniprot(protein, format)

transcript <- "ENST00000488540"
format <- "xml"
publish::queryUniprot(transcript, format)
```
readAnnot

*Read custom or remote annotation*

**Description**

Instructions to build the Shiny app

**Usage**

```
readAnnot(session, annotation, showProgress = FALSE)
```

**Arguments**

- **session**
  - Shiny session
- **annotation**
  - Character: chosen annotation
- **showProgress**
  - Boolean: show progress?

**Value**

NULL (function is only used to modify the Shiny session’s state or internal variables)

---

readFile

*Load psichomics-specific file*

**Description**

Load psichomics-specific file

**Usage**

```
readFile(file)
```

**Arguments**

- **file**
  - Character: path to the file

**Value**

Loaded file

**Examples**

```r
junctionQuant <- readFile("ex_junctionQuant.RDS")
```
Reduce dimensionality after processing missing values from data frame

Description

Reduce dimensionality after processing missing values from data frame

Usage

```r
reduceDimensionality(
  data,
  type = c("pca", "ica"),
  center = TRUE,
  scale. = FALSE,
  naTolerance = NULL,
  missingValues = round(0.05 * ncol(data)),
  ...
)
```

Arguments

- **data**
  - Data frame: data
- **type**
  - Character: dimensionality reduction technique (pca or ica)
- **center**
  - either a logical value or numeric-alike vector of length equal to the number of columns of `x`, where `numeric-alike` means that `as.numeric(.)` will be applied successfully if `is.numeric(.)` is not true.
- **scale.**
  - Boolean: scale variables?
- **naTolerance**
  - Integer: percentage of tolerated missing values per column (deprecated)
- **missingValues**
  - Integer: number of tolerated missing values per column to be replaced with the mean of the values of that same column
- **...**
  - Extra parameters passed to FUN

Value

PCA result in a `prcomp` object or ICA result object
renameDuplicated

Rename vector to avoid duplicated values with another vector

Description
Renames values by adding an index to the end of duplicates. This allows to prepare unique values in two vectors before a merge, for instance.

Usage
renameDuplicated(check, comp)

Arguments
check  Character: values to rename if duplicated
comp   Character: values to compare with

Value
Character vector with renamed values if duplicated; else, it returns the usual values. It does not return the comparator values.

Examples
psichomics::renameDuplicated(check = c("blue", "red"), comp = c("green", "blue"))

renameGroups

Rename duplicated names from a new group

Description
Rename duplicated names from a new group

Usage
renameGroups(new, old)

Arguments
new  Matrix: new groups
old  Matrix: pre-existing groups

Value
Character with no duplicated group names
Note

The names of pre-existing groups are not modified.

renderBoxplot Render boxplot

Description

Render boxplot

Usage

renderBoxplot(
  data,
  outliers = FALSE,
  sortByMedian = TRUE,
  showXlabels = TRUE,
  title = NULL,
  seriesName = "Gene expression"
)

Arguments

data                Data frame or matrix
outliers            Boolean: draw outliers?
sortByMedian        Boolean: sort box plots based on ascending median?
showXlabels         Boolean: show labels in X axis?

Value

Box plot

Examples

psychomics:::renderBoxplot(data.frame(a=1:10, b=10:19, c=45:54))
renderDataTableSparklines

Render a data table with sparkline HTML elements

Description

Render a data table with sparkline HTML elements

Usage

renderDataTableSparklines(..., options = NULL)

Arguments

... Arguments passed on to shiny::renderDataTable
expr An expression that returns a data frame or a matrix.
searchDelay The delay for searching, in milliseconds (to avoid too frequent search requests).
callback A JavaScript function to be applied to the DataTable object. This is useful for DataTables plug-ins, which often require the DataTable instance to be available.
quoted If it is TRUE, then the quote()ed value of expr will be used when expr is evaluated. If expr is a quosure and you would like to use its expression as a value for expr, then you must set quoted to TRUE.
outputArgs A list of arguments to be passed through to the implicit call to dataTableOutput() when renderDataTable() is used in an interactive R Markdown document.
options List of options to pass to renderDataTable()

Details

This slightly modified version of renderDataTable() calls a JavaScript function to convert the sparkline HTML elements to an interactive highchart object

Value

NULL (function is only used to modify the Shiny session’s state or internal variables)
renderGeneticInfo  Render genetic information

Description

Render genetic information

Usage

renderGeneticInfo(
    output,
    info,
    species = NULL,
    assembly = NULL,
    grch37 = FALSE,
    eventDiagram = NULL,
    gene = NULL
)

Arguments

output  Shiny output
info    Information as retrieved from Ensembl
species Character: species name
assembly Character: assembly version
grch37   Boolean: use version GRCh37 of the genome?
eventDiagram Diagram of selected alternative splicing event
ns       Namespace function

Value

HTML elements to render gene, protein and transcript annotation

renderGroupInterface  Render group interface

Description

Render group interface

Usage

renderGroupInterface(ns, multiFisherTests = TRUE)
**Arguments**

- `ns` Namespace function
- `multiFisherTests` Boolean: allow to perform multiple Fisher exact test between groups

**Value**

HTML elements

---

**renderProteinInfo** *Render protein information*

**Description**

Render protein information

**Usage**

`renderProteinInfo(protein, transcript, species, assembly)`

**Arguments**

- `protein` Character: protein identifier
- `transcript` Character: Ensembl identifier of the protein’s respective transcript
- `species` Character: species
- `assembly` Character: assembly

**Value**

HTML elements

---

**replaceStrInList** *Replace a string with another in a list*

**Description**

Replace a string with another in a list

**Usage**

`replaceStrInList(tag, old, new)`
**rm.null**

*Filter NULL elements from a vector or a list*

**Description**

Filter NULL elements from a vector or a list

**Usage**

rm.null(v)

**Arguments**

v 
Vector or list

**Value**

Filtered vector or list with no NULL elements; if v is a vector composed of NULL elements, returns a NULL; if v is a list of NULL elements, returns an empty list

**roundDigits**

*Round by the given number of digits*

**Description**

Round by the given number of digits

**Usage**

roundDigits(n)

**Arguments**

n 
Numeric: number to round

**Value**

Formatted number with a given numeric precision
roundMinDown | Round down/up the minimum/maximum value

### Description
Round down/up the minimum/maximum value

#### Usage
- `roundMinDown(x, digits = 0)`
- `roundMaxUp(x, digits = 0)`

#### Arguments
- **x**: Numeric: values
- **digits**: Numeric: number of maximum digits

#### Value
Rounded numeric value

saveProcessedSRAdata | Save processed SRA data in file

### Description
Save processed SRA data in file

#### Usage
- `saveProcessedSRAdata(data, output = NULL)`

#### Arguments
- **data**: Object to save
- **output**: Character: output filename (if NULL, no file is saved)

#### Value
If output = NULL, save input to a file and return it as invisible; otherwise, just return the input
selectGroupsUI  Group selection

Description

Group selection interface and logic

Usage

```r
selectGroupsUI(
  id,
  label,
  type,
  placeholder = "Type to search groups",
  noGroupsLabel = NULL,
  groupsLabel = NULL,
  maxItems = NULL,
  returnAllDataLabel = NULL,
  returnAllDataValue = FALSE
)
```

```r
selectGroupsServer(session, id, type, preference = NULL)
```

```r
getSelectedGroups(input, id, type, filter = NULL)
```

Arguments

- `id` Character: identifier
- `label` Character: selectize label
- `type` Character: type of groups (either Patients, Samples, ASevents or Genes)
- `placeholder` Character: selectize placeholder
- `noGroupsLabel` Character: label to explicitly allow to select no groups (if NULL, this option is not displayed to the user)
- `groupsLabel` Character: label to explicitly allow to select groups (only required if `noGroupsLabel` is not NULL)
- `maxItems` Numeric: maximum number of groups to select
- `returnAllDataLabel` Character: label to allow to return data outside selected groups as belonging to an outside group (if NULL, this option is not displayed to the user)
- `returnAllDataValue` Boolean: default value to whether return all data or not (only required if `returnAllDataLabel` is not NULL)
- `session` Shiny session
**selectizeGeneInput**

preference Character: name of groups to pre-select, when available (if NULL, all groups will be pre-selected)
input Shiny input
filter Character: get groups only if they are present in this argument (if TCGA-styled gene symbols, they will be "converted" to gene symbols alone)

**Value**

selectGroupsUI: Interface for group selection
selectGroupsServer: Server logic for group selection
getSelectedGroups: List with selected groups (or NULL when no groups are selected)

**Note**

To allow the user to (explicitly) select no groups, pass the noGroupsLabel and groupsLabel arguments.

---

**selectizeGeneInput**  
Create input to select a gene

**Description**

Create input to select a gene

**Usage**

selectizeGeneInput(
  id,
  label = "Gene",
  choices = NULL,
  multiple = FALSE,
  ...
  placeholder = "Type to search for a gene..."
)

**Arguments**

- **id**  Character: identifier
- **label**  Display label for the control, or NULL for no label.
- **choices**  List of values to select from. If elements of the list are named, then that name — rather than the value — is displayed to the user. It’s also possible to group related inputs by providing a named list whose elements are (either named or unnamed) lists, vectors, or factors. In this case, the outermost names will be used as the group labels (leveraging the <optgroup> HTML tag) for the elements in the respective sublist. See the example section for a small demo of this feature.
selectPreMadeGroup

multiple  Is selection of multiple items allowed?
...
placeholder  Character: placeholder

Value

HTML elements

selectPreMadeGroup  Select pre-made groups from a selected item

Description

Select pre-made groups from a selected item

Usage

selectPreMadeGroup(groups, selected, genes = NULL)

Arguments

groups  List of list of characters
selected  Character: selected item

Value

Elements of selected item

setFirebrowseData  Set data from FireBrowse

Description

Set data from FireBrowse

Usage

setFirebrowseData(input, output, session, replace = TRUE)

Arguments

input  Shiny input
output  Shiny output
session  Shiny session
replace  Boolean: replace loaded data?
setValue

Value

NULL (function is only used to modify the Shiny session’s state or internal variables)

setLocalData

Load local files

Description

Load local files

Usage

setLocalData(input, output, session, replace = TRUE)

setMultipleFilesData(input, output, session, replace = TRUE)

Arguments

input Shiny input
output Shiny output
session Shiny session
replace Boolean: replace loaded data?

Value

NULL (function is only used to modify the Shiny session’s state or internal variables)

setOperation

Perform set operations on selected groups

Description

Perform set operations on selected groups

Usage

setOperation(
  operation,
  groups,
  selected,
  symbol = " ",
  groupName = NULL,
  first = NULL,
  second = NULL,
  matches = NULL,
  type = "Samples",
  assignColoursToGroups = FALSE
)
**Arguments**

- **operation** Character: set operation
- **groups** Matrix: groups
- **selected** Integer: index of rows regarding selected groups
- **symbol** Character: Unicode symbol to visually indicate the operation performed
- **groupName** Character: group name (automatically created if NULL or "")
- **first** Character: identifiers of the first element (required when performing the complement operation)
- **second** Character: identifiers of the second element (required when performing the complement operation)
- **matches** Character: match between samples (as names) and subjects (as values)
- **type** Character: type of group where set operations are to be performed
- **assignColoursToGroups** Boolean: assign colours to new groups?

**Value**

Matrix containing groups (new group is in the first row)

---

**setOperationIcon**

*Create an icon based on set operations*

---

**Description**

Based on the `icon()` function

**Usage**

`setOperationIcon(name, class = NULL, ...)`

**Arguments**

- **name** Character: icon name
- **class** Character: additional classes to customise the icon element
- **...** Extra arguments for the icon HTML element

**Value**

Icon element
showAlert  

Show or remove an alert

Description

Show or remove an alert

Usage

```r
showAlert(
  session,
  ..., 
  title,
  style = NULL,
  dismissible = TRUE,
  alertId = "alert",
  iconName = NULL,
  caller = NULL
)
```

```r
successAlert(
  session,
  ..., 
  title = NULL,
  dismissible = TRUE,
  alertId = "success",
  caller = NULL
)
```

```r
errorAlert(
  session,
  ..., 
  title = NULL,
  dismissible = TRUE,
  alertId = "alert",
  caller = NULL
)
```

```r
warningAlert(
  session,
  ..., 
  title = NULL,
  dismissible = TRUE,
  alertId = "alert",
  caller = NULL
)
```
removeAlert(output, alertId = "alert")

Arguments

- **session**: Shiny session
- **...**: Arguments to render as elements of alert
- **title**: Character: title
- **style**: Character: style (error, warning or NULL)
- **dismissible**: Boolean: is the alert dismissible?
- **alertId**: Character: identifier
- **iconName**: Character: icon name
- **caller**: Character: caller module identifier
- **output**: Shiny output

Value

NULL (function is only used to modify the Shiny session’s state or internal variables)

See Also

- **showModal()**

---

**showGroupsTable**  
*Present groups table*

Description

Present groups table

Usage

  showGroupsTable(type)

Arguments

- **type**: Character: type of groups (either Patients, Samples, ASevents or Genes)

Value

Matrix with groups ordered (or NULL if there are no groups)
sidebar

*Sidebar without a well*

Description

Modified version of `shiny::sidebarPanel` without a well

Usage

```r
sidebar(..., width = 4)
```

Arguments

- `...` Output elements to include in the sidebar/main panel.
- `width` The width of the sidebar and main panel. By default, the sidebar takes up 1/3 of the width, and the main panel 2/3. The total width must be 12 or less.

Value

HTML elements

---

signifDigits

*Get number of significant digits*

Description

Get number of significant digits

Usage

```r
signifDigits(n)
```

Arguments

- `n` Numeric: number to round

Value

Formatted number with a given number of significant digits
singleDiffAnalyses

Perform statistical analysis on a given splicing event

Description

Perform statistical analyses on a given vector containing elements from different groups

Usage

```r
singleDiffAnalyses(
  vector,
  group,
  threshold = 1,
  step = 100,
  analyses = c("wilcoxRankSum", "ttest", "kruskal", "levene", "fligner")
)
```

Arguments

- **vector**: Numeric
- **group**: Character: group of each element in the vector
- **threshold**: Integer: minimum number of values per group
- **step**: Numeric: number of events before the progress bar is updated (a bigger number allows for a faster execution)
- **analyses**: Character: analyses to perform (see Details)

Details

The following statistical analyses may be performed by including the respective string in the `analyses` argument:

- **ttest**: Unpaired t-test (2 groups)
- **wilcoxRankSum**: Wilcoxon Rank Sum test (2 groups)
- **kruskal**: Kruskal test (2 or more groups)
- **levene**: Levene’s test (2 or more groups)
- **fligner**: Fligner-Killeen test (2 or more groups)

Value

A row from a data frame with the results
sortCoordinates  

*Sort coordinates for some event types*

**Description**
Some programs sort the coordinates of specific event types differently. To make them all comparable across programs, the coordinates are ordered by increasing (plus strand) or decreasing order (minus strand).

**Usage**

```
sortCoordinates(events)
```

**Arguments**
- **events** List of data frames with alternative splicing events for a given program

**Value**
List of data frames with alternative splicing events for a given program

---

startProcess  

*Set the status of a process to style a given button*

**Description**
- **startProcess**: Style button to show a process is in progress
- **endProcess**: Style button to show a process finished; also, closes the progress bar (if `closeProgressBar` = `TRUE`) and prints the difference between the current time and `time`

**Usage**

```
startProcess(id)
endProcess(id, time = NULL, closeProgressBar = TRUE)
```

**Arguments**
- **id** Character: button identifier
- **time** `POSIXct` object: start time needed to show the interval time (if `NULL`, the time interval is not displayed)
- **closeProgressBar** Boolean: close progress bar?
### startProgress

Create, set and terminate a progress object

#### Value

`startProcess` returns the start time of the process (may be used as the time argument to `endProcess`), whereas `endProcess` returns the difference between current time and time (or NULL if time is not specified).

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>startProgress</code></td>
<td>Create, set and terminate a progress object</td>
</tr>
</tbody>
</table>

#### Description

Create, set and terminate a progress object

#### Usage

```r
startProgress(
  message,
  divisions,
  global = if (isRunning()) sharedData else getHidden()
)
```

```r
updateProgress(
  message = "Loading...",
  value = NULL,
  max = NULL,
  detail = NULL,
  divisions = NULL,
  global = if (isRunning()) sharedData else getHidden(),
  console = TRUE
)
```

```r
closeProgress(
  message = NULL,
  global = if (isRunning()) sharedData else getHidden()
)
```

#### Arguments

- **message**: Character: progress message
- **divisions**: Integer: number of divisions in the progress bar
- **global**: Shiny’s global variable
- **value**: Integer: current progress value
- **max**: Integer: maximum progress value
- **detail**: Character: detailed message
- **console**: Boolean: print message to console?
Details

If `divisions` is not `NULL`, a progress bar starts with the given divisions. If `value = NULL`, the progress bar increments one unit; otherwise, the progress bar increments `value`.

Value

`NULL` (function is only used to modify the Shiny session’s state or internal variables)

---

**styleModal**

Create a modal window

---

Description

Create a modal window

Usage

```r
styleModal(
  session,
  title,
  ..., 
  style = NULL,
  iconName = "exclamation-circle",
  footer = NULL,
  echo = FALSE,
  size = "medium",
  dismissButton = TRUE,
  caller = NULL
)
```

```r
errorModal(session, title, ..., size = "small", footer = NULL, caller = NULL)
```

```r
warningModal(session, title, ..., size = "small", footer = NULL, caller = NULL)
```

```r
infoModal(session, title, ..., size = "small", footer = NULL, caller = NULL)
```

Arguments

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>session</code></td>
<td>Shiny session</td>
</tr>
<tr>
<td><code>title</code></td>
<td>Character: title</td>
</tr>
<tr>
<td><code>...</code></td>
<td>Arguments passed on to <code>shiny::modalDialog</code></td>
</tr>
</tbody>
</table>

`easyClose` If `TRUE`, the modal dialog can be dismissed by clicking outside the dialog box, or by pressing the Escape key. If `FALSE` (the default), the modal dialog can’t be dismissed in those ways; instead it must be dismissed by clicking on a `modalButton()`, or from a call to `removeModal()` on the server.
subjectMultiMatchWarning

Helper text to explain what happens when a subject matches multiple samples when performing survival analysis

Description

Helper text to explain what happens when a subject matches multiple samples when performing survival analysis

Usage

subjectMultiMatchWarning()

Value

Character
subsetGeneExpressionFromMatchingGenes

**Subset gene expression based on (full or partial) matching genes**

**Description**
Subset gene expression based on (full or partial) matching genes

**Usage**

```r
subsetGeneExpressionFromMatchingGenes(geneExpr, gene)
```

**Arguments**
- `geneExpr`  
  Data frame or matrix: gene expression
- `gene`  
  Character: genes to look for

**Value**
Gene expression subset for the input genes

---

survdiffTerms

**Test Survival Curve Differences**

**Description**
Tests if there is a difference between two or more survival curves using the $G^p$ family of tests, or for a single curve against a known alternative.

**Usage**

```r
survdiffTerms(survTerms, ...)
```

**Arguments**
- `survTerms`  
  `survTerms` object: survival terms obtained after running `processSurvTerms` (see examples)
- `...`  
  Arguments passed on to `survival::survdiff` subset expression indicating which subset of the rows of data should be used in the fit. This can be a logical vector (which is replicated to have length equal to the number of observations), a numeric vector indicating which observation numbers are to be included (or excluded if negative), or a character vector of row names to be included. All observations are included by default.
na.action a missing-data filter function. This is applied to the model.frame after any subset argument has been used. Default is `options()$na.action`.

rho a scalar parameter that controls the type of test.

timefix process times through the `aeqSurv` function to eliminate potential roundoff issues.

Value

`survfit` object. See `survfit.object` for details. Methods defined for `survfit` objects are `print`, `plot`, `lines`, and `points`.

Description

This function implements the G-rho family of Harrington and Fleming (1982), with weights on each death of $S(t)^\rho$, where $S(t)$ is the Kaplan-Meier estimate of survival. With $\rho = 0$ this is the log-rank or Mantel-Haenszel test, and with $\rho = 1$ it is equivalent to the Peto & Peto modification of the Gehan-Wilcoxon test.

Peto and Peto show that the Gehan-Wilcoxon test can be badly biased if the two groups have different censoring patterns, and proposed an alternative. Prentice and Marek later showed an actual example where this issue occurs. For most data sets the Gehan-Wilcoxon and Peto-Peto-Prentice variant will hardly differ, however.

If the right hand side of the formula consists only of an offset term, then a one sample test is done. To cause missing values in the predictors to be treated as a separate group, rather than being omitted, use the `factor` function with its `exclude` argument to recode the right-hand-side covariate.

References


See Also

Other functions to analyse survival: `assignValuePerSubject()`, `getAttributesTime()`, `labelBasedOnCutoff()`, `optimalSurvivalCutoff()`, `plotSurvivalCurves()`, `plotSurvivalPvaluesByCutoff()`, `processSurvTerms()`, `survfit.survTerms()`, `testSurvival()`

Examples

clinical <- read.table(text = "2549 NA ii female
840 NA i female
NA 1204 iv male
NA 383 iv female
1293 NA iii male
NA 1355 ii male")
names(clinical) <- c("patient.days_to_last_followup","
survfit.survTerms

Create survival curves

Description
Create survival curves

Usage
## S3 method for class 'survTerms'
survfit(formula, ...)

Arguments

formula survTerms object: survival terms obtained after running processSurvTerms (see examples)

... Arguments passed on to survival::survdiff

subset expression indicating which subset of the rows of data should be used in the fit. This can be a logical vector (which is replicated to have length equal to the number of observations), a numeric vector indicating which observation numbers are to be included (or excluded if negative), or a character vector of row names to be included. All observations are included by default.

na.action a missing-data filter function. This is applied to the model.frame after any subset argument has been used. Default is options()$na.action.

rho a scalar parameter that controls the type of test.

timefix process times through the aeqSurv function to eliminate potential roundoff issues.

Details
A survival curve is based on a tabulation of the number at risk and number of events at each unique death time. When time is a floating point number the definition of "unique" is subject to interpretation. The code uses factor() to define the set. For further details see the documentation for the appropriate method, i.e., ?survfit.formula or ?survfit.coxph.

A survfit object may contain a single curve, a set of curves (vector), a matrix of curves, or even a 3 way array: dim(fit) will reveal the dimensions. Predicted curves from a coxph model have one
row for each stratum in the Cox model fit and one column for each specified covariate set. Curves from a multi-state model have one row for each stratum and a column for each state, the strata correspond to predictors on the right hand side of the equation. The default printing and plotting order for curves is by column, as with other matrices.

Value

survfit object. See survfit.object for details. Methods defined for survfit objects are print, plot, lines, and points.

See Also

Other functions to analyse survival: assignValuePerSubject(), getAttributesTime(), labelBasedOnCutoff(), optimalSurvivalCutoff(), plotSurvivalCurves(), plotSurvivalPvaluesByCutoff(), processSurvTerms(), survdiffTerms(), testSurvival()

Examples

library("survival")
clinical <- read.table(text = "2549 NA ii female
840 NA i female
NA 1204 iv male
NA 383 iv female
1293 NA iii male
NA 1355 ii male")
names(clinical) <- c("patient.days_to_last_followup",
"patient.days_to_death",
"patient.stage_event.pathologic_stage",
"patient.gender")
timeStart <- "days_to_death"
event <- "days_to_death"
formulaStr <- "patient.stage_event.pathologic_stage + patient.gender"
survTerms <- processSurvTerms(clinical, censoring="right", event, timeStart,
formulaStr=formulaStr)
survfit(survTerms)

---

**t.sticky**

*Preserve attributes of sticky objects when extracting or transposing object*

**Description**

Most attributes - with the exception of names, dim, dimnames, class and row.names - are preserved in simple transformations of objects from class sticky.
Usage

```r
# S3 method for class 'sticky'
t(x)
```

```r
# S3 method for class 'sticky'
x[i, j, ...]
```

Arguments

- **x**: Object
- **i, j, ...**: Numeric or character: indices of elements to extract

Value

Transformed object with most attributes preserved

---

**tabDataset**

*Creates a tabPanel template for a datatable with a title and description*

Description

Creates a tabPanel template for a datatable with a title and description

Usage

```r
tabDataset(
  ns,
  title,
  tableId,
  columns,
  visCols,
  data,
  description = NULL,
  icon = NULL
)
```

Arguments

- **ns**: Namespace function
- **title**: Character: tab title
- **tableId**: Character: id of the datatable
- **columns**: Character: column names of the datatable
- **visCols**: Boolean: visible columns
- **data**: Data frame: dataset of interest
**Description**

Create HTML table from data frame or matrix

**Usage**

```r
table2html(
  data,
  rownames = TRUE,
  colnames = TRUE,
  class = NULL,
  style = NULL,
  thead = FALSE
)
```

**Arguments**

- `data` : Data frame or matrix
- `rownames` : Boolean: print row names?
- `colnames` : Boolean: print column names?
- `class` : Character: table class
- `style` : Character: table style
- `thead` : Boolean: add a `thead` tag to the first row?

**Value**

HTML elements
**tableRow**  
Create a row for a HTML table

**Description**  
Create a row for a HTML table

**Usage**  
`tableRow(..., th = FALSE)`

**Arguments**

...  
Elements to include in the row

th  
Boolean: is this row the table head?

**Value**  
HTML elements

---

**testGroupIndependence**  
Multiple independence tests between reference groups and list of groups

**Description**  
Test multiple contingency tables comprised by two groups (one reference group and another containing remaining elements) and provided groups.

**Usage**  
`testGroupIndependence(ref, groups, elements, pvalueAdjust = "BH")`

**Arguments**

ref  
List of character: list of groups where each element contains the identifiers of respective elements

groups  
List of characters: list of groups where each element contains the identifiers of respective elements

elements  
Character: all available elements (if a data frame is given, its rownames will be used)

pvalueAdjust  
Character: method used to adjust p-values (see Details)
Details

The following methods for p-value adjustment are supported by using the respective string in the pvalueAdjust argument:

- none: Do not adjust p-values
- BH: Benjamini-Hochberg’s method (false discovery rate)
- BY: Benjamini-Yekutieli’s method (false discovery rate)
- bonferroni: Bonferroni correction (family-wise error rate)
- holm: Holm’s method (family-wise error rate)
- hochberg: Hochberg’s method (family-wise error rate)
- hommel: Hommel’s method (family-wise error rate)

Value

multiGroupIndependenceTest object, a data frame containing:

- attribute: Name of the original groups compared against the reference groups
- table: Contingency table used for testing
- pvalue: Fisher’s exact test’s p-value

See Also

parseCategoricalGroups() and plotGroupIndependence()

Other functions for data grouping: createGroupByAttribute(), getGeneList(), getSampleFromSubject(), getSubjectFromSample(), groupPerElem(), plotGroupIndependence()

Examples

elements <- paste("subjects", 1:10)
ref <- elements[5:10]
groups <- list(race=list(asi=elements[1:3],
white=elements[4:7],
black=elements[8:10]),
region=list(european=elements[c(4, 5, 9)],
african=elements[c(6:8, 10)]))
groupTesting <- testGroupIndependence(ref, groups, elements)
# View(groupTesting)
Multiple independence tests between a reference group and list of groups

Description

Uses Fisher’s exact test.

Usage

testSingleIndependence(ref, groups, elements, pvalueAdjust = "BH")

Arguments

- `ref`: Character: identifier of elements in reference group
- `groups`: List of characters: list of groups where each element contains the identifiers of respective elements
- `elements`: Character: all subject identifiers
- `pvalueAdjust`: Character: method used to adjust p-values (see Details)

Details

The following methods for p-value adjustment are supported by using the respective string in the `pvalueAdjust` argument:

- `none`: Do not adjust p-values
- `BH`: Benjamini-Hochberg’s method (false discovery rate)
- `BY`: Benjamini-Yekutieli’s method (false discovery rate)
- `bonferroni`: Bonferroni correction (family-wise error rate)
- `holm`: Holm’s method (family-wise error rate)
- `hochberg`: Hochberg’s method (family-wise error rate)
- `hommel`: Hommel’s method (family-wise error rate)

Value

Returns a `groupIndependenceTest` object: a list where each element is a list containing:

- `attribute`: Name of the original groups compared against the reference groups
- `table`: Contingency table used for testing
- `pvalue`: Fisher’s exact test’s p-value
**testSurvival**

*Test the survival difference between groups of subjects*

**Description**

Test the survival difference between groups of subjects

**Usage**

`testSurvival(survTerms, ...)`

**Arguments**

- `survTerms`: survTerms object: survival terms obtained after running `processSurvTerms` (see examples)
- `...`: Arguments passed on to `survival::survdiff` subsetting expression indicating which subset of the rows of data should be used in the fit. This can be a logical vector (which is replicated to have length equal to the number of observations), a numeric vector indicating which observation numbers are to be included (or excluded if negative), or a character vector of row names to be included. All observations are included by default.
- `na.action`: a missing-data filter function. This is applied to the `model.frame` after any subset argument has been used. Default is `options()`$na.action.
- `rho`: a scalar parameter that controls the type of test.
- `timefix`: process times through the `aeqSurv` function to eliminate potential roundoff issues.

**Value**

p-value of the survival difference or NA

**Note**

Instead of raising errors, returns NA

**See Also**

Other functions to analyse survival: `assignValuePerSubject()`, `getAttributesTime()`, `labelBasedOnCutoff()`, `optimalSurvivalCutoff()`, `plotSurvivalCurves()`, `plotSurvivalPvaluesByCutoff()`, `processSurvTerms()`, `survdiffTerms()`, `survfit.survTerms()`
Examples

```r
require("survival")
data <- aml
timeStart <- "event"
event <- "event"
followup <- "time"
data$event <- NA
data$event[aml$status == 1] <- aml$time[aml$status == 1]
censoring <- "right"
formulaStr <- "x"
survTerms <- processSurvTerms(data, censoring=censoring, event=event,
timeStart=timeStart, followup=followup,
formulaStr=formulaStr)
testSurvival(survTerms)
```

testSurvivalCutoff

Test the survival difference between two survival groups given a cutoff

Description

Test the survival difference between two survival groups given a cutoff

Usage

```r
testSurvivalCutoff(
cutoff,
data,
filter = TRUE,
clinical,
...,  
session = NULL,
survivalInfo = FALSE)
```

Arguments

- **cutoff**: Numeric: Cutoff of interest
- **data**: Numeric: elements of interest to test against the cutoff
- **filter**: Boolean or numeric: elements to use (all are used by default)
- **clinical**: Data frame: clinical data
- **...**: Arguments passed on to `processSurvTerms`
- **censoring**: Character: censor using left, right, interval or interval2
- **scale**: Character: rescale the survival time to days, weeks, months or years
- **formulaStr**: Character: formula to use
- **coxph**: Boolean: fit a Cox proportional hazards regression model?
textSuggestions

**survTime**  survTime object: times to follow up, time start, time stop and event (optional)

**event**  Character: name of column containing time of the event of interest

**timeStart**  Character: name of column containing starting time of the interval or follow up time

**timeStop**  Character: name of column containing ending time of the interval (only relevant for interval censoring)

**followup**  Character: name of column containing follow up time

**session**  Shiny session

**survivalInfo**  Boolean: return extra survival information

**Value**

p-value of the survival difference

**textSuggestions**  Create script for auto-completion of text input

**Description**

Uses the JavaScript library jquery.textcomplete

**Usage**

textSuggestions(id, words, novalue = "No matching value", char = " ")

**Arguments**

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>Character: input ID</td>
</tr>
<tr>
<td>words</td>
<td>Character: words to suggest</td>
</tr>
<tr>
<td>novalue</td>
<td>Character: string when there’s no matching values</td>
</tr>
<tr>
<td>char</td>
<td>Character to succeed accepted word</td>
</tr>
</tbody>
</table>

**Value**

HTML string with the JavaScript script prepared to run

**Examples**

```r
words <- c("tumor_stage", "age", "gender")
psichomics:::textSuggestions("textareaid", words)
```
toJSarray

Convert vector of values to JavaScript array

Description
Convert vector of values to JavaScript array

Usage
toJSarray(values)

Arguments
values Character vector

Value
Character with valid JavaScript array

traceInList

Find an item in list of lists and return its coordinates

Description
Find an item in list of lists and return its coordinates

Usage
traceInList(ll, item)

transformData

Transform data in data frame

Description
Transform data in data frame

Usage
transformData(input, df, x, y)
transformOptions

Arguments

input  Shiny input
df  Data frame
x  Character: column name
y  Character: column name

Value

Data frame with transformed data in new columns and respective name of created columns

transformOptions  Show variable transformation(s)

Description

Show variable transformation(s)

Usage

transformOptions(label, type = NULL)

Arguments

label  Character: label to display
type  Character: show the variable transformation for the chosen type; if NULL, show all variable transformations

Value

Character labelling variable transformation(s)

transformValues  Transform values as per a given type of transformation

Description

Transform values as per a given type of transformation

Usage

transformValues(val, type, avoidZero = TRUE)
trimWhitespace

Arguments

val Integer: values to transform
type Character: type of transformation
avoidZero Boolean: add the smallest non-zero number available (\texttt{.Machine$double.xmin}) to avoid infinity values following log-transformation (may not be plotted); useful for p-values of 0

Value

Integer containing transformed values

trimWhitespace \textit{Trims whitespace from a word}

Description

Trims whitespace from a word

Usage

\texttt{trimWhitespace(word)}

Arguments

word Character to trim

Value

Character without whitespace

Examples

\texttt{psychomics::trimWhitespace(" hey there ")}
\texttt{psychomics::trimWhitespace(c("pineapple ", "one two three", ” sunken ship “))}
**uniqueBy**

*Check unique rows of a data frame based on a set of its columns*

**Description**

Check unique rows of a data frame based on a set of its columns

**Usage**

```r
uniqueBy(data, ...)
```

**Arguments**

- `data`  
  Data frame or matrix
- `...`  
  Name of columns

**Value**

Data frame with unique values based on set of columns

---

**updateClinicalParams**

*Update available clinical attributes when the clinical data changes*

**Description**

Update available clinical attributes when the clinical data changes

**Usage**

```r
updateClinicalParams(session, attrs)
```

**Arguments**

- `session`  
  Shiny session
- `attrs`  
  Character: subject attributes

**Value**

`NULL` (function is only used to modify the Shiny session’s state or internal variables)
updateFileBrowserInput

*Change the value of a fileBrowserInput() on the client*

**Description**

Change the value of a `fileBrowserInput()` on the client

**Usage**

`updateFileBrowserInput(session, id, ..., value = NULL, ask = FALSE)`

**Arguments**

- `session`  
  Shiny session
- `id`  
  Character: identifier
- `...`  
  Additional arguments passed to `fileBrowser()`. Only used if `value = NULL`.
- `value`  
  Character: file or directory path
- `ask`  
  Boolean: ask user to pick a file using file browser?

**Details**

Sends a message to the client, telling it to change the value of the input object. For `fileBrowserInput()` objects, this changes the value displayed in the text-field and triggers a client-side change event. A directory selection dialogue is not displayed.

**Value**

`NULL` (function is only used to modify the Shiny session’s state or internal variables)

**Source**

[https://github.com/wleepang/shiny-directory-input](https://github.com/wleepang/shiny-directory-input)

---

vennEvents

*Compare the number of events from the different programs in a Venn diagram*

**Description**

Compare the number of events from the different programs in a Venn diagram

**Usage**

`vennEvents(join, eventType)`
**Arguments**

- `join`: List of lists of data frame
- `eventType`: Character: type of event

**Value**

Venn diagrams for a given event type

---

**Description**

Includes interface containing the results

**Usage**

- `wilcox(data, groups, stat = NULL)`
- `ttest(data, groups, stat = NULL)`
- `levene(data, groups, stat = NULL)`
- `fligner(data, groups, stat = NULL)`
- `kruskal(data, groups, stat = NULL)`
- `fisher(data, groups)`
- `spearman(data, groups)`

**Arguments**

- `data`: Numeric, data frame or matrix: gene expression data or alternative splicing event quantification values (sample names are based on their names or colnames)
- `groups`: List of sample names or vector containing the group name per data value (read Details); if NULL or a character vector of length 1, data values are considered from the same group
- `stat`: Data frame or matrix: values of the analyses to be performed (if NULL, the analyses will be performed)
Details

- \texttt{ttest}: unpaired t-test
- \texttt{wilcox}: Wilcoxon test
- \texttt{levene}: Levene’s test
- \texttt{fligner}: Fligner-Killeen test
- \texttt{kruskal}: Kruskal test
- \texttt{fisher}: Fisher’s exact test
- \texttt{spearman}: Spearman’s test

Value

HTML elements

---

[GEandAScorrelation] Display results of correlation analyses

Description

Plot, print and display as table the results of gene expression and alternative splicing

Usage

```r
## S3 method for class 'GEandAScorrelation'
x[genes = NULL, ASevents = NULL]

## S3 method for class 'GEandAScorrelation'
plot(
  x,
  autoZoom = FALSE,
  loessSmooth = TRUE,
  loessFamily = c("gaussian", "symmetric"),
  colour = "black",
  alpha = 0.2,
  size = 1.5,
  loessColour = "red",
  loessAlpha = 1,
  loessWidth = 0.5,
  fontSize = 12,
  ...,
  colourGroups = NULL,
  legend = FALSE,
  showAllData = TRUE,
  density = FALSE,
  densityColour = "blue",
  densityWidth = 0.5
```

## S3 method for class 'GEandAScorrelation'
print(x, ...)

## S3 method for class 'GEandAScorrelation'
as.table(x, pvalueAdjust = "BH", ...)

### Arguments

- **x**: GEandAScorrelation object obtained after running `correlateGEandAS()`
- **genes**: Character: genes
- **ASevents**: Character: AS events
- **autoZoom**: Boolean: automatically set the range of PSI values based on available data? If FALSE, the axis relative to PSI values will range from 0 to 1
- **loessSmooth**: Boolean: plot a smooth curve computed by `stats::loess.smooth`?
- **loessFamily**: Character: if gaussian, loess fitting is by least-squares, and if symmetric, a re-descending M estimator is used
- **colour**: Character: points' colour
- **alpha**: Numeric: points' alpha
- **size**: Numeric: points' size
- **loessColour**: Character: loess line's colour
- **loessAlpha**: Numeric: loess line's opacity
- **loessWidth**: Numeric: loess line's width
- **fontSize**: Numeric: plot font size
- **...**: Arguments passed on to `stats::loess.smooth`
  - **span**: smoothness parameter for loess.
  - **degree**: degree of local polynomial used.
  - **evaluation**: number of points at which to evaluate the smooth curve.
- **colourGroups**: List of characters: sample colouring by group
- **legend**: Boolean: show legend for sample colouring?
- **showAllData**: Boolean: show data outside selected groups as a single group (coloured based on the colour argument)
- **density**: Boolean: contour plot of a density estimate
- **densityColour**: Character: line colour of contours
- **densityWidth**: Numeric: line width of contours
- **pvalueAdjust**: Character: method used to adjust p-values (see Details)
Details

The following methods for p-value adjustment are supported by using the respective string in the `pvalueAdjust` argument:

- `none`: do not adjust p-values
- `BH`: Benjamini-Hochberg’s method (false discovery rate)
- `BY`: Benjamini-Yekutieli’s method (false discovery rate)
- `bonferroni`: Bonferroni correction (family-wise error rate)
- `holm`: Holm’s method (family-wise error rate)
- `hochberg`: Hochberg’s method (family-wise error rate)
- `hommel`: Hommel’s method (family-wise error rate)

Value

Plots, summary tables or results of correlation analyses

See Also

Other functions to correlate gene expression and alternative splicing: `correlateGEandAS()`

Examples

```r
annot <- readFile("ex_splicing_annotation.RDS")
junctionQuant <- readFile("ex_junctionQuant.RDS")
psi <- quantifySplicing(annot, junctionQuant, eventType=c("SE", "MXE"))

geneExpr <- readFile("ex_gene_expression.RDS")
corr <- correlateGEandAS(geneExpr, psi, "ALDOA")

# Quick display of the correlation results per splicing event and gene
print(corr)

# Table summarising the correlation analysis results
as.table(corr)

# Correlation analysis plots
colourGroups <- list(Normal=paste("Normal", 1:3),
                      Tumour=paste("Cancer", 1:3))
attr(colourGroups, "Colour") <- c(Normal="#00C65A", Tumour="#EEE273")
plot(corr, colourGroups=colourGroups, alpha=1)
```
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