Package 'OmicNavigator'

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Type Package

Title Open-Source Software for 'Omic' Data Analysis and Visualization

Description A tool for interactive exploration of the results from 'omics' experiments to facilitate novel discoveries from high-throughput biology. The software includes R functions for the 'bioinformatician' to deposit study metadata and the outputs from statistical analyses (e.g. differential expression, enrichment). These results are then exported to an interactive JavaScript dashboard that can be interrogated on the user's local machine or deployed online to be explored by collaborators. The dashboard includes 'sortable' tables, interactive plots including network visualization, and fine-grained filtering based on statistical significance.

Version 1.13.6

URL https://github.com/abbvie-external/OmicNavigator

BugReports https://github.com/abbvie-external/OmicNavigator/issues

License MIT + file LICENSE

License_restricts_use no

License_is_FOSS yes

Encoding UTF-8

LazyData true

Depends R (>= 3.2.0)

Imports data.table (>= 1.12.4), graphics, jsonlite, stats, tools, utils

Suggests faviconPlease, ggplot2, opencpu, plotly, tinytest (>= 1.2.3), ttdo (>= 0.0.6), UpSetR

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NeedsCompilation no

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R topics documented:

addAnnotations *Add annotations*

Description

Add annotations

Usage

```
addAnnotations(study, annotations, reset = FALSE)
```

Arguments

study	An OmicNavigator study created with createStudy
annotations	The annotations used for the enrichment analyses. The input is a nested list. The top-level list contains one entry per annotation database, e.g. reactome. The names correspond to the name of each annotation database. Each of these elements should be a list that contains more information about each annotation database. Specifically the sublist should contain 1) description, a character vector that describes the resource, 2) featureID, the name of the column in the features table that was used for the enrichment analysis, and 3) terms, a list of annotation terms. The names of terms sublist correspond to the name of the annotation terms. Each of the annotation terms should be a character vector of featureIDs.
reset	Reset the data prior to adding the new data (default: FALSE). The default is to add to or modify any previously added data (if it exists). Setting reset = TRUE enables you to remove existing data you no longer want to include in the study.

Value

Returns the original onStudy object passed to the argument study, but modified to include the newly added data

addAssays *Add assays*

Description

Add assays

Usage

```
addAssays(study, assays, reset = FALSE)
```

Arguments

study	An OmicNavigator study created with createStudy
assays	The assays from the study. The input object is a list of data frames (one per model). The row names should correspond to the featureIDs (addFeatures). The column names should correspond to the sampleIDs (addSamples). The data frame should only contain numeric values. To share a data frame across multiple models, use the modelID "default".
reset	Reset the data prior to adding the new data (default: FALSE). The default is to add to or modify any previously added data (if it exists). Setting reset = TRUE enables you to remove existing data you no longer want to include in the study.

Value

Returns the original onStudy object passed to the argument study, but modified to include the newly added data

---

addBarcodes *Add barcode plot metadata*

Description

The app can display a barcode plot of the enrichment results for a given annotation term. The metadata in 'barcodes' instructs the app how to create and label the barcode plot.

Usage

```
addBarcodes(study, barcodes, reset = FALSE)
```

Arguments

study	An OmicNavigator study created with createStudy
barcodes	The metadata variables that describe the barcode plot. The input object is a list of lists (one per model). Each sublist must contain the element statistic, which is the column name in the results table to use to construct the barcode plot. Each sublist may additionally contain any of the following optional elements: 1) absolute - Should the statistic be converted to its absolute value (default is TRUE). 2) logFoldChange - The column name in the results table that contains the log fold change values. 3) labelStat - The x-axis label to describe the statistic. 4) labelLow - The left-side label to describe low values of the statistic. 5) labelHigh - The right-side label to describe high values of the statistic. 6) featureDisplay - The feature variable to use to label the barcode plot on hover. To share metadata across multiple models, use the modelID "default".
reset	Reset the data prior to adding the new data (default: FALSE). The default is to add to or modify any previously added data (if it exists). Setting reset = TRUE enables you to remove existing data you no longer want to include in the study.

Value

Returns the original onStudy object passed to the argument study, but modified to include the newly added data

---

addEnrichments *Add enrichment results*

Description

Add enrichment results

Usage

```
addEnrichments(study, enrichments, reset = FALSE)
```

Arguments

study	An OmicNavigator study created with createStudy
enrichments	The enrichment results from each model. The input is a nested named list. The names of the list correspond to the model names. Each list element should be a list of the annotation databases tested (addAnnotations). The names of the list correspond to the annotation databases. Each list element should be another list of tests (addTests). The names correspond to the tests performed. Each of these elements should be a data frame with enrichment results. Each table must contain the following columns: "termID", "description", "nominal" (the nominal statistics), and "adjusted" (the statistics after adjusting for multiple testing). Any additional columns are ignored.
reset	Reset the data prior to adding the new data (default: FALSE). The default is to add to or modify any previously added data (if it exists). Setting reset = TRUE enables you to remove existing data you no longer want to include in the study.

Value

Returns the original onStudy object passed to the argument study, but modified to include the newly added data

addEnrichmentsLinkouts *Add linkouts to external resources in the enrichments table*

Description

You can provide additional information on the annotation terms in your study by providing linkouts to external resources. These will be embedded directly in the enrichments table.

Usage

```
addEnrichmentsLinkouts(study, enrichmentsLinkouts, reset = FALSE)
```

Arguments

study	An OmicNavigator study created with createStudy
enrichmentsLinkouts	The URL patterns that describe linkouts to external resources (see Details below). The input object is a named list. The names of the list correspond to the annotation names. Each element of the list is a character vector of linkouts for that annotationID.
reset	Reset the data prior to adding the new data (default: FALSE). The default is to add to or modify any previously added data (if it exists). Setting reset = TRUE enables you to remove existing data you no longer want to include in the study.

Details

For each linkout, the URL pattern you provide will be concatenated with the value of the termID column. As an example, if you used the annotation database AmiGO 2 for your enrichments analysis, you can provide a linkout for each termID using the following pattern:

```
go = "http://amigo.geneontology.org/amigo/term/"
```

As another example, if you used the annotation database Reactome for your enrichments analysis, you can provide a linkout for each termID using the following pattern:

```
reactome = "https://reactome.org/content/detail/"
```

Note that you can provide more than one linkout per termID.

Value

Returns the original onStudy object passed to the argument study, but modified to include the newly added data

See Also

addAnnotations, addEnrichments

Examples

```
study <- createStudy("example")
enrichmentsLinkouts <- list(
  gobp = c("http://amigo.geneontology.org/amigo/term/",
           "https://www.ebi.ac.uk/QuickGO/term/"),
  reactome = "https://reactome.org/content/detail/"
)
study <- addEnrichmentsLinkouts(study, enrichmentsLinkouts)
```

---

addFeatures *Add feature metadata*

Description

Add feature metadata

Usage

```
addFeatures(study, features, reset = FALSE)
```

Arguments

study	An OmicNavigator study created with createStudy
features	The metadata variables that describe the features in the study. The input object is a list of data frames (one per model). The first column of each data frame is used as the featureID, so it must contain unique values. To share a data frame across multiple models, use the modelID "default". All columns will be coerced to character strings.
reset	Reset the data prior to adding the new data (default: FALSE). The default is to add to or modify any previously added data (if it exists). Setting reset = TRUE enables you to remove existing data you no longer want to include in the study.

Value

Returns the original onStudy object passed to the argument study, but modified to include the newly added data

addMapping *Add mapping object*

Description

Add mapping object

Usage

```
addMapping(study, mapping, reset = FALSE)
```

Arguments

study	An OmicNavigator study created with createStudy
mapping	Feature IDs from models. The input object is a list of named data frames. For each data frame, column names indicate model names while rows indicate featureIDs per model. Features with same index position across columns are treated as mapped across models. For each model, feature IDs must match feature IDs available in the results object of the respective model. 1:N relationships are allowed. Mapping list elements are required to be named as 'default' or after a model name as provided in addModels(). If a single data frame is provided, this list element is recommended to be named 'default'. For multiple list elements, each with its own data frame, list elements should be named after model name(s) (a single element may still be named 'default'). In that case, when navigating in ON front-end (FE), mapping element related to the selected model in the FE will be used in multimodel plots. If a selected model in FE does not have a corresponding mapping list element, it may still use the mapping list element called 'default' if this is available. E.g., if in a study there are models "transcriptomics" and "proteomics" and the user wants to create a plot based on data from both, a mapping list should be provided with addMapping(). In this case, the mapping list element may be named 'default'. This should contain a data frame with column names 'transcriptomics' and 'proteomics', where feature IDs that map across models are found in the same row.
reset	Reset the data prior to adding the new data (default: FALSE). The default is to add to or modify any previously added data (if it exists). Setting reset = TRUE enables you to remove existing data you no longer want to include in the study.

Value

Returns the original onStudy object passed to the argument study, but modified to include the newly added data

See Also

getPlottingData, plotStudy

addMetaFeatures *Add meta-feature metadata*

Description

The meta-features table is useful anytime there are metadata variables that cannot be mapped 1:1 to your features. For example, a peptide may be associated with multiple proteins.

Usage

```
addMetaFeatures(study, metaFeatures, reset = FALSE)
```

Arguments

study	An OmicNavigator study created with createStudy
metaFeatures	The metadata variables that describe the meta-features in the study. The input object is a list of data frames (one per model). The first column of each data frame is used as the featureID, so it must contain the same IDs as the corresponding features data frame (addFeatures). To share a data frame across multiple models, use the modelID "default". All columns will be coerced to character strings.
reset	Reset the data prior to adding the new data (default: FALSE). The default is to add to or modify any previously added data (if it exists). Setting reset = TRUE enables you to remove existing data you no longer want to include in the study.

Value

Returns the original onStudy object passed to the argument study, but modified to include the newly added data

addMetaFeaturesLinkouts *Add linkouts to external resources in the metaFeatures table*

Description

You can provide additional information on the metaFeatures in your study by providing linkouts to external resources. These will be embedded directly in the metaFeatures table.

Usage

```
addMetaFeaturesLinkouts(study, metaFeaturesLinkouts, reset = FALSE)
```

Arguments

study	An OmicNavigator study created with createStudy
metaFeaturesLinkouts	The URL patterns that describe linkouts to external resources (see Details below). The input object is a nested named list. The names of the list correspond to the model names. Each element of the list is a named list of character vectors. The names of this nested list must correspond to the column names of the matching metaFeatures table (addMetaFeatures). To share linkouts across multiple models, use the modelID "default".
reset	Reset the data prior to adding the new data (default: FALSE). The default is to add to or modify any previously added data (if it exists). Setting reset = TRUE enables you to remove existing data you no longer want to include in the study.

Details

For each linkout, the URL pattern you provide will be concatenated with the value of that column for each row. As an example, if your metaFeatures table included a column named "ensembl" that contained the Ensembl Gene ID for each feature, you could create a linkout to Ensembl using the following pattern:

```
ensembl = "https://ensembl.org/Homo_sapiens/Gene/Summary?g="
```

As another example, if you had a column named "entrez" that contained the Entrez Gene ID for each feature, you could create a linkout to Entrez using the following pattern:

```
entrez = "https://www.ncbi.nlm.nih.gov/gene/"
```

Note that you can provide more than one linkout per column.

Value

Returns the original onStudy object passed to the argument study, but modified to include the newly added data

See Also

addMetaFeatures

Examples

```
study <- createStudy("example")
metaFeaturesLinkouts <- list(
  default = list(
    ensembl = c("https://ensembl.org/Homo_sapiens/Gene/Summary?g=",
                "https://www.genome.ucsc.edu/cgi-bin/hgGene?hgg_gene="),
    entrez = "https://www.ncbi.nlm.nih.gov/gene/"
  )
)
study <- addMetaFeaturesLinkouts(study, metaFeaturesLinkouts)
```

addModels *Add models*

Description

Add models

Usage

```
addModels(study, models, reset = FALSE)
```

Arguments

study	An OmicNavigator study created with createStudy
models	The models analyzed in the study. The input is a named list. The names correspond to the names of the models. The elements correspond to the descriptions of the models. Alternatively, instead of a single character string, you can provide a list of metadata fields about each model. The field "description" will be used to derive the tooltip displayed in the app.
reset	Reset the data prior to adding the new data (default: FALSE). The default is to add to or modify any previously added data (if it exists). Setting reset = TRUE enables you to remove existing data you no longer want to include in the study.

Value

Returns the original onStudy object passed to the argument study, but modified to include the newly added data

Examples

```
study <- createStudy("example")
models <- list(
  model_01 = "Name of first model",
  model_02 = "Name of second model"
)
study <- addModels(study, models)

# Alternative: provide additional metadata about each model
models <- list(
  model_01 = list(
    description = "Name of first model",
    data_type = "transcriptomics"
  ),
  model_02 = list(
    description = "Name of second model",
    data_type = "proteomics"
  )
)
```

addOverlaps *Add overlaps between annotation gene sets*

Description

The app's network view of the enrichments results requires pairwise overlap metrics between all the terms of each annotation in order to draw the edges between the nodes/terms. These overlaps are calculated automatically when installing or exporting an OmicNavigator study. If you'd like, you can manually calculate these pairwise overlaps by calling `addOverlaps` prior to installing or exporting your study.

Usage

```
addOverlaps(study, reset = FALSE)
```

Arguments

`study`	An OmicNavigator study created with `createStudy`
`reset`	Reset the data prior to adding the new data (default: `FALSE`). The default is to add to or modify any previously added data (if it exists). Setting `reset = TRUE` enables you to remove existing data you no longer want to include in the study.

Value

Returns the original `onStudy` object passed to the argument `study`, but modified to include the newly added data

addPlots *Add custom plotting functions*

Description

Include custom plots that the app will display when a feature is selected by the user.

Usage

```
addPlots(study, plots, reset = FALSE)
```

Arguments

study	An OmicNavigator study created with createStudy
plots	Custom plotting functions for the study. The input object is a nested list. The first list corresponds to the modelID(s). The second list corresponds to the name(s) of the function(s) defined in the current R session. The third list provides metadata to describe each plot. The only required metadata element is displayName, which controls how the plot will be named in the app. You are encouraged to also specify the plotType, e.g. "singleFeature", "multiFeature", "multiTest", "multiModel". PlotType accepts vector of entries, whenever applicable, e.g., plotType = c("multiFeature", "multiTest"). If you do not specify the plotType, the plot will be assumed to be "singleFeature" and "singleTest". Optionally, if the plotting function requires external packages, these can be defined in the element packages. To share plots across multiple models, use the modelID "default". To add a plotting function that returns an interactive plotly plot, add "plotly" to the plotType vector.
reset	Reset the data prior to adding the new data (default: FALSE). The default is to add to or modify any previously added data (if it exists). Setting reset = TRUE enables you to remove existing data you no longer want to include in the study.

Details

Custom plotting functions are passed a list of data frames: assays with the measurements, features with the feature data, samples with the sample data, and results with test results data. Note that assays, features and results only include data for the specified featureID(s) (and re-ordered so their rows match). Thus your custom plotting function must have at least one argument. It can have additional arguments if you wish, but these must be provided with default values, because plotStudy only passes the plotting data to the first argument.

Note that any ggplot2 plots will require extra care. This is because the plotting code will be inserted into a study package, and thus must follow the best practices for using ggplot2 within packages. Specifically, when you refer to columns of the data frame, e.g. aes(x = group), you need to prefix it with .data$, so that it becomes aes(x = .data$group). Fortunately this latter code will also run fine as you interactively develop the function.

Value

Returns the original onStudy object passed to the argument study, but modified to include the newly added data

See Also

getPlottingData, plotStudy

addReports *Add reports*

Description

You can include reports of the analyses you performed to generate the results.

Usage

```
addReports(study, reports, reset = FALSE)
```

Arguments

study	An OmicNavigator study created with createStudy
reports	The analysis report(s) that explain how the study results were generated. The input object is a list of character vectors (one per model). Each element should be either a URL or a path to a file on your computer. If it is a path to a file, this file will be included in the exported study package. To share a report across multiple models, use the modelID "default".
reset	Reset the data prior to adding the new data (default: FALSE). The default is to add to or modify any previously added data (if it exists). Setting reset = TRUE enables you to remove existing data you no longer want to include in the study.

Value

Returns the original onStudy object passed to the argument study, but modified to include the newly added data

addResults *Add inference results*

Description

Add inference results

Usage

```
addResults(study, results, reset = FALSE)
```

Arguments

study	An OmicNavigator study created with createStudy
results	The inference results from each model. The input is a nested named list. The names of the list correspond to the model names. Each element in the list should be a list of data frames with inference results, one for each test. In each data frame, the featureID must be in the first column, and all other columns must be numeric.
reset	Reset the data prior to adding the new data (default: FALSE). The default is to add to or modify any previously added data (if it exists). Setting reset = TRUE enables you to remove existing data you no longer want to include in the study.

Value

Returns the original onStudy object passed to the argument study, but modified to include the newly added data

---

addResultsLinkouts *Add linkouts to external resources in the results table*

Description

You can provide additional information on the features in your study by providing linkouts to external resources. These will be embedded directly in the results table.

Usage

```
addResultsLinkouts(study, resultsLinkouts, reset = FALSE)
```

Arguments

study	An OmicNavigator study created with createStudy
resultsLinkouts	The URL patterns that describe linkouts to external resources (see Details below). The input object is a nested named list. The names of the list correspond to the model names. Each element of the list is a named list of character vectors. The names of this nested list must correspond to the column names of the matching features table. To share linkouts across multiple models, use the modelID "default".
reset	Reset the data prior to adding the new data (default: FALSE). The default is to add to or modify any previously added data (if it exists). Setting reset = TRUE enables you to remove existing data you no longer want to include in the study.

Details

For each linkout, the URL pattern you provide will be concatenated with the value of that column for each row. As an example, if your features table included a column named "ensembl" that contained the Ensembl Gene ID for each feature, you could create a linkout to Ensembl using the following pattern:

```
ensembl = "https://ensembl.org/Homo_sapiens/Gene/Summary?g="
```

As another example, if you had a column named "entrez" that contained the Entrez Gene ID for each feature, you could create a linkout to Entrez using the following pattern:

```
entrez = "https://www.ncbi.nlm.nih.gov/gene/"
```

Note that you can provide more than one linkout per column.

Value

Returns the original onStudy object passed to the argument study, but modified to include the newly added data

See Also

addFeatures

Examples

```
study <- createStudy("example")
resultsLinkouts <- list(
  default = list(
    ensembl = c("https://ensembl.org/Homo_sapiens/Gene/Summary?g=",
                "https://www.genome.ucsc.edu/cgi-bin/hgGene?hgg_gene="),
    entrez = "https://www.ncbi.nlm.nih.gov/gene/"
  )
)
study <- addResultsLinkouts(study, resultsLinkouts)
```

---

addSamples *Add sample metadata*

Description

Add sample metadata

Usage

```
addSamples(study, samples, reset = FALSE)
```

Arguments

study	An OmicNavigator study created with createStudy
samples	The metadata variables that describe the samples in the study. The input object is a named list of data frames (one per model). The first column of each data frame is used as the sampleID, so it must contain unique values. To share a data frame across multiple models, use the modelID "default".
reset	Reset the data prior to adding the new data (default: FALSE). The default is to add to or modify any previously added data (if it exists). Setting reset = TRUE enables you to remove existing data you no longer want to include in the study.

Value

Returns the original onStudy object passed to the argument study, but modified to include the newly added data

---

addTests *Add tests*

Description

Add tests

Usage

```
addTests(study, tests, reset = FALSE)
```

Arguments

study	An OmicNavigator study created with createStudy
tests	The tests from the study. The input object is a list of lists. Each element of the top-level list is a model. The names should be the modelIDs. For each modelID, each element of the nested list is a test. The names should be the testIDs. The value should be a single character string describing the testID. To share tests across multiple models, use the modelID "default". Instead of a single character string, you can provide a list of metadata fields about each test. The field "description" will be used to derive the tooltip displayed in the app.
reset	Reset the data prior to adding the new data (default: FALSE). The default is to add to or modify any previously added data (if it exists). Setting reset = TRUE enables you to remove existing data you no longer want to include in the study.

Value

Returns the original onStudy object passed to the argument study, but modified to include the newly added data

Examples

```
study <- createStudy("example")
tests <- list(
  default = list(
    test_01 = "Name of first test",
    test_02 = "Name of second test"
  )
)
study <- addTests(study, tests)

# Alternative: provide additional metadata about each test
tests <- list(
  default = list(
    test_01 = list(
      description = "Name of first test",
      comparison_type = "treatment vs control",
      effect_size = "beta"
    ),
    test_02 = list(
      description = "Name of second test",
      comparison_type = "treatment vs control",
      effect_size = "logFC"
    )
  )
)
```

---

basal.vs.lp *basal.vs.lp from Bioconductor workflow RNAseq123*

Description

A subset of the object `basal.vs.lp` from Bioconductor workflow RNAseq123.

Usage

```
basal.vs.lp
```

Format

A data frame with 24 rows and 8 columns:

ENTREZID Entrez ID of mouse gene

SYMBOL Symbol of mouse gene

TXCHROM Chromosome location of mouse gene

logFC Log fold change

AveExpr Average expression level of the gene across all samples

t Moderated t-statistic

P.Value p-value

adj.P.Val Adjusted p-value

Source

https://bioconductor.org/packages/release/workflows/vignettes/RNAseq123/inst/doc/limmaWorkflow.html

References

Law CW, Alhamdoosh M, Su S, Dong X, Tian L, Smyth GK, Ritchie ME. RNA-seq analysis is easy as 1-2-3 with limma, Glimma and edgeR [version 3; peer review: 3 approved]. F1000Research 2018, 5:1408 doi:10.12688/f1000research.9005.3

Sheridan, J.M., Ritchie, M.E., Best, S.A. et al. A pooled shRNA screen for regulators of primary mammary stem and progenitor cells identifies roles for *Asap1* and *Prox1*. BMC Cancer 2015, 15:221 doi:10.1186/s128850151187z

Examples

```
head(basal.vs.lp)
str(basal.vs.lp)
```

`basal.vs.ml` *basal.vs.ml from Bioconductor workflow RNAseq123*

Description

A subset of the object `basal.vs.ml` from Bioconductor workflow RNAseq123.

Usage

```
basal.vs.ml
```

Format

A data frame with 24 rows and 8 columns:

ENTREZID Entrez ID of mouse gene

SYMBOL Symbol of mouse gene

TXCHROM Chromosome location of mouse gene

logFC Log fold change

AveExpr Average expression level of the gene across all samples

t Moderated t-statistic

P.Value p-value

adj.P.Val Adjusted p-value

Source

https://bioconductor.org/packages/release/workflows/vignettes/RNAseq123/inst/doc/limmaWorkflow.html

References

Law CW, Alhamdoosh M, Su S, Dong X, Tian L, Smyth GK, Ritchie ME. RNA-seq analysis is easy as 1-2-3 with limma, Glimma and edgeR [version 3; peer review: 3 approved]. F1000Research 2018, 5:1408 doi:10.12688/f1000research.9005.3

Sheridan, J.M., Ritchie, M.E., Best, S.A. et al. A pooled shRNA screen for regulators of primary mammary stem and progenitor cells identifies roles for *Asap1* and *Prox1*. BMC Cancer 2015, 15:221 doi:10.1186/s128850151187z

Examples

```
head(basal.vs.ml)
str(basal.vs.ml)
```

`cam.BasalvsLP` *cam.BasalvsLP from Bioconductor workflow RNAseq123*

Description

A subset of the object `cam.BasalvsLP` from Bioconductor workflow RNAseq123.

Usage

```
cam.BasalvsLP
```

Format

A data frame with 4 rows and 4 columns:

NGenes Number of genes in each term

Direction Direction of the enrichment

PValue Nominal p-value

FDR Multiple-testing adjusted p-value

Source

https://bioconductor.org/packages/release/workflows/vignettes/RNAseq123/inst/doc/limmaWorkflow.html

References

Law CW, Alhamdoosh M, Su S, Dong X, Tian L, Smyth GK, Ritchie ME. RNA-seq analysis is easy as 1-2-3 with limma, Glimma and edgeR [version 3; peer review: 3 approved]. F1000Research 2018, 5:1408 doi:10.12688/f1000research.9005.3

Sheridan, J.M., Ritchie, M.E., Best, S.A. et al. A pooled shRNA screen for regulators of primary mammary stem and progenitor cells identifies roles for *Asap1* and *Prox1*. BMC Cancer 2015, 15:221 doi:10.1186/s128850151187z

Examples

```
head(cam.BasalvsLP)
str(cam.BasalvsLP)
```

`cam.BasalvsML` *cam.BasalvsML from Bioconductor workflow RNAseq123*

Description

A subset of the object `cam.BasalvsML` from Bioconductor workflow RNAseq123.

Usage

```
cam.BasalvsML
```

Format

A data frame with 4 rows and 4 columns:

NGenes Number of genes in each term

Direction Direction of the enrichment

PValue Nominal p-value

FDR Multiple-testing adjusted p-value

Source

https://bioconductor.org/packages/release/workflows/vignettes/RNAseq123/inst/doc/limmaWorkflow.html

References

Law CW, Alhamdoosh M, Su S, Dong X, Tian L, Smyth GK, Ritchie ME. RNA-seq analysis is easy as 1-2-3 with limma, Glimma and edgeR [version 3; peer review: 3 approved]. F1000Research 2018, 5:1408 doi:10.12688/f1000research.9005.3

Sheridan, J.M., Ritchie, M.E., Best, S.A. et al. A pooled shRNA screen for regulators of primary mammary stem and progenitor cells identifies roles for *Asap1* and *Prox1*. BMC Cancer 2015, 15:221 doi:10.1186/s128850151187z

Examples

```
head(cam.BasalvsML)
str(cam.BasalvsML)
```

`combineStudies` *Combine two or more studies*

Description

Create a new OmicNavigator study by combining two or more existing study objects.

Usage

```
combineStudies(...)
```

Arguments

`...`	Two or more objects of class `onStudy`

Details

This is a convenience function to quickly and conveniently combine studies. However, it is naive, and you will likely need to edit the new study after combining. When there are conflicting elements (e.g. different study names or different maintainers), then the value for the latter study is kept. As a concrete example, if you combined 5 studies, the name of the combined study would be the name of the 5th study.

The behavior is more complex for study elements that are nested lists of data frames (e.g. results). If the 5 studies included a results table for the same modelID/testID combination, then only the results from the 5th study would be retained. However, if they each defined a different modelID, then the results for all 5 modelIDs would be included in the combined study. Please note that you should be extra cautious in the situation where the studies have the same modelID/testID combination. Ideally they should all have the same column names. Since a data frame is technically a list, the workhorse function `modifyList` will retain any uniquely named columns from earlier studies along with the columns from the final study.

Note that as a shortcut you can also combine studies using the S3 method `c`.

If a study you would like to combine is already installed, you can convert it to a study object by importing it with `importStudy`.

Value

Returns a new combined OmicNavigator study object, which is a named nested list with class `onStudy`

See Also

`createStudy`, `importStudy`

Examples

```
# Define threee study objects
studyOne <- createStudy(name = "One",
                        description = "First study",
                        studyMeta = list(metafield1 = "metavalue1"))

studyTwo <- createStudy(name = "Two",
                        description = "Second study",
                        maintainer = "The Maintainer",
                        studyMeta = list(metafield2 = "metavalue2"))

studyThree <- createStudy(name = "Three",
                          description = "Third study",
                          studyMeta = list(metafield3 = "metavalue3"))

# Combine the three studies
combineStudies(studyOne, studyTwo, studyThree)

# Equivalently, can use c()
c(studyOne, studyTwo, studyThree)
```

---

createStudy *Create a study*

Description

Create a new OmicNavigator study.

Usage

```
createStudy(
  name,
  description = name,
  samples = list(),
  features = list(),
  models = list(),
  assays = list(),
  tests = list(),
  annotations = list(),
  results = list(),
  enrichments = list(),
  metaFeatures = list(),
  plots = list(),
  mapping = list(),
  barcodes = list(),
  reports = list(),
```

```
  resultsLinkouts = list(),
  enrichmentsLinkouts = list(),
  metaFeaturesLinkouts = list(),
  version = NULL,
  maintainer = NULL,
  maintainerEmail = NULL,
  studyMeta = list()
)
```

Arguments

name	Name of the study
description	Description of the study
samples	The metadata variables that describe the samples in the study. The input object is a named list of data frames (one per model). The first column of each data frame is used as the sampleID, so it must contain unique values. To share a data frame across multiple models, use the modelID "default".
features	The metadata variables that describe the features in the study. The input object is a list of data frames (one per model). The first column of each data frame is used as the featureID, so it must contain unique values. To share a data frame across multiple models, use the modelID "default". All columns will be coerced to character strings.
models	The models analyzed in the study. The input is a named list. The names correspond to the names of the models. The elements correspond to the descriptions of the models. Alternatively, instead of a single character string, you can provide a list of metadata fields about each model. The field "description" will be used to derive the tooltip displayed in the app.
assays	The assays from the study. The input object is a list of data frames (one per model). The row names should correspond to the featureIDs (addFeatures). The column names should correspond to the sampleIDs (addSamples). The data frame should only contain numeric values. To share a data frame across multiple models, use the modelID "default".
tests	The tests from the study. The input object is a list of lists. Each element of the top-level list is a model. The names should be the modelIDs. For each modelID, each element of the nested list is a test. The names should be the testIDs. The value should be a single character string describing the testID. To share tests across multiple models, use the modelID "default". Instead of a single character string, you can provide a list of metadata fields about each test. The field "description" will be used to derive the tooltip displayed in the app.
annotations	The annotations used for the enrichment analyses. The input is a nested list. The top-level list contains one entry per annotation database, e.g. reactome. The names correspond to the name of each annotation database. Each of these elements should be a list that contains more information about each annotation database. Specifically the sublist should contain 1) description, a character vector that describes the resource, 2) featureID, the name of the column in the features table that was used for the enrichment analysis, and 3) terms, a list of annotation terms. The names of terms sublist correspond to the name of the

annotation terms. Each of the annotation terms should be a character vector of featureIDs.

`results` The inference results from each model. The input is a nested named list. The names of the list correspond to the model names. Each element in the list should be a list of data frames with inference results, one for each test. In each data frame, the featureID must be in the first column, and all other columns must be numeric.

`enrichments` The enrichment results from each model. The input is a nested named list. The names of the list correspond to the model names. Each list element should be a list of the annotation databases tested (`addAnnotations`). The names of the list correspond to the annotation databases. Each list element should be another list of tests (`addTests`). The names correspond to the tests performed. Each of these elements should be a data frame with enrichment results. Each table must contain the following columns: "termID", "description", "nominal" (the nominal statistics), and "adjusted" (the statistics after adjusting for multiple testing). Any additional columns are ignored.

`metaFeatures` The metadata variables that describe the meta-features in the study. The input object is a list of data frames (one per model). The first column of each data frame is used as the featureID, so it must contain the same IDs as the corresponding features data frame (`addFeatures`). To share a data frame across multiple models, use the modelID "default". All columns will be coerced to character strings.

`plots` Custom plotting functions for the study. The input object is a nested list. The first list corresponds to the modelID(s). The second list corresponds to the name(s) of the function(s) defined in the current R session. The third list provides metadata to describe each plot. The only required metadata element is `displayName`, which controls how the plot will be named in the app. You are encouraged to also specify the `plotType`, e.g. `"singleFeature"`, `"multiFeature"`, `"multiTest"`, `"multiModel"`. PlotType accepts vector of entries, whenever applicable, e.g., plotType = c(`"multiFeature"`, `"multiTest"`). If you do not specify the `plotType`, the plot will be assumed to be `"singleFeature"` and `"singleTest"`. Optionally, if the plotting function requires external packages, these can be defined in the element `packages`. To share plots across multiple models, use the modelID "default". To add a plotting function that returns an interactive plotly plot, add "plotly" to the `plotType` vector.

`mapping` Feature IDs from models. The input object is a list of named data frames. For each data frame, column names indicate model names while rows indicate featureIDs per model. Features with same index position across columns are treated as mapped across models. For each model, feature IDs must match feature IDs available in the results object of the respective model. 1:N relationships are allowed.

Mapping list elements are required to be named as 'default' or after a model name as provided in addModels(). If a single data frame is provided, this list element is recommended to be named 'default'. For multiple list elements, each with its own data frame, list elements should be named after model name(s) (a single element may still be named 'default'). In that case, when navigating in ON front-end (FE), mapping element related to the selected model in the FE

will be used in multimodel plots. If a selected model in FE does not have a corresponding mapping list element, it may still use the mapping list element called 'default' if this is available.

E.g., if in a study there are models "transcriptomics" and "proteomics" and the user wants to create a plot based on data from both, a mapping list should be provided with addMapping(). In this case, the mapping list element may be named 'default'. This should contain a data frame with column names 'transcriptomics' and 'proteomics', where feature IDs that map across models are found in the same row.

`barcodes` The metadata variables that describe the barcode plot. The input object is a list of lists (one per model). Each sublist must contain the element `statistic`, which is the column name in the results table to use to construct the barcode plot. Each sublist may additionally contain any of the following optional elements: 1) `absolute` - Should the statistic be converted to its absolute value (default is `TRUE`). 2) `logFoldChange` - The column name in the results table that contains the log fold change values. 3) `labelStat` - The x-axis label to describe the statistic. 4) `labelLow` - The left-side label to describe low values of the statistic. 5) `labelHigh` - The right-side label to describe high values of the statistic. 6) `featureDisplay` - The feature variable to use to label the barcode plot on hover. To share metadata across multiple models, use the modelID "default".

`reports` The analysis report(s) that explain how the study results were generated. The input object is a list of character vectors (one per model). Each element should be either a URL or a path to a file on your computer. If it is a path to a file, this file will be included in the exported study package. To share a report across multiple models, use the modelID "default".

`resultsLinkouts`
The URL patterns that describe linkouts to external resources (see Details below). The input object is a nested named list. The names of the list correspond to the model names. Each element of the list is a named list of character vectors. The names of this nested list must correspond to the column names of the matching features table. To share linkouts across multiple models, use the modelID "default".

`enrichmentsLinkouts`
The URL patterns that describe linkouts to external resources (see Details below). The input object is a named list. The names of the list correspond to the annotation names. Each element of the list is a character vector of linkouts for that annotationID.

`metaFeaturesLinkouts`
The URL patterns that describe linkouts to external resources (see Details below). The input object is a nested named list. The names of the list correspond to the model names. Each element of the list is a named list of character vectors. The names of this nested list must correspond to the column names of the matching metaFeatures table (`addMetaFeatures`). To share linkouts across multiple models, use the modelID "default".

`version` (Optional) Include a version number to track the updates to your study package. If you export the study to a package, the version is used as the package version.

`maintainer` (Optional) Include the name of the study package's maintainer

`maintainerEmail`
: (Optional) Include the email of the study package's maintainer

`studyMeta`
: (Optional) Define metadata about your study. The input is a list of key:value pairs. See below for more details.

Details

You can add metadata to describe your study by passing a named list to to the argument `studyMeta`. The names of the list cannot contain spaces or colons, and they can't start with # or -. The values of each list should be a single value. Also, your metadata fields cannot use any of the reserved fields for R's DESCRIPTION file.

Value

Returns a new OmicNavigator study object, which is a named nested list with class `onStudy`

See Also

`addSamples`, `addFeatures`, `addModels`, `addAssays`, `addTests`, `addAnnotations`, `addResults`, `addEnrichments`, `addMetaFeatures`, `addPlots`, `addMapping`, `addBarcodes`, `addReports`, `addResultsLinkouts`, `addEnrichmentsLinkouts`, `addMetaFeaturesLinkouts`, `exportStudy`, `installStudy`

Examples

```
study <- createStudy(name = "ABC",
                     description = "An analysis of ABC")

# Define a version and study metadata
study <- createStudy(name = "ABC",
                     description = "An analysis of ABC",
                     version = "0.1.0",
                     maintainer = "My Name",
                     maintainerEmail = "me@email.com",
                     studyMeta = list(department = "immunology",
                                      organism = "Mus musculus"))
```

`exportStudy` *Export a study*

Description

Export a study

Usage

```
exportStudy(
  study,
  type = c("tarball", "package"),
  path = NULL,
  requireValid = TRUE
)
```

Arguments

study	An OmicNavigator study
type	Export study as a package tarball ("tarball") or as a package directory ("package")
path	Optional file path to save the object
requireValid	Require that study is valid before exporting

Value

Invisibly returns the name of the tarball file ("tarball") or the path to the package directory ("package")

See Also

validateStudy

---

getAnnotations *Get annotations from a study*

Description

Get annotations from a study

Usage

```
getAnnotations(study, annotationID = NULL, quiet = FALSE, libraries = NULL)
```

Arguments

study	An OmicNavigator study. Either an object of class onStudy, or the name of an installed study package.
annotationID	Filter by annotationID
quiet	Suppress messages (default: FALSE)
libraries	The directories to search for installed study packages. If left as NULL (the default), then installed.packages will use the result of .libPaths.

Value

The object returned depends on the data available and any filters (e.g. the argument `modelID`):

If no filters are specified, then the object returned is a nested list, similar to the original input object.

If one or more filters are applied, then only a subset of the original nested list is returned. Technically, each filter applied is used to subset the original nested list using `[[`.

If no data is available, an empty list is returned (`list()`).

`getAssays` *Get assays from a study*

Description

Get assays from a study

Usage

```
getAssays(study, modelID = NULL, quiet = FALSE, libraries = NULL)
```

Arguments

`study`	An OmicNavigator study. Either an object of class `onStudy`, or the name of an installed study package.
`modelID`	Filter by modelID
`quiet`	Suppress messages (default: `FALSE`)
`libraries`	The directories to search for installed study packages. If left as `NULL` (the default), then `installed.packages` will use the result of `.libPaths`.

Value

The object returned depends on the data available and any filters (e.g. the argument `modelID`):

If no filters are specified, then the object returned is a nested list, similar to the original input object.

If one or more filters are applied, then only a subset of the original nested list is returned. Technically, each filter applied is used to subset the original nested list using `[[`.

If no data is available, an empty list is returned (`list()`).

getBarcodeData *Get data for barcode and violin plots*

Description

Get data for barcode and violin plots

Usage

```
getBarcodeData(study, modelID, testID, annotationID, termID)
```

Arguments

study	An OmicNavigator study. Either an object of class onStudy, or the name of an installed study package.
modelID	Filter by modelID
testID	Filter by testID
annotationID	Filter by annotationID
termID	Filter by termID

Value

A list with the following components:

data	Data frame with the differential statistics to plot
highest	(numeric) The largest differential statistic, rounded up to the next integer
labelStat	(character) The x-axis label to describe the differential statistic
labelLow	(character) The vertical axis label on the left to describe smaller values (default is "Low")
labelHigh	(character) The vertical axis label on the right to describe larger values (default is "High")

See Also

addBarcodes, getBarcodes

getBarcodes *Get barcodes from a study*

Description

Get barcodes from a study

Usage

```
getBarcodes(study, modelID = NULL, quiet = FALSE, libraries = NULL)
```

Arguments

study	An OmicNavigator study. Either an object of class onStudy, or the name of an installed study package.
modelID	Filter by modelID
quiet	Suppress messages (default: FALSE)
libraries	The directories to search for installed study packages. If left as NULL (the default), then installed.packages will use the result of .libPaths.

Value

The object returned depends on the data available and any filters (e.g. the argument modelID):

If no filters are specified, then the object returned is a nested list, similar to the original input object.

If one or more filters are applied, then only a subset of the original nested list is returned. Technically, each filter applied is used to subset the original nested list using [[.

If no data is available, an empty list is returned (list()).

getEnrichments *Get enrichments from a study*

Description

Get enrichments from a study

Usage

```
getEnrichments(
  study,
  modelID = NULL,
  annotationID = NULL,
  testID = NULL,
  quiet = FALSE,
  libraries = NULL
)
```

Arguments

study	An OmicNavigator study. Either an object of class onStudy, or the name of an installed study package.
modelID	Filter by modelID
annotationID	Filter by annotationID
testID	Filter by testID
quiet	Suppress messages (default: FALSE)
libraries	The directories to search for installed study packages. If left as NULL (the default), then installed.packages will use the result of .libPaths.

Value

The object returned depends on the data available and any filters (e.g. the argument modelID):

If no filters are specified, then the object returned is a nested list, similar to the original input object.

If one or more filters are applied, then only a subset of the original nested list is returned. Technically, each filter applied is used to subset the original nested list using [[.

If no data is available, an empty list is returned (list()).

---

getEnrichmentsIntersection

getEnrichmentsIntersection

Description

getEnrichmentsIntersection

Usage

```
getEnrichmentsIntersection(
  study,
  modelID,
  annotationID,
  mustTests,
  notTests,
  sigValue,
  operator,
  type
)
```

Arguments

study	An OmicNavigator study. Either an object of class onStudy, or the name of an installed study package.
modelID	Filter by modelID
annotationID	Filter by annotationID
mustTests	The testIDs for which a featureID (or termID for enrichment) must pass the filters
notTests	The testIDs for which a featureID (or termID for enrichment) must **not** pass the filters. In other words, if a featureID passes the filter for a testID specified in notTests, that featureID is removed from the output
sigValue	The numeric significance value to use as a cutoff for each column
operator	The comparison operators for each column, e.g. "<"
type	Type of p-value: ("nominal" or "adjusted")

Value

Returns a data frame with the enrichments, similar to getEnrichmentsTable. Only rows that pass all the filters are included.

See Also

getEnrichmentsTable

---

getEnrichmentsLinkouts

Get enrichments table linkouts from a study

Description

Get enrichments table linkouts from a study

Usage

```
getEnrichmentsLinkouts(
  study,
  annotationID = NULL,
  quiet = FALSE,
  libraries = NULL
)
```

Arguments

study	An OmicNavigator study. Either an object of class onStudy, or the name of an installed study package.
annotationID	Filter by annotationID
quiet	Suppress messages (default: FALSE)
libraries	The directories to search for installed study packages. If left as NULL (the default), then installed.packages will use the result of .libPaths.

Value

The object returned depends on the data available and any filters (e.g. the argument modelID):

If no filters are specified, then the object returned is a nested list, similar to the original input object.

If one or more filters are applied, then only a subset of the original nested list is returned. Technically, each filter applied is used to subset the original nested list using [[.

If no data is available, an empty list is returned (list()).

---

getEnrichmentsNetwork *Get enrichments network from a study*

Description

Get enrichments network from a study

Usage

```
getEnrichmentsNetwork(study, modelID, annotationID, libraries = NULL)
```

Arguments

study	An OmicNavigator study. Either an object of class onStudy, or the name of an installed study package.
modelID	Filter by modelID
annotationID	Filter by annotationID
libraries	The directories to search for installed study packages. If left as NULL (the default), then installed.packages will use the result of .libPaths.

Value

Returns a list with the following components:

tests	(character) Vector of testIDs
nodes	(data frame) The description of each annotation term (i.e. node). The nominal and adjusted p-values are in list-columns.
links	(list) The statistics for each pairwise overlap between the annotation terms (i.e. nodes)

`getEnrichmentsTable` *Get enrichments table from a study*

Description

Get enrichments table from a study

Usage

```
getEnrichmentsTable(
  study,
  modelID,
  annotationID,
  type = "nominal",
  libraries = NULL
)
```

Arguments

`study`	An OmicNavigator study. Either an object of class `onStudy`, or the name of an installed study package.
`modelID`	Filter by modelID
`annotationID`	Filter by annotationID
`type`	Type of p-value: (`"nominal"` or `"adjusted"`)
`libraries`	The directories to search for installed study packages. If left as `NULL` (the default), then `installed.packages` will use the result of `.libPaths`.

Value

A data frame of enrichments with the following columns:

`termID`	The unique ID for the annotation term
`description`	The description of the annotation term
`...`	One column for each of the enrichments

getEnrichmentsUpset *getEnrichmentsUpset*

Description

getEnrichmentsUpset

Usage

```
getEnrichmentsUpset(
  study,
  modelID,
  annotationID,
  sigValue,
  operator,
  type,
  tests = NULL
)
```

Arguments

study	An OmicNavigator study. Either an object of class onStudy, or the name of an installed study package.
modelID	Filter by modelID
annotationID	Filter by annotationID
sigValue	The numeric significance value to use as a cutoff for each column
operator	The comparison operators for each column, e.g. "<"
type	Type of p-value: ("nominal" or "adjusted")
tests	Restrict UpSet plot to only include these tests

Value

No return value. This function is called for the side effect of creating an UpSet plot.

getFavicons *Get favicon URLs for table linkouts*

Description

To enhance the display of the linkouts in the app's tables, it can fetch the favicon URL for each website.

Usage

```
getFavicons(linkouts)
```

Arguments

linkouts	Character vector or (potentially nested) list of character vectors containing the URLs for the table linkouts.

Value

The URLs to the favicons for each linkout. The output returned will always be the same class and structure as the input.

See Also

getResultsLinkouts, getEnrichmentsLinkouts

---

getFeatures *Get features from a study*

Description

Get features from a study

Usage

```
getFeatures(study, modelID = NULL, quiet = FALSE, libraries = NULL)
```

Arguments

study	An OmicNavigator study. Either an object of class onStudy, or the name of an installed study package.
modelID	Filter by modelID
quiet	Suppress messages (default: FALSE)
libraries	The directories to search for installed study packages. If left as NULL (the default), then installed.packages will use the result of .libPaths.

Value

A data frame (if modelID is specified) or a list of data frames. All the columns will be character strings, even if the values appear numeric.

getInstalledStudies *Get installed OmicNavigator studies*

Description

Get installed OmicNavigator studies

Usage

```
getInstalledStudies(libraries = NULL)
```

Arguments

libraries	Character vector of library directories to search for study packages. If NULL, uses .libPaths.

Value

Returns a character vector of the installed OmicNavigator study packages

getLinkFeatures *Get the shared features in a network link*

Description

Get the shared features in a network link

Usage

```
getLinkFeatures(study, annotationID, termID1, termID2)
```

Arguments

study	An OmicNavigator study. Only accepts name of installed study package.
annotationID	Filter by annotationID
termID1, termID2	Linked terms to find overlapping features

Value

Returns a character vector with the features included in both termIDs (i.e. the intersection)

See Also

getNodeFeatures

getMapping *Get mapping object from a study*

Description

Get mapping object from a study

Usage

```
getMapping(study, modelID = NULL, quiet = FALSE, libraries = NULL)
```

Arguments

study	An OmicNavigator study. Either an object of class onStudy, or the name of an installed study package.
modelID	Filter by modelID
quiet	Suppress messages (default: FALSE)
libraries	The directories to search for installed study packages. If left as NULL (the default), then installed.packages will use the result of .libPaths.

Value

The object returned depends on the data available and any filters (e.g. the argument modelID):

If no filters are specified, then the object returned is a nested list, similar to the original input object.

If one or more filters are applied, then only a subset of the original nested list is returned. Technically, each filter applied is used to subset the original nested list using [[.

If no data is available, an empty list is returned (list()).

getMetaFeatures *Get metaFeatures from a study*

Description

Get metaFeatures from a study

Usage

```
getMetaFeatures(study, modelID = NULL, quiet = FALSE, libraries = NULL)
```

Arguments

study	An OmicNavigator study. Either an object of class onStudy, or the name of an installed study package.
modelID	Filter by modelID
quiet	Suppress messages (default: FALSE)
libraries	The directories to search for installed study packages. If left as NULL (the default), then installed.packages will use the result of .libPaths.

Value

The object returned depends on the data available and any filters (e.g. the argument modelID):

If no filters are specified, then the object returned is a nested list, similar to the original input object.

If one or more filters are applied, then only a subset of the original nested list is returned. Technically, each filter applied is used to subset the original nested list using [[.

If no data is available, an empty list is returned (list()).

---

getMetaFeaturesLinkouts

Get metaFeatures table linkouts from a study

Description

Get metaFeatures table linkouts from a study

Usage

```
getMetaFeaturesLinkouts(study, modelID = NULL, quiet = FALSE, libraries = NULL)
```

Arguments

study	An OmicNavigator study. Either an object of class onStudy, or the name of an installed study package.
modelID	Filter by modelID
quiet	Suppress messages (default: FALSE)
libraries	The directories to search for installed study packages. If left as NULL (the default), then installed.packages will use the result of .libPaths.

Value

The object returned depends on the data available and any filters (e.g. the argument modelID):

If no filters are specified, then the object returned is a nested list, similar to the original input object.

If one or more filters are applied, then only a subset of the original nested list is returned. Technically, each filter applied is used to subset the original nested list using [[.

If no data is available, an empty list is returned (list()).

getMetaFeaturesTable *Get metaFeatures for a given feature*

Description

Get metaFeatures for a given feature

Usage

```
getMetaFeaturesTable(study, modelID, featureID)
```

Arguments

study	An OmicNavigator study. Either an object of class onStudy, or the name of an installed study package.
modelID	Filter by modelID
featureID	Filter by featureID

Value

Returns a data frame with the metaFeatures for the provided featureID. If the featureID is not found in the metaFeatures table, the data frame will have zero rows.

See Also

addMetaFeatures, getMetaFeatures

getModels *Get models from a study*

Description

Get models from a study

Usage

```
getModels(study, modelID = NULL, quiet = FALSE, libraries = NULL)
```

Arguments

study	An OmicNavigator study. Either an object of class onStudy, or the name of an installed study package.
modelID	Filter by modelID
quiet	Suppress messages (default: FALSE)
libraries	The directories to search for installed study packages. If left as NULL (the default), then installed.packages will use the result of .libPaths.

Value

The object returned depends on the data available and any filters (e.g. the argument `modelID`):

If no filters are specified, then the object returned is a nested list, similar to the original input object.

If one or more filters are applied, then only a subset of the original nested list is returned. Technically, each filter applied is used to subset the original nested list using `[[`.

If no data is available, an empty list is returned (`list()`).

`getNodeFeatures` *Get the features in a network node*

Description

Get the features in a network node

Usage

```
getNodeFeatures(study, annotationID, termID, libraries = NULL)
```

Arguments

`study`	An OmicNavigator study. Only accepts name of installed study package.
`annotationID`	Filter by annotationID
`termID`	Filter by termID
`libraries`	The directories to search for installed study packages. If left as `NULL` (the default), then `installed.packages` will use the result of `.libPaths`.

Value

Returns a character vector with the features in the termID

See Also

`getLinkFeatures`

getOverlaps *Get overlaps from a study*

Description

Get overlaps from a study

Usage

```
getOverlaps(study, annotationID = NULL, quiet = FALSE, libraries = NULL)
```

Arguments

study	An OmicNavigator study. Either an object of class onStudy, or the name of an installed study package.
annotationID	Filter by annotationID
quiet	Suppress messages (default: FALSE)
libraries	The directories to search for installed study packages. If left as NULL (the default), then installed.packages will use the result of .libPaths.

Value

The object returned depends on the data available and any filters (e.g. the argument modelID):

If no filters are specified, then the object returned is a nested list, similar to the original input object.

If one or more filters are applied, then only a subset of the original nested list is returned. Technically, each filter applied is used to subset the original nested list using [[.

If no data is available, an empty list is returned (list()).

getPackageVersion *Get version of OmicNavigator package*

Description

This is a convenience function for the app. It is easier to always call the OmicNavigator package functions via OpenCPU than to call the utils package for this one endpoint.

Usage

```
getPackageVersion()
```

Value

Returns a one-element character vector with the version of the currently installed OmicNavigator R package

getPlots *Get plots from a study*

Description

Get plots from a study

Usage

```
getPlots(study, modelID = NULL, quiet = FALSE, libraries = NULL)
```

Arguments

study	An OmicNavigator study. Either an object of class onStudy, or the name of an installed study package.
modelID	Filter by modelID
quiet	Suppress messages (default: FALSE)
libraries	The directories to search for installed study packages. If left as NULL (the default), then installed.packages will use the result of .libPaths.

Value

The object returned depends on the data available and any filters (e.g. the argument modelID):

If no filters are specified, then the object returned is a nested list, similar to the original input object.

If one or more filters are applied, then only a subset of the original nested list is returned. Technically, each filter applied is used to subset the original nested list using [[.

If no data is available, an empty list is returned (list()).

getPlottingData *Get plotting data*

Description

This function creates the input data that plotStudy passes to custom plotting functions added with addPlots. You can use it directly when you are interactively creating your custom plotting functions. Note that for multiModel plots testID is required to be a named vector, with each testID named after the related modelID.

Usage

```
getPlottingData(study, modelID, featureID, testID = NULL, libraries = NULL)
```

Arguments

study	An OmicNavigator study. Either an object of class onStudy, or the name of an installed study package.
modelID	Filter by modelID
featureID	Filter by featureID
testID	Filter by testID
libraries	The directories to search for installed study packages. If left as NULL (the default), then installed.packages will use the result of .libPaths.

Value

Returns a list of 4 data frames:

assays	A data frame that contains the assay measurements, filtered to only include the row(s) corresponding to the input featureID(s) (see getAssays). If multiple featureIDs are requested, the rows are reordered to match the order of this input. The column order is unchanged.
samples	A data frame that contains the sample metadata for the given modelID (see getSamples). The rows are reordered to match the columns of the assays data frame.
features	A data frame that contains the feature metadata, filtered to only include the row(s) corresponding to the input featureID(s) (see getFeatures). If multiple featureIDs are requested, the rows are reordered to match the order of this input (and thus match the order of the assays data frame).
results	A data frame that contains the test results, filtered to only include the row(s) corresponding to the input featureID(s). If multiple featureIDs are requested, the rows are reordered to match the order of this input. The column order is unchanged. If multiple testIDs are provided, they are stored in a list object.

The data frame results is only returned if you pass a testID. By default the app will always pass the currently selected testID. To make results a list of data frames (one for each testID for the currently selected modelID), set the plotType to be "multiTest" when adding the plot with addPlots. For "multiModel" plots, testID and modelID should be vectors of same length, where the index position indicate which test in testID relate to which model in modelID.

See Also

addPlots, plotStudy

getReportLink *Get link to report*

Description

Get link to report

Usage

```
getReportLink(study, modelID)
```

Arguments

study	An OmicNavigator study. Either an object of class onStudy, or the name of an installed study package.
modelID	Filter by modelID

Value

Returns a one-element character vector with either a path to a report file or a URL to a report web page. If no report is available for the modelID, an empty character vector is returned.

getReports *Get reports from a study*

Description

Get reports from a study

Usage

```
getReports(study, modelID = NULL, quiet = FALSE, libraries = NULL)
```

Arguments

study	An OmicNavigator study. Either an object of class onStudy, or the name of an installed study package.
modelID	Filter by modelID
quiet	Suppress messages (default: FALSE)
libraries	The directories to search for installed study packages. If left as NULL (the default), then installed.packages will use the result of .libPaths.

Value

The object returned depends on the data available and any filters (e.g. the argument `modelID`):

If no filters are specified, then the object returned is a nested list, similar to the original input object.

If one or more filters are applied, then only a subset of the original nested list is returned. Technically, each filter applied is used to subset the original nested list using `[[`.

If no data is available, an empty list is returned (`list()`).

`getResults` *Get results from a study*

Description

Get results from a study

Usage

```
getResults(
  study,
  modelID = NULL,
  testID = NULL,
  quiet = FALSE,
  libraries = NULL
)
```

Arguments

`study`	An OmicNavigator study. Either an object of class `onStudy`, or the name of an installed study package.
`modelID`	Filter by modelID
`testID`	Filter by testID
`quiet`	Suppress messages (default: `FALSE`)
`libraries`	The directories to search for installed study packages. If left as `NULL` (the default), then `installed.packages` will use the result of `.libPaths`.

Value

The object returned depends on the data available and any filters (e.g. the argument `modelID`):

If no filters are specified, then the object returned is a nested list, similar to the original input object.

If one or more filters are applied, then only a subset of the original nested list is returned. Technically, each filter applied is used to subset the original nested list using `[[`.

If no data is available, an empty list is returned (`list()`).

getResultsIntersection *getResultsIntersection*

Description

getResultsIntersection

Usage

```
getResultsIntersection(
  study,
  modelID,
  anchor,
  mustTests,
  notTests,
  sigValue,
  operator,
  column
)
```

Arguments

study	An OmicNavigator study. Either an object of class onStudy, or the name of an installed study package.
modelID	Filter by modelID
anchor	The primary testID to filter the results
mustTests	The testIDs for which a featureID (or termID for enrichment) must pass the filters
notTests	The testIDs for which a featureID (or termID for enrichment) must **not** pass the filters. In other words, if a featureID passes the filter for a testID specified in notTests, that featureID is removed from the output
sigValue	The numeric significance value to use as a cutoff for each column
operator	The comparison operators for each column, e.g. "<"
column	The columns to apply the filters

Value

Returns a data frame with the results, similar to getResultsTable. Only rows that pass all the filters are included. The new column Set_Membership is a comma-separated field that includes the testIDs in which the featureID passed the filters.

See Also

getResultsTable

getResultsLinkouts *Get results table linkouts from a study*

Description

Get results table linkouts from a study

Usage

```
getResultsLinkouts(study, modelID = NULL, quiet = FALSE, libraries = NULL)
```

Arguments

study	An OmicNavigator study. Either an object of class onStudy, or the name of an installed study package.
modelID	Filter by modelID
quiet	Suppress messages (default: FALSE)
libraries	The directories to search for installed study packages. If left as NULL (the default), then installed.packages will use the result of .libPaths.

Value

The object returned depends on the data available and any filters (e.g. the argument modelID):

If no filters are specified, then the object returned is a nested list, similar to the original input object.

If one or more filters are applied, then only a subset of the original nested list is returned. Technically, each filter applied is used to subset the original nested list using [[.

If no data is available, an empty list is returned (list()).

getResultsTable *Get results table from a study*

Description

Get results table from a study

Usage

```
getResultsTable(
  study,
  modelID,
  testID,
  annotationID = NULL,
  termID = NULL,
  libraries = NULL
)
```

Arguments

`study`	An OmicNavigator study. Either an object of class `onStudy`, or the name of an installed study package.
`modelID`	Filter by modelID
`testID`	Filter by testID
`annotationID`	Filter by annotationID
`termID`	Filter by termID
`libraries`	The directories to search for installed study packages. If left as `NULL` (the default), then `installed.packages` will use the result of `.libPaths`.

Value

A data frame which includes the columns from the features table followed by the columns from the results table. All the columns from the features table will be character strings, even if the values appear numeric.

If the optional arguments `annotationID` and `termID` are provided, the table will be filtered to only include features in that annotation term.

`getResultsUpset` *getResultsUpset*

Description

getResultsUpset

Usage

```
getResultsUpset(study, modelID, sigValue, operator, column, legacy = FALSE)
```

Arguments

`study`	An OmicNavigator study. Either an object of class `onStudy`, or the name of an installed study package.
`modelID`	Filter by modelID
`sigValue`	The numeric significance value to use as a cutoff for each column
`operator`	The comparison operators for each column, e.g. `"<"`
`column`	The columns to apply the filters
`legacy`	Use legacy code (for testing purposes only)

Value

Invisibly returns the output from `upset`

getSamples *Get samples from a study*

Description

Get samples from a study

Usage

```
getSamples(study, modelID = NULL, quiet = FALSE, libraries = NULL)
```

Arguments

study	An OmicNavigator study. Either an object of class onStudy, or the name of an installed study package.
modelID	Filter by modelID
quiet	Suppress messages (default: FALSE)
libraries	The directories to search for installed study packages. If left as NULL (the default), then installed.packages will use the result of .libPaths.

Value

The object returned depends on the data available and any filters (e.g. the argument modelID):

If no filters are specified, then the object returned is a nested list, similar to the original input object.

If one or more filters are applied, then only a subset of the original nested list is returned. Technically, each filter applied is used to subset the original nested list using [[.

If no data is available, an empty list is returned (list()).

getTests *Get tests from a study*

Description

Get tests from a study

Usage

```
getTests(study, modelID = NULL, testID = NULL, quiet = FALSE, libraries = NULL)
```

Arguments

`study`	An OmicNavigator study. Either an object of class `onStudy`, or the name of an installed study package.
`modelID`	Filter by modelID
`testID`	Filter by testID
`quiet`	Suppress messages (default: `FALSE`)
`libraries`	The directories to search for installed study packages. If left as `NULL` (the default), then `installed.packages` will use the result of `.libPaths`.

Value

The object returned depends on the data available and any filters (e.g. the argument `modelID`):

If no filters are specified, then the object returned is a nested list, similar to the original input object.

If one or more filters are applied, then only a subset of the original nested list is returned. Technically, each filter applied is used to subset the original nested list using `[[`.

If no data is available, an empty list is returned (`list()`).

`getUpsetCols` *getUpsetCols*

Description

Determine the common columns across all tests of a model that are available for filtering with UpSet.

Usage

```
getUpsetCols(study, modelID)
```

Arguments

`study`	An OmicNavigator study. Either an object of class `onStudy`, or the name of an installed study package.
`modelID`	Filter by modelID

Value

Returns a character vector with the names of the common columns

group *group from Bioconductor workflow RNAseq123*

Description

A subset of the object group from Bioconductor workflow RNAseq123.

Usage

```
group
```

Format

A factor with 3 levels:

Basal Basal cells

LP Luminal progenitor cells

ML Mature luminal cells

Source

https://bioconductor.org/packages/release/workflows/vignettes/RNAseq123/inst/doc/limmaWorkflow.html

References

Law CW, Alhamdoosh M, Su S, Dong X, Tian L, Smyth GK, Ritchie ME. RNA-seq analysis is easy as 1-2-3 with limma, Glimma and edgeR [version 3; peer review: 3 approved]. F1000Research 2018, 5:1408 doi:10.12688/f1000research.9005.3

Sheridan, J.M., Ritchie, M.E., Best, S.A. et al. A pooled shRNA screen for regulators of primary mammary stem and progenitor cells identifies roles for *Asap1* and *Prox1*. BMC Cancer 2015, 15:221 doi:10.1186/s128850151187z

Examples

```
table(group)
str(group)
```

importStudy *Import a study package*

Description

Create an onStudy object by importing an installed study package

Usage

```
importStudy(study, libraries = NULL)
```

Arguments

study	Named of an installed OmicNavigator study
libraries	The directories to search for installed study packages. If left as NULL (the default), then installed.packages will use the result of .libPaths.

Value

Returns the onStudy object imported from the OmicNavigator study package

installApp *Install the OmicNavigator web app*

Description

In order to run the OmicNavigator web app on your local machine, the app must be installed in the www/ subdirectory of the R package. If you installed the release tarball from the GitHub Releases page, then you already have the app installed. If you installed directly from GitHub with install_github, or if you want to use a different version of the app, you can manually download and install the app.

Usage

```
installApp(version = NULL, overwrite = FALSE, lib.loc = NULL, ...)
```

Arguments

version	Version of the web app to install, e.g. "1.0.0"
overwrite	Should an existing installation of the app be overwritten?
lib.loc	a character vector with path names of R libraries. See 'Details' for the meaning of the default value of NULL.
...	Passed to download.file. If the download fails, you may need to adjust the download settings for your operating system. For example, to download with wget, pass the argument method = "wget".

Value

A one-element character vector with the absolute path to the directory in which the app files were installed

---

`installStudy` *Install a study as an R package*

Description

Install a study as an R package

Usage

```
installStudy(study, library = .libPaths()[1])
```

Arguments

`study`	An OmicNavigator study to install (class `onStudy`)
`library`	Directory to install package. Defaults to first directory returned by `.libPaths`.

Value

Invisibly returns the original `onStudy` object that was passed to the argument `study`

`lane` *lane from Bioconductor workflow RNAseq123*

Description

A subset of the object `lane` from Bioconductor workflow RNAseq123.

Usage

```
lane
```

Format

A factor with 3 levels:

L004 Sample sequenced on lane 4

L006 Sample sequenced on lane 6

L008 Sample sequenced on lane 8

Source

https://bioconductor.org/packages/release/workflows/vignettes/RNAseq123/inst/doc/limmaWorkflow.html

References

Law CW, Alhamdoosh M, Su S, Dong X, Tian L, Smyth GK, Ritchie ME. RNA-seq analysis is easy as 1-2-3 with limma, Glimma and edgeR [version 3; peer review: 3 approved]. F1000Research 2018, 5:1408 doi:10.12688/f1000research.9005.3

Sheridan, J.M., Ritchie, M.E., Best, S.A. et al. A pooled shRNA screen for regulators of primary mammary stem and progenitor cells identifies roles for *Asap1* and *Prox1*. BMC Cancer 2015, 15:221 doi:10.1186/s128850151187z

Examples

```
table(lane)
str(lane)
```

`lcpm` *lcpm from Bioconductor workflow RNAseq123*

Description

A subset of the object `lcpm` from Bioconductor workflow RNAseq123.

Usage

```
lcpm
```

Format

A matrix with 24 rows and 9 columns

Source

https://bioconductor.org/packages/release/workflows/vignettes/RNAseq123/inst/doc/limmaWorkflow.html

References

Law CW, Alhamdoosh M, Su S, Dong X, Tian L, Smyth GK, Ritchie ME. RNA-seq analysis is easy as 1-2-3 with limma, Glimma and edgeR [version 3; peer review: 3 approved]. F1000Research 2018, 5:1408 doi:10.12688/f1000research.9005.3

Sheridan, J.M., Ritchie, M.E., Best, S.A. et al. A pooled shRNA screen for regulators of primary mammary stem and progenitor cells identifies roles for *Asap1* and *Prox1*. BMC Cancer 2015, 15:221 doi:10.1186/s128850151187z

Examples

```
head(lcpm)
str(lcpm)
```

`listStudies` *List available studies and their metadata*

Description

List available studies and their metadata

Usage

```
listStudies(libraries = NULL)
```

Arguments

`libraries`	The directories to search for installed study packages. If left as `NULL` (the default), then `installed.packages` will use the result of `.libPaths`.

Value

Returns a nested list with one element per installed OmicNavigator study package. Each study package entry has the following sublist components:

`name`	(character) Name of the study
`package`	(list) The fields from `DESCRIPTION`
`results`	(nested list) The testIDs available for each modelID
`enrichments`	(nested list) The annotationIDs available for each modelID
`plots`	(nested list) The plotIDs available for each modelID

`Mm.c2` *Mm.c2 from Bioconductor workflow RNAseq123*

Description

A subset of the object `Mm.c2` from Bioconductor workflow RNAseq123.

Usage

```
Mm.c2
```

Format

A list of 4 character vectors

Source

https://bioconductor.org/packages/release/workflows/vignettes/RNAseq123/inst/doc/limmaWorkflow.html

References

Law CW, Alhamdoosh M, Su S, Dong X, Tian L, Smyth GK, Ritchie ME. RNA-seq analysis is easy as 1-2-3 with limma, Glimma and edgeR [version 3; peer review: 3 approved]. F1000Research 2018, 5:1408 doi:10.12688/f1000research.9005.3

Sheridan, J.M., Ritchie, M.E., Best, S.A. et al. A pooled shRNA screen for regulators of primary mammary stem and progenitor cells identifies roles for *Asap1* and *Prox1*. BMC Cancer 2015, 15:221 doi:10.1186/s128850151187z

Examples

```
Mm.c2[[1]]
str(Mm.c2)
```

`OmicNavigator` *OmicNavigator*

Description

Package options to control package-wide behavior are described below.

Details

The default prefix for OmicNavigator study packages is "ONstudy". If you would prefer to use a different prefix, you can change the package option `OmicNavigator.prefix`. For example, to use the prefix "OmicNavigatorStudy", you could add the following line to your `.Rprofile` file.

```
options(OmicNavigator.prefix = "OmicNavigatorStudy")
```

plotStudy *Plot a feature using a custom plotting function*

Description

Plot a feature using a custom plotting function

Usage

```
plotStudy(study, modelID, featureID, plotID, testID = NULL, libraries = NULL)
```

Arguments

study	An OmicNavigator study. Either an object of class onStudy, or the name of an installed study package.
modelID	Filter by modelID
featureID	Filter by featureID
plotID	Filter by plotID
testID	Filter by testID
libraries	The directories to search for installed study packages. If left as NULL (the default), then installed.packages will use the result of .libPaths.

Details

The arguments study, modelID, featureID, and testID are passed to the function getPlottingData, and the nested list returned by this function is passed as the first argument to your custom plotting function.

Value

This function is called for the side effect of creating a plot. It invisibly returns the result from the custom plotting function specified by plotID. Previously it invisibly returned the study object. It's unlikely you relied on this behavior. For a ggplot2 plot, the return value will be the plotting object with class "ggplot".

See Also

addPlots, getPlottingData

removeStudy *Remove an installed study R package*

Description

Remove an installed study R package

Usage

```
removeStudy(study, library = .libPaths()[1])
```

Arguments

study	The name of the study or an onStudy object. Do **not** include the prefix of the installed package, e.g. ONstudy.
library	Directory where the study package is installed. Defaults to first directory returned by .libPaths.

Value

Invisibly returns the path of the removed study package

samplenames *samplenames from Bioconductor workflow RNAseq123*

Description

A subset of the object samplenames from Bioconductor workflow RNAseq123.

Usage

```
samplenames
```

Format

A character vector containing the unique sample identifiers

Source

https://bioconductor.org/packages/release/workflows/vignettes/RNAseq123/inst/doc/limmaWorkflow.html

References

Law CW, Alhamdoosh M, Su S, Dong X, Tian L, Smyth GK, Ritchie ME. RNA-seq analysis is easy as 1-2-3 with limma, Glimma and edgeR [version 3; peer review: 3 approved]. F1000Research 2018, 5:1408 doi:10.12688/f1000research.9005.3

Sheridan, J.M., Ritchie, M.E., Best, S.A. et al. A pooled shRNA screen for regulators of primary mammary stem and progenitor cells identifies roles for *Asap1* and *Prox1*. BMC Cancer 2015, 15:221 doi:10.1186/s128850151187z

Examples

```
head(samplenames)
str(samplenames)
```

`startApp` *Start app on local machine*

Description

After you have installed at least one OmicNavigator study package with `installStudy`, you can explore the results in the app. The function `startApp` starts a local instance of the app running on your current machine. It will automatically open the app in your default browser. For the best experience, use Google Chrome. From the dropdown menu, you will be able to select from any of the studies you have installed on your machine. When you are finished, you can stop the web server by returning to the R console and pressing the Esc key (Windows) or Ctrl-C (Linux, macOS).

Usage

```
startApp(...)
```

Arguments

`...`	extra parameters passed to ocpu_start_server

Details

Note that the app can't be run from within RStudio Server.

The app requires some additional R packages to run. If you receive an error about a missing package, please install it with `install.packages`. To ensure you have all the extra packages installed, you can run the command below:

```
install.packages(c("faviconPlease", "opencpu", "UpSetR"))
```

Value

No return value. This function is only called for the side effect of running a local instance of the app.

summary.onStudy *Summarize elements of OmicNavigator study*

Description

Displays a tree-like summary of the elements that have been added to an OmicNavigator study.

Usage

```
## S3 method for class 'onStudy'
summary(object, elements = NULL, ...)
```

Arguments

object	OmicNavigator study object (class onStudy)
elements	Subset the output to only include specific elements of the study, e.g. c("results", "enrichments")
...	Currently unused

Value

Invisibly returns the original onStudy object

validateStudy *Validate a study*

Description

Validate a study

Usage

```
validateStudy(study)
```

Arguments

study	An OmicNavigator study object

Value

For a valid study object, the logical value TRUE is invisibly returned. For an invalid study object, there is no return value because an error is thrown.

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