

# Package ‘microbiomeExplorer’

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**Type** Package

**Title** Microbiome Exploration App

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**Description** The MicrobiomeExplorer R package is designed to facilitate the analysis and visualization of marker-gene survey feature data.

It allows a user to perform and visualize typical microbiome analytical workflows either through the command line or an interactive

Shiny application included with the package. In addition to applying common analytical workflows the application enables automated analysis report generation.

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**Imports** shinyjs (>= 2.0.0), shinydashboard, shinycssloaders, shinyWidgets, rmarkdown (>= 1.9.0), DESeq2, RColorBrewer, dplyr, tidyr, purrr, rlang, knitr, readr, DT (>= 0.12.0), biomformat, tools, stringr, vegan, matrixStats, heatmaply, car, broom, limma, reshape2, tibble, forcats, lubridate, methods, plotly (>= 4.9.1)

**Depends** shiny, magrittr, metagenomeSeq, Biobase

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|                  |                                          |
|------------------|------------------------------------------|
| abundanceHeatmap | <i>Abundance Heatmap module - server</i> |
|------------------|------------------------------------------|

---

## Description

Abundance Heatmap module - server

## Usage

```
abundanceHeatmap(
  input,
  output,
  session,
  aggDat,
  featLevel,
  colorOptions,
  levelOpts,
  hmSort,
  hmFeatList,
  reset
)
```

## Arguments

|              |                                                         |
|--------------|---------------------------------------------------------|
| input        | shiny input                                             |
| output       | shiny output                                            |
| session      | shiny session                                           |
| aggDat       | aggregated MRExperiment                                 |
| featLevel    | chosen feature level (aggregation level)                |
| colorOptions | reactive storing filters selected via data input        |
| levelOpts    | all available level choices for this dataset            |
| hmSort       | reactive storing sorting method for heatmap             |
| hmFeatList   | reactive storing list of features to include in heatmap |
| reset        | boolean reactive which resets the module if TRUE        |

## Value

R code needed to generate the heatmap

**Author(s)**

Janina Reeder

---

|                    |                                      |
|--------------------|--------------------------------------|
| abundanceHeatmapUI | <i>Abundance Heatmap module - UI</i> |
|--------------------|--------------------------------------|

---

**Description**

Abundance Heatmap module - UI

**Usage**`abundanceHeatmapUI(id)`**Arguments**

|                 |                      |
|-----------------|----------------------|
| <code>id</code> | namespace identifier |
|-----------------|----------------------|

**Value**

box holding the UI code

**Author(s)**

Janina Reeder

---

|                          |                                   |
|--------------------------|-----------------------------------|
| <code>addFeatData</code> | <i>Add feature data to MRobj.</i> |
|--------------------------|-----------------------------------|

---

**Description**

This function adds feature data to the featureData slot in an MRExperiment object.

**Usage**`addFeatData(MRobj, featdata = NULL)`**Arguments**

|                       |                                  |
|-----------------------|----------------------------------|
| <code>MRobj</code>    | An MRExperiment object.          |
| <code>featdata</code> | Feature data frame or file path. |

**Value**

An updated MRExperiment object.

---

|              |                                      |
|--------------|--------------------------------------|
| addPhenoData | <i>Add phenotype data to object.</i> |
|--------------|--------------------------------------|

---

**Description**

This function adds phenotype data to the phenoData slot in an MExperiment object.

**Usage**

```
addPhenoData(MRobj, phenodata = NULL)
```

**Arguments**

|           |                                    |
|-----------|------------------------------------|
| MRobj     | An MExperiment object.             |
| phenodata | Phenotype data frame or file path. |

**Value**

An updated MExperiment object.

---

|                   |                                                   |
|-------------------|---------------------------------------------------|
| add_plotly_config | <i>Adds a config call based on plotly::config</i> |
|-------------------|---------------------------------------------------|

---

**Description**

Adds a config call based on plotly::config

**Usage**

```
add_plotly_config(.data)
```

**Arguments**

|       |                                                |
|-------|------------------------------------------------|
| .data | plotly data object to apply the config call to |
|-------|------------------------------------------------|

**Value**

plotly::config call

---

|                   |                                                   |
|-------------------|---------------------------------------------------|
| add_plotly_layout | <i>Adds a layout call based on plotly::layout</i> |
|-------------------|---------------------------------------------------|

---

**Description**

Adds a layout call based on plotly::layout

**Usage**

```
add_plotly_layout(.data, plotTitle, xaxis_text, ylab)
```

**Arguments**

|            |                                                |
|------------|------------------------------------------------|
| .data      | plotly data object to apply the layout call to |
| plotTitle  | plot title to use                              |
| xaxis_text | x axis label to use                            |
| ylab       | y axis label to use                            |

**Value**

plotly::layout call

---

|             |                                   |
|-------------|-----------------------------------|
| aggFeatures | <i>Aggregates counts by level</i> |
|-------------|-----------------------------------|

---

**Description**

This function aggregates counts by a level specified in the featureData slot of the MRexperiment object.

**Usage**

```
aggFeatures(MRobj, level = NULL, sort = TRUE)
```

**Arguments**

|       |                                                                                                             |
|-------|-------------------------------------------------------------------------------------------------------------|
| MRobj | An MRexperiment object.                                                                                     |
| level | Level to aggregate over. If NULL, no aggregation occurs.                                                    |
| sort  | boolean determining if resulting aggregated MRexperiment should be sorted based on rowSums; default is TRUE |

**Value**

Aggregated MRexperiment object or matrix depending on out.

**Examples**

```
data("mouseData", package = "metagenomeSeq")
aggFeatures(mouseData, level = "genus")
```

---

|                |                                           |
|----------------|-------------------------------------------|
| aggregationTab | <i>Aggregation module server function</i> |
|----------------|-------------------------------------------|

---

**Description**

Aggregation module server function

**Usage**

```
aggregationTab(  
  input,  
  output,  
  session,  
  resetInput,  
  levelOpts,  
  chosenLevel,  
  meData  
)
```

**Arguments**

|             |                                                            |
|-------------|------------------------------------------------------------|
| input       | shiny input                                                |
| output      | shiny output                                               |
| session     | shiny session                                              |
| resetInput  | boolean updated to TRUE if new data is available           |
| levelOpts   | available levels to aggregate on (depends on input data)   |
| chosenLevel | previously selected level (passed from different instance) |
| meData      | the main MRExperiment object                               |

**Value**

reactive list holding aggregated object, aggregation code and boolean on normalization

**Author(s)**

Janina Reeder

---

|                  |                                       |
|------------------|---------------------------------------|
| aggregationTabUI | <i>Aggregation module ui function</i> |
|------------------|---------------------------------------|

---

**Description**

Aggregation module ui function

**Usage**

```
aggregationTabUI(id)
```

**Arguments**

id                      namespace identifier

**Value**

box holding aggregation input elements

**Author(s)**

Janina Reeder

**Examples**

```
aggregationTabUI("atu_id")
```

---

|                |                                        |
|----------------|----------------------------------------|
| alphaDiversity | <i>Alpha Diversity module - server</i> |
|----------------|----------------------------------------|

---

**Description**

Alpha Diversity module - server

**Usage**

```
alphaDiversity(
  input,
  output,
  session,
  aggDat,
  featLevel,
  intraSettings,
  colorOptions,
  reset
)
```

**Arguments**

|               |                                                             |
|---------------|-------------------------------------------------------------|
| input         | shiny input                                                 |
| output        | shiny output                                                |
| session       | shiny session                                               |
| aggDat        | aggregated MRExperiment                                     |
| featLevel     | chosen feature level (aggregation level)                    |
| intraSettings | analysis settings as passed over from analysis input module |
| colorOptions  | phenotype selections: used for color choices                |
| reset         | boolean reactive which resets the module if TRUE            |

**Value**

R code used to make the alpha diversity plot

**Author(s)**

Janina Reeder

---

|                  |                                    |
|------------------|------------------------------------|
| alphaDiversityUI | <i>Alpha Diversity module - UI</i> |
|------------------|------------------------------------|

---

**Description**

Alpha Diversity module - UI

**Usage**

```
alphaDiversityUI(id)
```

**Arguments**

|    |                      |
|----|----------------------|
| id | namespace identifier |
|----|----------------------|

**Value**

box holding the UI code

**Author(s)**

Janina Reeder

---

|              |                                                |
|--------------|------------------------------------------------|
| avgAbundance | <i>Relative abundance plot module - server</i> |
|--------------|------------------------------------------------|

---

**Description**

Relative abundance plot module - server

**Usage**

```
avgAbundance(  
  input,  
  output,  
  session,  
  aggDat,  
  featLevel,  
  featureSettings,  
  normalizedData,  
  reset  
)
```

**Arguments**

|                 |                                                     |
|-----------------|-----------------------------------------------------|
| input           | shiny input                                         |
| output          | shiny output                                        |
| session         | shiny session                                       |
| aggDat          | aggregated MRExperiment                             |
| featLevel       | chosen feature level (aggregation level)            |
| featureSettings | analysis input settings passed over to this module  |
| normalizedData  | boolean indicating whether data has been normalized |
| reset           | boolean reactive which resets the module if TRUE    |

**Value**

list storing plot clicks and number of features displayed (passed to feature plot module) as well as the R code to make plot

---

|                |                                            |
|----------------|--------------------------------------------|
| avgAbundanceUI | <i>Relative abundance plot module - UI</i> |
|----------------|--------------------------------------------|

---

**Description**

Relative abundance plot module - UI

**Usage**

```
avgAbundanceUI(id)
```

**Arguments**

|    |                      |
|----|----------------------|
| id | namespace identifier |
|----|----------------------|

**Value**

box containing the ui code

**Author(s)**

Janina Reeder

---

`betaDiversity`*Beta Diversity module - server*

---

**Description**

Beta Diversity module - server

**Usage**

```
betaDiversity(  
  input,  
  output,  
  session,  
  aggDat,  
  aggLevel,  
  colorOptions,  
  shapeOptions,  
  betadistance,  
  betaSettings,  
  reset  
)
```

**Arguments**

|                           |                                                    |
|---------------------------|----------------------------------------------------|
| <code>input</code>        | shiny input                                        |
| <code>output</code>       | shiny output                                       |
| <code>session</code>      | shiny session                                      |
| <code>aggDat</code>       | MRExperiment storing data                          |
| <code>aggLevel</code>     | aggregation level                                  |
| <code>colorOptions</code> | phenotype selection options for color              |
| <code>shapeOptions</code> | phenotype selection options for shape              |
| <code>betadistance</code> | distance measured used for beta diversity analysis |
| <code>betaSettings</code> | input choices for beta diversity                   |
| <code>reset</code>        | boolean reactive which resets the module if TRUE   |

**Value**

R code needed to generate the beta diversity plot

**Author(s)**

Janina Reeder

---

|                 |                                   |
|-----------------|-----------------------------------|
| betaDiversityUI | <i>Beta Diversity module - UI</i> |
|-----------------|-----------------------------------|

---

**Description**

Beta Diversity module - UI

**Usage**

```
betaDiversityUI(id)
```

**Arguments**

|    |                      |
|----|----------------------|
| id | namespace identifier |
|----|----------------------|

**Value**

box holding the ui code

**Author(s)**

Janina Reeder

---

|           |                                                                            |
|-----------|----------------------------------------------------------------------------|
| betaInput | <i>Server side for the analysis input module handling analysis control</i> |
|-----------|----------------------------------------------------------------------------|

---

**Description**

Server side for the analysis input module handling analysis control

**Usage**

```
betaInput(input, output, session, meData, adonisOptions, reset)
```

**Arguments**

|               |                                                            |
|---------------|------------------------------------------------------------|
| input         | shiny input                                                |
| output        | shiny output                                               |
| session       | shiny session                                              |
| meData        | MRExperiment object storing all data                       |
| adonisOptions | phenodata columns ready for adonis analysis                |
| reset         | reactive boolean determining if all inputs should be reset |

**Value**

list holding all chosen values and the selected feature

**Author(s)**

Janina Reeder

---

|             |                                                                                                                     |
|-------------|---------------------------------------------------------------------------------------------------------------------|
| betaInputUI | <i>Main beta analysis input module. Set up to handle all analysis tabs in the app depending on given parameters</i> |
|-------------|---------------------------------------------------------------------------------------------------------------------|

---

**Description**

Main beta analysis input module. Set up to handle all analysis tabs in the app depending on given parameters

**Usage**

```
betaInputUI(id)
```

**Arguments**

|    |                                |
|----|--------------------------------|
| id | element identifier - namespace |
|----|--------------------------------|

**Value**

box containing ui element

**Author(s)**

Janina Reeder

---

|                      |                                                                                |
|----------------------|--------------------------------------------------------------------------------|
| buildEmptyPlotlyPlot | <i>Creates an empty plotly plot using the given labels on the x and y axis</i> |
|----------------------|--------------------------------------------------------------------------------|

---

**Description**

Creates an empty plotly plot using the given labels on the x and y axis

**Usage**

```
buildEmptyPlotlyPlot(xaxis_text, ylab)
```

**Arguments**

|            |              |
|------------|--------------|
| xaxis_text | x axis label |
| ylab       | y axis label |

**Value**

call to plotly\_empty

---

|                 |                                                                                                                         |
|-----------------|-------------------------------------------------------------------------------------------------------------------------|
| buildPlottingDF | <i>Sets up a dataframe used by several plotting functions by joining the required data with relevant phenotype data</i> |
|-----------------|-------------------------------------------------------------------------------------------------------------------------|

---

**Description**

Sets up a dataframe used by several plotting functions by joining the required data with relevant phenotype data

**Usage**

```
buildPlottingDF(
  df,
  phenoTable,
  x_var = NULL,
  facet1 = NULL,
  facet2 = NULL,
  col_by = NULL,
  col_name = col_by,
  id_var = NULL
)
```

**Arguments**

|            |                                                                                        |
|------------|----------------------------------------------------------------------------------------|
| df         | dataframe storing plotting data values                                                 |
| phenoTable | pData of the MRexperiment; all following parameters must be a column of the phenoTable |
| x_var      | main plotting variable                                                                 |
| facet1     | column-based faceting (can be NULL)                                                    |
| facet2     | row-based faceting (can be NULL)                                                       |
| col_by     | coloring factor (can be NULL)                                                          |
| col_name   | character to be used as name for col_by                                                |
| id_var     | variable used to connect samples longitudinally (can be NULL)                          |

**Value**

dataframe obtained by joining df and relevant columns of phenoTable

---

|               |                                                                 |
|---------------|-----------------------------------------------------------------|
| calculatePCAs | <i>Function to compute the PCAs for a given distance matrix</i> |
|---------------|-----------------------------------------------------------------|

---

**Description**

Function to compute the PCAs for a given distance matrix

**Usage**

```
calculatePCAs(distmat, pcas)
```

**Arguments**

|         |                                                |
|---------|------------------------------------------------|
| distmat | the distance matrix                            |
| pcas    | 2-element vector of PCAs to include in results |

**Value**

the x slot limited to pcas after calling stats::prcomp on distmat

**Examples**

```
data("mouseData", package = "metagenomeSeq")
aggdat <- aggFeatures(mouseData, level = "genus")
distmat <- computeDistMat(aggdat, dist_method = "bray")
calculatePCAs(distmat, c(1,2))
```

---

|                    |                                                                            |
|--------------------|----------------------------------------------------------------------------|
| computeCI_Interval | <i>Helper function to calculate the confidence interval for a cor.test</i> |
|--------------------|----------------------------------------------------------------------------|

---

**Description**

Helper function to calculate the confidence interval for a cor.test

**Usage**

```
computeCI_Interval(num, mS, method)
```

**Arguments**

|        |                                      |
|--------|--------------------------------------|
| num    | number of samples                    |
| mS     | results of cor.test                  |
| method | statistical method used for cor.test |

**Value**

named vector holding lower and upper thresholds

---

|                |                                                                                     |
|----------------|-------------------------------------------------------------------------------------|
| computeDistMat | <i>Function to compute the distance matrix using vegdist from the vegan package</i> |
|----------------|-------------------------------------------------------------------------------------|

---

**Description**

Function to compute the distance matrix using vegdist from the vegan package

**Usage**

```
computeDistMat(aggdat, dist_method, log = TRUE, nfeatures = nrow(aggmat))
```

**Arguments**

|             |                                                                      |
|-------------|----------------------------------------------------------------------|
| aggdat      | aggregated MRExperiment                                              |
| dist_method | distance method from vegan package (See ?vegan::vegdist for details) |
| log         | transform count matrix to log2; default is TRUE                      |
| nfeatures   | number of features to use; default is all                            |

**Value**

distance as dist

**Examples**

```
data("mouseData", package = "metagenomeSeq")
aggdat <- aggFeatures(mouseData, level = "genus")
computeDistMat(aggdat, dist_method = "bray")
```

---

|              |                                      |
|--------------|--------------------------------------|
| corrAnalysis | <i>corr Analysis Module - server</i> |
|--------------|--------------------------------------|

---

**Description**

corr Analysis Module - server

**Usage**

```
corrAnalysis(
  input,
  output,
  session,
  data,
  levelOpts,
  chosenLevel,
  resetInput,
  aggData
)
```

**Arguments**

|             |                                                            |
|-------------|------------------------------------------------------------|
| input       | shiny input                                                |
| output      | shiny output                                               |
| session     | shiny session                                              |
| data        | the main data object returned from data_input_module       |
| levelOpts   | available levels to aggregate on (depends on input data)   |
| chosenLevel | previously selected level (passed from different instance) |
| resetInput  | reactive boolean determining if reset is required          |
| aggData     | the aggregated MRExperiment object                         |

**Value**

reactive holding code to be used in reports

---

|                |                                  |
|----------------|----------------------------------|
| corrAnalysisUI | <i>corr Analysis Module - UI</i> |
|----------------|----------------------------------|

---

**Description**

corr Analysis Module - UI

**Usage**

```
corrAnalysisUI(id)
```

**Arguments**

|    |                      |
|----|----------------------|
| id | namespace identifier |
|----|----------------------|

**Value**

fluidRow containing the ui code

**Author(s)**

Janina Reeder

**Examples**

```
corrAnalysisUI("coranalysis_id")
```

---

|             |                                    |
|-------------|------------------------------------|
| corrFeature | <i>Scatterplot of two features</i> |
|-------------|------------------------------------|

---

## Description

This function plots a scatterplot of two features along with sample correlation statistics.

## Usage

```
corrFeature(
  aggdat,
  feat1,
  feat2,
  log = TRUE,
  method = c("spearman", "pearson", "kendall"),
  addRegression = TRUE,
  col_by = NULL,
  facet1 = NULL,
  facet2 = NULL,
  plotTitle = "",
  xlab = NULL,
  ylab = NULL,
  allowWebGL = TRUE,
  pwidth = 550,
  pheight = 200
)
```

## Arguments

|               |                                                                                            |
|---------------|--------------------------------------------------------------------------------------------|
| aggdat        | aggregated MRExperiment                                                                    |
| feat1         | Feature 1.                                                                                 |
| feat2         | Feature 2.                                                                                 |
| log           | Log2 transform data. Default is TRUE.                                                      |
| method        | Correlation coefficient. One of "spearman" (default), "pearson", or "kendall".             |
| addRegression | boolean parameter indicating whether linear regression line should be drawn; default: TRUE |
| col_by        | Phenotype for coloring.                                                                    |
| facet1        | Phenotype for facet 1.                                                                     |
| facet2        | Phenotype for facet 2.                                                                     |
| plotTitle     | Plot title. Default is no title.                                                           |
| xlab          | X-axis label. Default is feat1.                                                            |
| ylab          | Y-axis label. Default is feat2.                                                            |
| allowWebGL    | boolean indicating if WebGL should be used for large data                                  |
| pwidth        | overall plot width; default is 550                                                         |
| pheight       | overall plot height; default is 200                                                        |

**Value**

list holding plotly plot and lm fit

**Examples**

```
data("mouseData", package = "metagenomeSeq")
aggdat <- aggFeatures(mouseData, level = "genus")
corrFeature(aggdat, feat1 = "Bacteroides", feat2 = "Prevotella")
```

---

|           |                                                                            |
|-----------|----------------------------------------------------------------------------|
| corrInput | <i>Server side for the analysis input module handling analysis control</i> |
|-----------|----------------------------------------------------------------------------|

---

**Description**

Server side for the analysis input module handling analysis control

**Usage**

```
corrInput(
  input,
  output,
  session,
  type,
  meData,
  facetOptions = NULL,
  reset,
  aggDat = reactive(NULL)
)
```

**Arguments**

|              |                                                            |
|--------------|------------------------------------------------------------|
| input        | shiny input                                                |
| output       | shiny output                                               |
| session      | shiny session                                              |
| type         | of the correlation (feature vs phenotype)                  |
| meData       | MRExperiment object storing all data                       |
| facetOptions | named vector of available facet choices                    |
| reset        | reactive boolean determining if all inputs should be reset |
| aggDat       | aggregated MRExperiment object (default is NULL)           |

**Value**

list holding all chosen values and the selected feature

**Author(s)**

Janina Reeder

---

|             |                                                                                            |
|-------------|--------------------------------------------------------------------------------------------|
| corrInputUI | <i>Main correlation analysis input module. Handles correlation analysis tab in the app</i> |
|-------------|--------------------------------------------------------------------------------------------|

---

**Description**

Main correlation analysis input module. Handles correlation analysis tab in the app

**Usage**

```
corrInputUI(id, type)
```

**Arguments**

|      |                                                |
|------|------------------------------------------------|
| id   | element identifier - namespace                 |
| type | determines if 'feature' or 'pheno' correlation |

**Value**

box containing ui element

**Author(s)**

Janina Reeder

---

|               |                                                 |
|---------------|-------------------------------------------------|
| corrPhenotype | <i>Scatterplot of a feature and a phenotype</i> |
|---------------|-------------------------------------------------|

---

**Description**

This function plots a scatterplot of a feature and a phenotype along with sample correlation statistics.

**Usage**

```
corrPhenotype(
  aggdat,
  feature,
  phenotype,
  log = TRUE,
  method = c("spearman", "pearson", "kendall"),
  addRegression = TRUE,
  col_by = NULL,
  facet1 = NULL,
  facet2 = NULL,
  plotTitle = "",
  xlab = NULL,
  ylab = NULL,
  allowWebGL = TRUE,
  pwidth = 550,
  pheight = 200
)
```

**Arguments**

|               |                                                                                            |
|---------------|--------------------------------------------------------------------------------------------|
| aggdat        | aggregated MRExperiment                                                                    |
| feature       | Feature input.                                                                             |
| phenotype     | Phenotype input (must be numeric)                                                          |
| log           | Log2 transform data. Default is TRUE.                                                      |
| method        | Correlation coefficient. One of "spearman" (default), "pearson", or "kendall".             |
| addRegression | boolean parameter indicating whether linear regression line should be drawn; default: TRUE |
| col_by        | Phenotype for coloring.                                                                    |
| facet1        | Phenotype for facet 1.                                                                     |
| facet2        | Phenotype for facet 2. (WIP/TODO)                                                          |
| plotTitle     | Plot title. Default is no title.                                                           |
| xlab          | X-axis label. Default is feat1.                                                            |
| ylab          | Y-axis label. Default is feat2.                                                            |
| allowWebGL    | boolean indicating if WebGL should be used for large data                                  |
| pwidth        | overall plot width; default is 550                                                         |
| pheight       | overall plot height; default is 200                                                        |

**Value**

list holding plotly plot and lm fit

**Examples**

```
data("mouseData", package = "metagenomeSeq")
aggdat <- aggFeatures(mouseData, level = "genus")
corrPhenotype(aggdat, feature = "Bacteroides", phenotype = "relativeTime")
```

---

|              |                                  |
|--------------|----------------------------------|
| createHeader | <i>Makes header for R script</i> |
|--------------|----------------------------------|

---

**Description**

This function makes the header for the report R script to be rendered by knitr into Rmarkdown and rendered into HTML, PDF, or Word.

**Usage**

```
createHeader(
  title = "MicrobiomeExplorer Report",
  author = "",
  date = "",
  data.source = "",
  output = getOption("me.reportformat"),
  toc = TRUE
)
```

**Arguments**

|             |                                     |
|-------------|-------------------------------------|
| title       | Title of the report.                |
| author      | Author of the report.               |
| date        | Date of the report.                 |
| data.source | R code used to obtain the dataset   |
| output      | Output of Rmarkdown file.           |
| toc         | Table of contents. Default is TRUE. |

**Details**

This was adapted from <https://yihui.name/knitr/demo/stitch/>

**Value**

A character vector where each element is a line in the R script.

---

|           |                                                                                                         |
|-----------|---------------------------------------------------------------------------------------------------------|
| dataInput | <i>Main Data input server where the user selects files to upload to the app or connects to database</i> |
|-----------|---------------------------------------------------------------------------------------------------------|

---

**Description**

Main Data input server where the user selects files to upload to the app or connects to database

**Usage**

```
dataInput(
  input,
  output,
  session,
  dataSource,
  dataFilterRep,
  qcRep,
  addPheno,
  resetReports
)
```

**Arguments**

|               |                                                              |
|---------------|--------------------------------------------------------------|
| input         | module input                                                 |
| output        | module output                                                |
| session       | app session                                                  |
| dataSource    | reactive Value storing commands for loading data             |
| dataFilterRep | reactive Value storing commands for filtering data           |
| qcRep         | reactive Value storing commands for producing qc plots       |
| addPheno      | reactive boolean keeping track of phenodata changes          |
| resetReports  | reactive boolean indicating whether reports need to be reset |

**Value**

list of reactives containing the uploaded and filtered data as well as the filterChoices on phenotypes

**Author(s)**

Janina Reeder

---

dataInputUI

*Main Data input UI where the user selects files to upload to the app or connects to database*

---

**Description**

Main Data input UI where the user selects files to upload to the app or connects to database

**Usage**

```
dataInputUI(id)
```

**Arguments**

id                      module identifier

**Value**

fluidRow holding UI interface

**Author(s)**

Janina Reeder

**Examples**

```
dataInputUI("datainput_id")
```

---

designPairs

*Produce design matrix of pairwise comparisons*

---

**Description**

This function takes in the levels of a factor phenotype and outputs a design matrix of all pairwise comparisons.

**Usage**

```
designPairs(levels)
```

**Arguments**

levels                      Character vector of the levels of a factor phenotype

**Value**

A model matrix

---

diffAnalysis

*diff Analysis Module - server*

---

**Description**

diff Analysis Module - server

**Usage**

```
diffAnalysis(  
  input,  
  output,  
  session,  
  data,  
  levelOpts,  
  chosenLevel,  
  resetInput,  
  aggData,  
  normalizedData  
)
```

**Arguments**

|                |                                                            |
|----------------|------------------------------------------------------------|
| input          | shiny input                                                |
| output         | shiny output                                               |
| session        | shiny session                                              |
| data           | the main data object returned from data_input_module       |
| levelOpts      | available levels to aggregate on (depends on input data)   |
| chosenLevel    | previously selected level (passed from different instance) |
| resetInput     | reactive boolean determining if reset is required          |
| aggData        | the aggregated MRExperiment object                         |
| normalizedData | boolean indicating if normalization was done               |

**Value**

reactive holding code to be used in reports

**Author(s)**

Janina Reeder

---

|                |                                  |
|----------------|----------------------------------|
| diffAnalysisUI | <i>Diff Analysis Module - UI</i> |
|----------------|----------------------------------|

---

**Description**

Diff Analysis Module - UI

**Usage**

```
diffAnalysisUI(id)
```

**Arguments**

|    |                      |
|----|----------------------|
| id | namespace identifier |
|----|----------------------|

**Value**

fluidRow containing the ui code

**Author(s)**

Janina Reeder

**Examples**

```
diffAnalysisUI("diffanalysis_id")
```

---

|           |                                                                            |
|-----------|----------------------------------------------------------------------------|
| diffInput | <i>Server side for the analysis input module handling analysis control</i> |
|-----------|----------------------------------------------------------------------------|

---

**Description**

Server side for the analysis input module handling analysis control

**Usage**

```
diffInput(input, output, session, meData, facetOptions = NULL, reset)
```

**Arguments**

|              |                                                            |
|--------------|------------------------------------------------------------|
| input        | shiny input                                                |
| output       | shiny output                                               |
| session      | shiny session                                              |
| meData       | MRExperiment object storing all data                       |
| facetOptions | named vector of available facet choices                    |
| reset        | reactive boolean determining if all inputs should be reset |

**Value**

list holding all chosen values and the selected feature

**Author(s)**

Janina Reeder

---

|             |                                                                                                                     |
|-------------|---------------------------------------------------------------------------------------------------------------------|
| diffInputUI | <i>Main diffanalysis input module. Set up to handle diff analysis tabs in the app depending on given parameters</i> |
|-------------|---------------------------------------------------------------------------------------------------------------------|

---

**Description**

Main diffanalysis input module. Set up to handle diff analysis tabs in the app depending on given parameters

**Usage**

```
diffInputUI(id)
```

**Arguments**

|    |                                |
|----|--------------------------------|
| id | element identifier - namespace |
|----|--------------------------------|

**Value**

box containing ui element

**Author(s)**

Janina Reeder

---

|           |                                                 |
|-----------|-------------------------------------------------|
| diffTable | <i>Differential analysis module server code</i> |
|-----------|-------------------------------------------------|

---

**Description**

Differential analysis module server code

**Usage**

```
diffTable(  
  input,  
  output,  
  session,  
  aggDat,  
  featLevel,  
  diffSettings,  
  reset,  
  normalized  
)
```

**Arguments**

|              |                                                              |
|--------------|--------------------------------------------------------------|
| input        | shiny input                                                  |
| output       | shiny output                                                 |
| session      | shiny session                                                |
| aggDat       | aggregated MRExperiment                                      |
| featLevel    | chosen feature level (aggregation level)                     |
| diffSettings | reactive storing values selected in analysis input interface |
| reset        | boolean reactive which resets the module if TRUE             |
| normalized   | boolean reactive indicating if data has been normalized      |

**Value**

list containing R code for analysis and for feature plots

**Author(s)**

Janina Reeder

---

diffTableUI

*Differential Analysis module UI*

---

**Description**

Differential Analysis module UI

**Usage**

```
diffTableUI(id)
```

**Arguments**

|    |                      |
|----|----------------------|
| id | namespace identifier |
|----|----------------------|

**Value**

row containing the UI elements

**Author(s)**

Janina Reeder

---

|                 |                                                 |
|-----------------|-------------------------------------------------|
| extendPhenoData | <i>Extends existing phenodata for an object</i> |
|-----------------|-------------------------------------------------|

---

**Description**

This function adds phenotype data to the phenoData slot in an MRExperiment object.

**Usage**

```
extendPhenoData(MRobj, phenodata = NULL)
```

**Arguments**

|           |                                    |
|-----------|------------------------------------|
| MRobj     | An MRExperiment object.            |
| phenodata | Phenotype data frame or file path. |

**Value**

An updated MRExperiment object.

---

|               |                                     |
|---------------|-------------------------------------|
| featAbundance | <i>Feature plot module - server</i> |
|---------------|-------------------------------------|

---

**Description**

Feature plot module - server

**Usage**

```
featAbundance(  
  input,  
  output,  
  session,  
  aggDat,  
  featLevel,  
  intraSettings,  
  selectedFeat,  
  featName,  
  numOfFeats,  
  ylabMode,  
  normalizedData,  
  reset  
)
```

**Arguments**

|                |                                                                                 |
|----------------|---------------------------------------------------------------------------------|
| input          | shiny input                                                                     |
| output         | shiny output                                                                    |
| session        | shiny session                                                                   |
| aggDat         | aggregated MRExperiment                                                         |
| featLevel      | chosen feature level (aggregation level)                                        |
| intraSettings  | analysis settings passed over from analysis input module                        |
| selectedFeat   | feature selected via drop down element of analysis input                        |
| featName       | plotly click event passed via relative abundance                                |
| numOfFeats     | number of features shown in relative abundance plot (affects plotly click data) |
| ylabMode       | character indication if raw \"Reads\" or \"Percentage\" should be shown         |
| normalizedData | boolean indicating whether data has been normalized                             |
| reset          | boolean reactive which resets the module if TRUE                                |

**Value**

R code needed to build the feature plot

**Author(s)**

Janina Reeder

---

|                 |                                 |
|-----------------|---------------------------------|
| featAbundanceUI | <i>Feature plot module - UI</i> |
|-----------------|---------------------------------|

---

**Description**

Feature plot module - UI

**Usage**

```
featAbundanceUI(id)
```

**Arguments**

|    |                      |
|----|----------------------|
| id | namespace identifier |
|----|----------------------|

**Value**

box holding the UI code

---

|                 |                                         |
|-----------------|-----------------------------------------|
| featureAnalysis | <i>feature Analysis Module - server</i> |
|-----------------|-----------------------------------------|

---

**Description**

feature Analysis Module - server

**Usage**

```
featureAnalysis(  
  input,  
  output,  
  session,  
  data,  
  resetInput,  
  aggData,  
  normalizedData  
)
```

**Arguments**

|                |                                                      |
|----------------|------------------------------------------------------|
| input          | shiny input                                          |
| output         | shiny output                                         |
| session        | shiny session                                        |
| data           | the main data object returned from data_input_module |
| resetInput     | reactive boolean determining if reset is required    |
| aggData        | the aggregated MRExperiment object                   |
| normalizedData | boolean indicating if normalization was done         |

**Value**

reactive holding code to be used in reports

**Author(s)**

Janina Reeder

---

|                   |                                     |
|-------------------|-------------------------------------|
| featureAnalysisUI | <i>feature Analysis Module - UI</i> |
|-------------------|-------------------------------------|

---

**Description**

feature Analysis Module - UI

**Usage**

```
featureAnalysisUI(id)
```

Arguments

id                    namespace identifier

Value

fluidRow containing the ui code

Author(s)

Janina Reeder

Examples

```
featureAnalysisUI("featureanalysis_id")
```

---

|             |                                                   |
|-------------|---------------------------------------------------|
| featureCorr | <i>Feature correlation analysis server module</i> |
|-------------|---------------------------------------------------|

---

Description

Feature correlation analysis server module

Usage

```
featureCorr(  
  input,  
  output,  
  session,  
  aggDat,  
  colorOptions,  
  corFeatBase,  
  corFeat2,  
  corFacet1,  
  corFacet2,  
  corMethod,  
  reset  
)
```

Arguments

|              |                                                   |
|--------------|---------------------------------------------------|
| input        | module input                                      |
| output       | module output                                     |
| session      | app session                                       |
| aggDat       | aggregated MRExperiment                           |
| colorOptions | reactive storing filters available via data input |
| corFeatBase  | first correlation feature                         |
| corFeat2     | second correlation feature                        |
| corFacet1    | first correlation facet                           |

|           |                                                  |
|-----------|--------------------------------------------------|
| corFacet2 | second correlation facet                         |
| corMethod | correlation method to use                        |
| reset     | boolean reactive which resets the module if TRUE |

**Value**

R code used to do the correlation analysis (character)

**Author(s)**

Janina Reeder

---

|               |                                               |
|---------------|-----------------------------------------------|
| featureCorrUI | <i>Feature correlation analysis module UI</i> |
|---------------|-----------------------------------------------|

---

**Description**

Feature correlation analysis module UI

**Usage**

```
featureCorrUI(id)
```

**Arguments**

|    |                      |
|----|----------------------|
| id | namespace identifier |
|----|----------------------|

**Value**

box containing the UI elements

**Author(s)**

Janina Reeder

---

|              |                                                          |
|--------------|----------------------------------------------------------|
| featureInput | <i>Server side for the feature analysis input module</i> |
|--------------|----------------------------------------------------------|

---

**Description**

Server side for the feature analysis input module

**Usage**

```
featureInput(
  input,
  output,
  session,
  meData,
  facetOptions = NULL,
  reset,
  aggDat = reactive(NULL)
)
```

**Arguments**

|              |                                                            |
|--------------|------------------------------------------------------------|
| input        | shiny input                                                |
| output       | shiny output                                               |
| session      | shiny session                                              |
| meData       | MRExperiment object storing all data                       |
| facetOptions | named vector of available facet choices                    |
| reset        | reactive boolean determining if all inputs should be reset |
| aggDat       | aggregated MRExperiment object (default is NULL)           |

**Value**

list holding all chosen values and the selected feature

**Author(s)**

Janina Reeder

---

|                |                                                                                                                        |
|----------------|------------------------------------------------------------------------------------------------------------------------|
| featureInputUI | <i>Main feature analysis input module. Set up to handle all analysis tabs in the app depending on given parameters</i> |
|----------------|------------------------------------------------------------------------------------------------------------------------|

---

**Description**

Main feature analysis input module. Set up to handle all analysis tabs in the app depending on given parameters

**Usage**

```
featureInputUI(id)
```

**Arguments**

|    |                                |
|----|--------------------------------|
| id | element identifier - namespace |
|----|--------------------------------|

**Value**

box containing ui element

**Author(s)**

Janina Reeder

---

|              |                                         |
|--------------|-----------------------------------------|
| featureTable | <i>Feature table module server code</i> |
|--------------|-----------------------------------------|

---

**Description**

Feature table module server code

**Usage**

```
featureTable(input, output, session, meData, featureModRep)
```

**Arguments**

|               |                                                        |
|---------------|--------------------------------------------------------|
| input         | shiny input                                            |
| output        | shiny output                                           |
| session       | shiny session                                          |
| meData        | MRExperiment storing the data                          |
| featureModRep | reactiveValue storing modifications performed on fData |

**Value**

feature table server fragment - no return value

**Author(s)**

Janina Reeder

---

|                |                                |
|----------------|--------------------------------|
| featureTableUI | <i>Feature table UI module</i> |
|----------------|--------------------------------|

---

**Description**

Feature table UI module

**Usage**

```
featureTableUI(id)
```

**Arguments**

|    |                      |
|----|----------------------|
| id | namespace identifier |
|----|----------------------|

**Value**

fluidRow containing the UI code for feature tables

**Author(s)**

Janina Reeder

**Examples**

```
featureTableUI("feature_id")
```

---

**fileUpload***Module handling file upload for the application: server*

---

**Description**

Module handling file upload for the application: server

**Usage**

```
fileUpload(  
  input,  
  output,  
  session,  
  meData,  
  meName,  
  initializeData,  
  addPheno,  
  dataSource,  
  resetFile = reactive(NULL)  
)
```

**Arguments**

|                |                                                        |
|----------------|--------------------------------------------------------|
| input          | module input                                           |
| output         | module output                                          |
| session        | app session                                            |
| meData         | main reactive storing the MRexperiment data            |
| meName         | main reactive storing the filename uploaded            |
| initializeData | reactiveVal keeping track of new uploads to reset data |
| addPheno       | reactiveVal keeping track of phenodata changes         |
| dataSource     | reactive Value storing commands for loading data       |
| resetFile      | indicating if module should be reset                   |

**Value**

boolean denoting successful upload of a file

**Author(s)**

Janina Reeder

---

|              |                                                                                                                                      |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------|
| fileUploadUI | <i>Module handling file upload for the application: UI In a deployed version this module should be replaced with database access</i> |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------|

---

**Description**

Module handling file upload for the application: UI In a deployed version this module should be replaced with database access

**Usage**

```
fileUploadUI(id)
```

**Arguments**

|    |                   |
|----|-------------------|
| id | module identifier |
|----|-------------------|

**Value**

div holding ui elements

**Author(s)**

Janina Reeder

---

|               |                                                                        |
|---------------|------------------------------------------------------------------------|
| filterByPheno | <i>Function to filter the MRExperiment by certain phenotype values</i> |
|---------------|------------------------------------------------------------------------|

---

**Description**

Function to filter the MRExperiment by certain phenotype values

**Usage**

```
filterByPheno(MRobj, rm_phenovalues)
```

**Arguments**

|                |                                                                                                                              |
|----------------|------------------------------------------------------------------------------------------------------------------------------|
| MRobj          | the MRExperiment to subset                                                                                                   |
| rm_phenovalues | list of named vectors with names corresponding to column names in pData and values representing phenotypes within the column |

**Value**

the filtered MRobj

**Author(s)**

Janina Reeder

**Examples**

```
data("mouseData", package = "metagenomeSeq")
filterByPheno(MRobj = mouseData,
  rm_phenovalues = list("diet" = c("BK"), "mouseID" = c("PM1", "PM10")))
```

---

**filterMEData***Function to filter the MRExperiment data by numerical parameters*

---

**Description**

Function to filter the MRExperiment data by numerical parameters

**Usage**

```
filterMEData(MRobj, minpresence = 1, minfeats = 2, minreads = 2)
```

**Arguments**

|             |                                       |
|-------------|---------------------------------------|
| MRobj       | MRExperiment object to filter         |
| minpresence | minimum sample presence per feature   |
| minfeats    | minimum number of features per sample |
| minreads    | minimum number of reads per sample    |

**Value**

the filtered MRobj

**Author(s)**

Janina Reeder

**Examples**

```
data("mouseData", package = "metagenomeSeq")
filterMEData(MRobj = mouseData, minpresence = 4, minfeats = 300)
```

---

|                |                         |
|----------------|-------------------------|
| generateReport | <i>Generates report</i> |
|----------------|-------------------------|

---

## Description

This function generates the pieces of the report, which includes the R script, Rmarkdown file, and any Rmarkdown outputs.

## Usage

```
generateReport(  
  rcode,  
  filename = "report",  
  dir = "out",  
  title = "MicrobiomeExplorer Report",  
  author = "",  
  date = "`r format(Sys.time(), '%d %B, %Y')`",  
  data.source = "",  
  output = c("html_document"),  
  toc = TRUE,  
  intro_text = NULL  
)
```

## Arguments

|             |                                                                                                                                                                                                                                                                                                    |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| rcode       | A named list where each element corresponds to a different analysis (Alpha diversity, Beta diversity). The name of the list is used to denote the first part of the code chunks in each analysis section (alpha, beta). Each element is itself a list of R commands corresponding to a code chunk. |
| filename    | Name of output files. Default is "report".                                                                                                                                                                                                                                                         |
| dir         | Directory of output. Default is "out".                                                                                                                                                                                                                                                             |
| title       | Title of the report.                                                                                                                                                                                                                                                                               |
| author      | Author of the report.                                                                                                                                                                                                                                                                              |
| date        | Date of the report.                                                                                                                                                                                                                                                                                |
| data.source | R code used to obtain the dataset                                                                                                                                                                                                                                                                  |
| output      | Output of Rmarkdown file. Options defined in global.R                                                                                                                                                                                                                                              |
| toc         | Table of contents. Default is TRUE.                                                                                                                                                                                                                                                                |
| intro_text  | Introductory text to include with the report (optional)                                                                                                                                                                                                                                            |

## Details

Adapted from <https://yihui.name/knitr/demo/stitch/>

## Value

A character vector where each element is a line in the R script.

---

|                |                                                                                           |
|----------------|-------------------------------------------------------------------------------------------|
| getFeatModCode | <i>Helper function returning the fData modifications as strings for report generation</i> |
|----------------|-------------------------------------------------------------------------------------------|

---

**Description**

Helper function returning the fData modifications as strings for report generation

**Usage**

```
getFeatModCode(featureanno)
```

**Arguments**

featureanno      type of feature annotation; values are "Mark unknown" or "Roll down"

**Value**

String containing R code performing the modification

---

|                  |                                                                                           |
|------------------|-------------------------------------------------------------------------------------------|
| getFeatSplitCode | <i>Helper function returning the fData modifications as strings for report generation</i> |
|------------------|-------------------------------------------------------------------------------------------|

---

**Description**

Helper function returning the fData modifications as strings for report generation

**Usage**

```
getFeatSplitCode(splittaxonomy)
```

**Arguments**

splittaxonomy      name of column to split on

**Value**

String containing R code performing the modification

---

|             |                                                                                                          |
|-------------|----------------------------------------------------------------------------------------------------------|
| getFileType | <i>Helper function assigning different file extensions to specific short texts identifying the types</i> |
|-------------|----------------------------------------------------------------------------------------------------------|

---

**Description**

Helper function assigning different file extensions to specific short texts identifying the types

**Usage**

```
getFileType(fileext)
```

**Arguments**

fileext            the file extension found after ‘.’

**Value**

character string for the filetype

**Author(s)**

Janina Reeder

---

|                  |                                                                                                              |
|------------------|--------------------------------------------------------------------------------------------------------------|
| getFilterChoices | <i>Helper function to filter phenodata for interesting phenotypes to be used for filtering or subsetting</i> |
|------------------|--------------------------------------------------------------------------------------------------------------|

---

**Description**

Helper function to filter phenodata for interesting phenotypes to be used for filtering or subsetting

**Usage**

```
getFilterChoices(MRobj)
```

**Arguments**

MRobj            the MRExperiment storing the data

**Value**

list of named vectors with names being pData column headers and values being unique entries; columns with only one entry or those with different values for each samples are omitted

**Author(s)**

Janina Reeder

---

|                |                                                                                                                                               |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| getLegendLevel | <i>Function to find a non-empty facet in the last row. This will be the one to be connected to the plot legend to avoid duplicates within</i> |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------|

---

### Description

Function to find a non-empty facet in the last row. This will be the one to be connected to the plot legend to avoid duplicates within

### Usage

```
getLegendLevel(df2, facets, facet2s)
```

### Arguments

|         |                     |
|---------|---------------------|
| df2     | plotting data frame |
| facets  | column facets       |
| facet2s | row facets          |

### Value

the name of the column-based facet which can be used as legend

---

|                 |                                                                                            |
|-----------------|--------------------------------------------------------------------------------------------|
| getPhenoChanges | <i>Helper function returning the code used to modify the data types of the pheno table</i> |
|-----------------|--------------------------------------------------------------------------------------------|

---

### Description

Helper function returning the code used to modify the data types of the pheno table

### Usage

```
getPhenoChanges(phenoType, datatype)
```

### Arguments

|           |                                     |
|-----------|-------------------------------------|
| phenoType | name of the phenotype column header |
| datatype  | variable type to assign to column   |

### Value

String storing code to perform modification

### Author(s)

Janina Reeder

---

|                 |                                                                                     |
|-----------------|-------------------------------------------------------------------------------------|
| getPhenoModCode | <i>Helper function returning the code used to modify the phenotable as a string</i> |
|-----------------|-------------------------------------------------------------------------------------|

---

**Description**

Helper function returning the code used to modify the phenotable as a string

**Usage**

```
getPhenoModCode(name, pheno1, pheno2)
```

**Arguments**

|        |                              |
|--------|------------------------------|
| name   | interaction name             |
| pheno1 | first interaction phenotype  |
| pheno2 | second interaction phenotype |

**Value**

String storing code to perform modification

**Author(s)**

Janina Reeder

---

|           |                                                                                                                                          |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------|
| getWidths | <i>Helper function to account for issues plotly has with very small widths (these end up being 1 and cover the entire plotting area)</i> |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------|

---

**Description**

Helper function to account for issues plotly has with very small widths (these end up being 1 and cover the entire plotting area)

**Usage**

```
getWidths(df2, facets, x_var, drop = TRUE)
```

**Arguments**

|        |                                       |
|--------|---------------------------------------|
| df2    | dataframe storing plotting data       |
| facets | column facets                         |
| x_var  | x variable                            |
| drop   | passed on as .drop to dplyr::group_by |

**Value**

widths for each facet

---

|              |                                                                            |
|--------------|----------------------------------------------------------------------------|
| heatmapInput | <i>Server side for the analysis input module handling analysis control</i> |
|--------------|----------------------------------------------------------------------------|

---

**Description**

Server side for the analysis input module handling analysis control

**Usage**

```
heatmapInput(input, output, session, meData, reset, aggDat = reactive(NULL))
```

**Arguments**

|         |                                                            |
|---------|------------------------------------------------------------|
| input   | shiny input                                                |
| output  | shiny output                                               |
| session | shiny session                                              |
| meData  | MRExperiment object storing all data                       |
| reset   | reactive boolean determining if all inputs should be reset |
| aggDat  | aggregated MRExperiment object (default is NULL)           |

**Value**

list holding all chosen values and the selected feature

**Author(s)**

Janina Reeder

---

|                |                                                                                                                   |
|----------------|-------------------------------------------------------------------------------------------------------------------|
| heatmapInputUI | <i>Heatmap analysis input module. Set up to handle all analysis tabs in the app depending on given parameters</i> |
|----------------|-------------------------------------------------------------------------------------------------------------------|

---

**Description**

Heatmap analysis input module. Set up to handle all analysis tabs in the app depending on given parameters

**Usage**

```
heatmapInputUI(id)
```

**Arguments**

|    |                                |
|----|--------------------------------|
| id | element identifier - namespace |
|----|--------------------------------|

**Value**

box containing ui element

**Author(s)**

Janina Reeder

---

|               |                                       |
|---------------|---------------------------------------|
| interAnalysis | <i>inter Analysis Module - server</i> |
|---------------|---------------------------------------|

---

**Description**

inter Analysis Module - server

**Usage**

```
interAnalysis(  
  input,  
  output,  
  session,  
  data,  
  levelOpts,  
  chosenLevel,  
  resetInput,  
  aggData  
)
```

**Arguments**

|             |                                                            |
|-------------|------------------------------------------------------------|
| input       | shiny input                                                |
| output      | shiny output                                               |
| session     | shiny session                                              |
| data        | the main data object returned from data_input_module       |
| levelOpts   | available levels to aggregate on (depends on input data)   |
| chosenLevel | previously selected level (passed from different instance) |
| resetInput  | reactive boolean determining if reset is required          |
| aggData     | the aggregated MRExperiment object                         |

**Value**

reactive holding code to be used in reports

---

|                 |                                   |
|-----------------|-----------------------------------|
| interAnalysisUI | <i>inter Analysis Module - UI</i> |
|-----------------|-----------------------------------|

---

**Description**

inter Analysis Module - UI

**Usage**

```
interAnalysisUI(id)
```

**Arguments**

id                      namespace identifier

**Value**

fluidRow containing the ui code

**Author(s)**

Janina Reeder

**Examples**

```
interAnalysisUI("interanalysis_id")
```

---

|               |                                       |
|---------------|---------------------------------------|
| intraAnalysis | <i>Intra Analysis Module - server</i> |
|---------------|---------------------------------------|

---

**Description**

Intra Analysis Module - server

**Usage**

```
intraAnalysis(
  input,
  output,
  session,
  data,
  levelOpts,
  chosenLevel,
  resetInput,
  aggData,
  normalizedData
)
```

**Arguments**

|                |                                                            |
|----------------|------------------------------------------------------------|
| input          | shiny input                                                |
| output         | shiny output                                               |
| session        | shiny session                                              |
| data           | the main data object returned from data_input_module       |
| levelOpts      | available levels to aggregate on (depends on input data)   |
| chosenLevel    | previously selected level (passed from different instance) |
| resetInput     | reactive boolean determining if reset is required          |
| aggData        | the aggregated MRExperiment object                         |
| normalizedData | boolean indicating if normalization was done               |

**Value**

reactive holding code to be used in reports

**Author(s)**

Janina Reeder

---

intraAnalysisUI

*Intra Analysis Module - UI*

---

**Description**

Intra Analysis Module - UI

**Usage**

```
intraAnalysisUI(id)
```

**Arguments**

id                      namespace identifier

**Value**

fluidRow containing the ui code

**Author(s)**

Janina Reeder

**Examples**

```
intraAnalysisUI("intraanalysis_id")
```

---

intraInput

*Server side for the intra analysis input module*

---

**Description**

Server side for the intra analysis input module

**Usage**

```
intraInput(  
  input,  
  output,  
  session,  
  meData,  
  facetOptions = NULL,  
  reset,  
  aggDat = reactive(NULL)  
)
```

**Arguments**

|              |                                                            |
|--------------|------------------------------------------------------------|
| input        | shiny input                                                |
| output       | shiny output                                               |
| session      | shiny session                                              |
| meData       | MRExperiment object storing all data                       |
| facetOptions | named vector of available facet choices                    |
| reset        | reactive boolean determining if all inputs should be reset |
| aggDat       | aggregated MRExperiment object (default is NULL)           |

**Value**

list holding all chosen values and the selected feature

**Author(s)**

Janina Reeder

---

|              |                                                                                                                      |
|--------------|----------------------------------------------------------------------------------------------------------------------|
| intraInputUI | <i>Main intra analysis input module. Set up to handle all analysis tabs in the app depending on given parameters</i> |
|--------------|----------------------------------------------------------------------------------------------------------------------|

---

**Description**

Main intra analysis input module. Set up to handle all analysis tabs in the app depending on given parameters

**Usage**

```
intraInputUI(id)
```

**Arguments**

|    |                                |
|----|--------------------------------|
| id | element identifier - namespace |
|----|--------------------------------|

**Value**

box containing ui element

**Author(s)**

Janina Reeder

---

|              |                                      |
|--------------|--------------------------------------|
| longAnalysis | <i>long Analysis Module - server</i> |
|--------------|--------------------------------------|

---

**Description**

long Analysis Module - server

**Usage**

```
longAnalysis(  
  input,  
  output,  
  session,  
  data,  
  levelOpts,  
  chosenLevel,  
  resetInput,  
  aggData,  
  normalizedData  
)
```

**Arguments**

|                |                                                            |
|----------------|------------------------------------------------------------|
| input          | shiny input                                                |
| output         | shiny output                                               |
| session        | shiny session                                              |
| data           | the main data object returned from data_input_module       |
| levelOpts      | available levels to aggregate on (depends on input data)   |
| chosenLevel    | previously selected level (passed from longerent instance) |
| resetInput     | reactive boolean determining if reset is required          |
| aggData        | the aggregated MRExperiment object                         |
| normalizedData | boolean indicating if normalization was done               |

**Value**

reactive holding code to be used in reports

**Author(s)**

Janina Reeder

---

|                |                                  |
|----------------|----------------------------------|
| longAnalysisUI | <i>Long Analysis Module - UI</i> |
|----------------|----------------------------------|

---

**Description**

Long Analysis Module - UI

**Usage**

```
longAnalysisUI(id)
```

**Arguments**

|    |                      |
|----|----------------------|
| id | namespace identifier |
|----|----------------------|

**Value**

fluidRow containing the ui code

**Author(s)**

Janina Reeder

**Examples**

```
longAnalysisUI("longanalysis_id")
```

---

|           |                                                                            |
|-----------|----------------------------------------------------------------------------|
| longInput | <i>Server side for the analysis input module handling analysis control</i> |
|-----------|----------------------------------------------------------------------------|

---

**Description**

Server side for the analysis input module handling analysis control

**Usage**

```
longInput(  
  input,  
  output,  
  session,  
  meData,  
  facetOptions = NULL,  
  reset,  
  aggDat = reactive(NULL)  
)
```

**Arguments**

|              |                                                            |
|--------------|------------------------------------------------------------|
| input        | shiny input                                                |
| output       | shiny output                                               |
| session      | shiny session                                              |
| meData       | MRExperiment object storing all data                       |
| facetOptions | named vector of available facet choices                    |
| reset        | reactive boolean determining if all inputs should be reset |
| aggDat       | aggregated MRExperiment                                    |

**Value**

list holding all chosen values and the selected feature

**Author(s)**

Janina Reeder

---

|             |                                                                                                                     |
|-------------|---------------------------------------------------------------------------------------------------------------------|
| longInputUI | <i>Main diffanalysis input module. Set up to handle diff analysis tabs in the app depending on given parameters</i> |
|-------------|---------------------------------------------------------------------------------------------------------------------|

---

**Description**

Main diffanalysis input module. Set up to handle diff analysis tabs in the app depending on given parameters

**Usage**

```
longInputUI(id)
```

**Arguments**

|    |                                |
|----|--------------------------------|
| id | element identifier - namespace |
|----|--------------------------------|

**Value**

box containing ui element

**Author(s)**

Janina Reeder

---

|             |                                                 |
|-------------|-------------------------------------------------|
| longResults | <i>Longitudinal analysis module server code</i> |
|-------------|-------------------------------------------------|

---

**Description**

Longitudinal analysis module server code

**Usage**

```
longResults(  
  input,  
  output,  
  session,  
  aggDat,  
  featLevel,  
  longSettings,  
  normalizedData,  
  reset  
)
```

**Arguments**

|                |                                                              |
|----------------|--------------------------------------------------------------|
| input          | shiny input                                                  |
| output         | shiny output                                                 |
| session        | shiny session                                                |
| aggDat         | aggregated MRExperiment                                      |
| featLevel      | chosen feature level (aggregation level)                     |
| longSettings   | reactive storing values selected in analysis input interface |
| normalizedData | reactive boolean indicating if data has been normalized      |
| reset          | boolean reactive which resets the module if TRUE             |

**Value**

list containing R code for analysis and for feature plots

**Author(s)**

Janina Reeder

---

|               |                                        |
|---------------|----------------------------------------|
| longResultsUI | <i>Longitudinal Analysis module UI</i> |
|---------------|----------------------------------------|

---

**Description**

Longitudinal Analysis module UI

**Usage**

```
longResultsUI(id)
```

**Arguments**

|    |                      |
|----|----------------------|
| id | namespace identifier |
|----|----------------------|

**Value**

row containing the UI elements

**Author(s)**

Janina Reeder

---

|            |                                                |
|------------|------------------------------------------------|
| makeQCPlot | <i>Plots sequencing statistics scatterplot</i> |
|------------|------------------------------------------------|

---

**Description**

This function makes a scatterplot of read and feature counts for each sample. It was adjusted based on original work by Mo Huang

**Usage**

```
makeQCPlot(  
  MRobj,  
  col_by = NULL,  
  log = "none",  
  filter_feat = 0,  
  filter_read = 0,  
  allowWebGL = TRUE,  
  pwidth = 550,  
  pheight = 550  
)
```

**Arguments**

|             |                                                                                                                       |
|-------------|-----------------------------------------------------------------------------------------------------------------------|
| MRobj       | metagenomeSeq object to be plotted                                                                                    |
| col_by      | factor by which to color the points                                                                                   |
| log         | character indicating which (if any) axes should be shown as log                                                       |
| filter_feat | Numeric Y-coordinate to draw horizontal dashed line to indicate feature filtering. If 0 (default), no line is drawn.  |
| filter_read | Numeric X-coordinate to draw vertical dashed line to indicate read count filtering. If 0 (default), no line is drawn. |
| allowWebGL  | boolean indicating if webGL should be added                                                                           |
| pwidth      | overall plot width; default is 550 (125 are added for legend)                                                         |
| pheight     | overall plot height; default is 550                                                                                   |

**Value**

the plotly QC plot

**Author(s)**

Janina Reeder

**Examples**

```
data("mouseData", package = "metagenomeSeq")
makeQCPlot(mouseData)
```

---

|               |                                                                                                                                                                                                                                                      |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| normalizeData | <i>Calls appropriate normalization functions depending on input parameter The two available methods included in the package are based on either calculating proportions or by using cumulative sum scaling (CSS), Paulson, et al. Nat Meth 2013.</i> |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

---

**Description**

Calls appropriate normalization functions depending on input parameter The two available methods included in the package are based on either calculating proportions or by using cumulative sum scaling (CSS), Paulson, et al. Nat Meth 2013.

**Usage**

```
normalizeData(MRobj, norm_method)
```

**Arguments**

|             |                                                      |
|-------------|------------------------------------------------------|
| MRobj       | the MRexperiment                                     |
| norm_method | method to use for normalization; CSS or Proportional |

**Value**

the normalized MRobj

**Examples**

```
data("mouseData", package = "metagenomeSeq")
normalizeData(mouseData, norm_method = "CSS")
```

---

|                      |                                                                                            |
|----------------------|--------------------------------------------------------------------------------------------|
| parseInteractionName | <i>Helper function used to build a correct interactionName based on the chosen columns</i> |
|----------------------|--------------------------------------------------------------------------------------------|

---

**Description**

Helper function used to build a correct interactionName based on the chosen columns

**Usage**

```
parseInteractionName(interactionName)
```

**Arguments**

interactionName  
as chosen by user. This may not be good to store internally

**Value**

updated interactionName or warning/error string

---

|               |                                                     |
|---------------|-----------------------------------------------------|
| phenotypeCorr | <i>Phenotype correlation analysis server module</i> |
|---------------|-----------------------------------------------------|

---

**Description**

Phenotype correlation analysis server module

**Usage**

```
phenotypeCorr(
  input,
  output,
  session,
  aggDat,
  colorOptions,
  corFeatBase,
  corPheno,
  corFacet1,
  corFacet2,
  corMethod,
  reset
)
```

**Arguments**

|              |                                                   |
|--------------|---------------------------------------------------|
| input        | shiny input                                       |
| output       | shiny output                                      |
| session      | shiny session                                     |
| aggDat       | aggregated MRExperiment                           |
| colorOptions | reactive storing filters available via data input |
| corFeatBase  | first correlation feature                         |
| corPheno     | correlation phenotype                             |
| corFacet1    | first correlation facet                           |
| corFacet2    | second correlation facet                          |
| corMethod    | correlation method to use                         |
| reset        | boolean reactive which resets the module if TRUE  |

**Value**

R code used to do the correlation analysis (character)

**Author(s)**

Janina Reeder

---

|                 |                                              |
|-----------------|----------------------------------------------|
| phenotypeCorrUI | <i>Phenotype correlation analysis module</i> |
|-----------------|----------------------------------------------|

---

**Description**

Phenotype correlation analysis module

**Usage**

```
phenotypeCorrUI(id)
```

**Arguments**

|    |                      |
|----|----------------------|
| id | namespace identifier |
|----|----------------------|

**Value**

box containing the UI element

**Author(s)**

Janina Reeder

---

|                |                                      |
|----------------|--------------------------------------|
| phenotypeTable | <i>Phenotype table server module</i> |
|----------------|--------------------------------------|

---

**Description**

Phenotype table server module

**Usage**

```
phenotypeTable(input, output, session, meData, phenoModRep, addPheno)
```

**Arguments**

|             |                                                            |
|-------------|------------------------------------------------------------|
| input       | shiny input                                                |
| output      | shiny output                                               |
| session     | shiny session                                              |
| meData      | MRExperiment storing the data                              |
| phenoModRep | reactive Value storing any phenotable modifications made   |
| addPheno    | reactive boolean keeping track of pheno data modifications |

**Value**

phenotype table server fragment - no return value

**Author(s)**

Janina Reeder

---

|                  |                                  |
|------------------|----------------------------------|
| phenotypeTableUI | <i>Phenotype table UI module</i> |
|------------------|----------------------------------|

---

**Description**

Phenotype table UI module

**Usage**

```
phenotypeTableUI(id)
```

**Arguments**

|    |                      |
|----|----------------------|
| id | namespace identifier |
|----|----------------------|

**Value**

fluidRow holding the ui code

**Author(s)**

Janina Reeder

**Examples**

```
phenotypeTableUI("phenotype_id")
```

---

|               |                                |
|---------------|--------------------------------|
| plotAbundance | <i>Plot relative abundance</i> |
|---------------|--------------------------------|

---

**Description**

This function plots the relative abundance of the top abundant features.

**Usage**

```
plotAbundance(
  aggdat,
  level,
  x_var = "SAMPLE_ID",
  ind = seq_len(10),
  plotTitle = "",
  ylab = "Reads",
  facet1 = NULL,
  facet2 = NULL,
  source = "A",
  pwidth = 650,
  pheight = 150
)
```

**Arguments**

|           |                                                                                                     |
|-----------|-----------------------------------------------------------------------------------------------------|
| aggdat    | aggregated MRExperiment object                                                                      |
| level     | Feature level.                                                                                      |
| x_var     | Phenotype to aggregate over on X-axis. Default by "SAMPLE_ID".                                      |
| ind       | Indices of top abundant features to plot. Rest of features are aggregated and displayed as "other". |
| plotTitle | Plot title. Default shows no title.                                                                 |
| ylab      | Y-axis label. Default is "Reads"                                                                    |
| facet1    | Phenotype for facet 1.                                                                              |
| facet2    | Phenotype for facet 2.                                                                              |
| source    | name of the plot (needed for event handling); default is "A"                                        |
| pwidth    | overall plot width; default is 650                                                                  |
| pheight   | overall plot height; default is 150                                                                 |

**Value**

plotly plot

**Author(s)**

Janina Reeder

**Examples**

```
data("mouseData", package = "metagenomeSeq")
aggdat <- aggFeatures(mouseData, level = "genus")
plotAbundance(aggdat, level = "genus", x_var = "diet")
```

---

|           |                             |
|-----------|-----------------------------|
| plotAlpha | <i>Plot alpha diversity</i> |
|-----------|-----------------------------|

---

**Description**

This function plots the alpha diversity. See `?vegan::diversity` for details on the available index

**Usage**

```
plotAlpha(
  aggdat,
  level,
  index = c("shannon", "simpson", "invsimpson", "richness"),
  x_var = "SAMPLE_ID",
  ylab = index,
  col_by = NULL,
  facet1 = NULL,
  facet2 = NULL,
  plotTitle = "",
  pwidth = 500,
  pheight = 150
)
```

**Arguments**

|           |                                                                                                                       |
|-----------|-----------------------------------------------------------------------------------------------------------------------|
| aggdat    | aggregated MRExperiment                                                                                               |
| level     | Feature level                                                                                                         |
| index     | Diversity index, one of "shannon", "simpson", "invsimpson" or "richness" (=number of features). Default is "shannon". |
| x_var     | Phenotype to aggregate over on X-axis. Default by "SAMPLE_ID".                                                        |
| ylab      | Y-axis label. Default is "Reads".                                                                                     |
| col_by    | Phenotype for coloring.                                                                                               |
| facet1    | Phenotype for facet 1.                                                                                                |
| facet2    | Phenotype for facet 2.                                                                                                |
| plotTitle | Plot title. By default, no title is used.                                                                             |
| pwidth    | overall plot width; default is 650                                                                                    |
| pheight   | overall plot height; default is 150                                                                                   |

**Value**

plotly plot object

**Examples**

```
data("mouseData", package = "metagenomeSeq")
aggdat <- aggFeatures(mouseData, level = "genus")
plotAlpha(aggdat, level = "genus", index = "shannon", x_var = "diet")
```

---

|                  |                                        |
|------------------|----------------------------------------|
| plotAvgAbundance | <i>Plot average relative abundance</i> |
|------------------|----------------------------------------|

---

**Description**

This function plots the average relative abundance of the top abundant features.

**Usage**

```
plotAvgAbundance(
  aggdat,
  level,
  ind = seq_len(10),
  plotTitle = "",
  ylab = "Reads",
  facet1 = NULL,
  facet2 = NULL,
  source = "A",
  pwidth = 500,
  pheight = 150
)
```

**Arguments**

|           |                                                                                                     |
|-----------|-----------------------------------------------------------------------------------------------------|
| aggdat    | aggregated MRExperiment object                                                                      |
| level     | Feature level.                                                                                      |
| ind       | Indices of top abundant features to plot. Rest of features are aggregated and displayed as "other". |
| plotTitle | Plot title. Default shows no title.                                                                 |
| ylab      | Y-axis label. Default is "Reads"                                                                    |
| facet1    | Phenotype for facet 1.                                                                              |
| facet2    | Phenotype for facet 2.                                                                              |
| source    | name of the plot (needed for event handling); default is "A"                                        |
| pwidth    | overall plot width; default is 500                                                                  |
| pheight   | overall plot height; default is 150                                                                 |

**Value**

plotly plot

**Author(s)**

Janina Reeder

**Examples**

```
data("mouseData", package = "metagenomeSeq")
aggdat <- aggFeatures(mouseData, level = "genus")
plotAvgAbundance(aggdat, level = "genus")
```

plotBeta

*Plot beta diversity***Description**

This functions plots the beta diversity as a PCoA plot.

**Usage**

```
plotBeta(
  aggdat,
  dim = c(1, 2),
  log = TRUE,
  dist_method = "bray",
  pcas = NULL,
  nfeatures = nrow(aggdat),
  col_by = NULL,
  shape_by = NULL,
  plotTitle = "",
  xlab = NULL,
  ylab = NULL,
  pt_size = 8,
  plotText = NULL,
  confInterval = NULL,
  allowWebGL = TRUE,
  pwidth = 550,
  pheight = 550
)
```

**Arguments**

|             |                                                                                                                                   |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------|
| aggdat      | aggregated MRExperiment                                                                                                           |
| dim         | Vector of length 2 specifying which dimensions to plot.                                                                           |
| log         | Log2 transform data. Default is TRUE.                                                                                             |
| dist_method | Which distance method to use. See <code>?vegan::vegdist</code> for more <a href="#">vegdist()</a> for options. Default is "bray". |
| pcas        | precalculated pcas to avoid recalculation via CalcPCs                                                                             |
| nfeatures   | Number of top features in terms of standard deviation. Default is all.                                                            |
| col_by      | Phenotype for coloring.                                                                                                           |
| shape_by    | Phenotype for shape.                                                                                                              |
| plotTitle   | Plot title. By default, becomes PCoA (codedist.method).                                                                           |
| xlab        | X-axis label. By default, shows dimension and percent variance explained.                                                         |

|              |                                                                           |
|--------------|---------------------------------------------------------------------------|
| ylab         | Y-axis label. By default, shows dimension and percent variance explained. |
| pt_size      | the size of the markers                                                   |
| plotText     | adonis text to be added to plot                                           |
| confInterval | numeric value indicating confidence level for ellipses                    |
| allowWebGL   | boolean indicating if WebGL should be used                                |
| pwidth       | overall plot width; default is 550 (125 are added for legend)             |
| pheight      | overall plot height; default is 550                                       |

### Value

plotly plot object

### Examples

```
data("mouseData", package = "metagenomeSeq")
aggdat <- aggFeatures(mouseData, level = "genus")
plotBeta(aggdat)
```

---

plotHeatmap

*Plot heatmap*

---

### Description

This function plots a heatmap of feature abundance.

### Usage

```
plotHeatmap(
  aggdat,
  features = NULL,
  log = TRUE,
  sort_by = c("Fano", "MAD", "Variance"),
  nfeat = 50,
  col_by = NULL,
  row_by = NULL,
  plotTitle = ""
)
```

### Arguments

|           |                                                                                                      |
|-----------|------------------------------------------------------------------------------------------------------|
| aggdat    | aggregated MRExperiment                                                                              |
| features  | Vector of features to plot. If NULL, the top ‘nfeat’ features in terms of ‘sort_by’ will be plotted. |
| log       | Log2 transform data. Default is TRUE.                                                                |
| sort_by   | Dispersion measure to sort features, one of "Fano", "MAD", and "Variance"                            |
| nfeat     | Number of features to display. Default is 50.                                                        |
| col_by    | Vector of phenotypes for coloring.                                                                   |
| row_by    | Name of feature level for coloring.                                                                  |
| plotTitle | Plot title. By default, no title.                                                                    |

**Value**

plotly heatmap

**Examples**

```
data("mouseData", package = "metagenomeSeq")
aggdat <- aggFeatures(mouseData, level = "genus")
plotHeatmap(aggdat, sort_by = "Fano")
```

---

|                 |                                   |
|-----------------|-----------------------------------|
| plotLongFeature | <i>Plot longitudinal features</i> |
|-----------------|-----------------------------------|

---

**Description**

This function plots the reads of a particular feature over different time points.

**Usage**

```
plotLongFeature(
  aggdat,
  feature,
  x_var,
  id_var = "SAMPLE_ID",
  plotTitle = NULL,
  ylab = "Reads",
  log = FALSE,
  showLines = TRUE,
  fixedHeight = NULL,
  x_levels = NULL,
  pwidth = 650
)
```

**Arguments**

|             |                                                               |
|-------------|---------------------------------------------------------------|
| aggdat      | aggregated MRExperiment                                       |
| feature     | Feature to plot.                                              |
| x_var       | Phenotype to show along on X-axis.                            |
| id_var      | phenotype used to connect data points. Default is "SAMPLE_ID" |
| plotTitle   | Plot title. Default shows no title.                           |
| ylab        | Y-axis label. Default is "Reads"                              |
| log         | Log2 transform data. Default is FALSE.                        |
| showLines   | add lines between the points                                  |
| fixedHeight | sets a specific plot height (differential analysis)           |
| x_levels    | restrict to specific levels of x_var (differential analysis)  |
| pwidth      | overall plot width; default is 650                            |

**Value**

plotly object holding long feature plot

**Author(s)**

Janina Reeder, Mo Huang

**Examples**

```
data("mouseData", package = "metagenomeSeq")
aggdat <- aggFeatures(mouseData, level = "genus")
plotLongFeature(aggdat, feature = "Prevotella", x_var = "diet",
                 id_var = "mouseID")
```

---

plotlyHistogram

*Function plotting a plotly histogram on the given histvalue*

---

**Description**

Function plotting a plotly histogram on the given histvalue

**Usage**

```
plotlyHistogram(
  histvalue,
  plotTitle,
  xaxisTitle = "",
  yaxisTitle = "",
  pwidth = 200,
  pheight = 200
)
```

**Arguments**

|            |                                     |
|------------|-------------------------------------|
| histvalue  | the value to plot as a histogram    |
| plotTitle  | title of the plot                   |
| xaxisTitle | name of xaxis; default is ""        |
| yaxisTitle | name of yaxis; default is ""        |
| pwidth     | overall plot width; default is 200  |
| pheight    | overall plot height; default is 200 |

**Value**

plotly plot object

**Examples**

```
data("mouseData", package = "metagenomeSeq")
plotlyHistogram(histvalue = colSums(MRcounts(mouseData) > 0),
  plotTitle = "Feature distribution",
  xaxisTitle = "features", yaxisTitle = "frequency")
```

---

plotlySampleBarplot     *Function plotting a barplot showing number of OTUs per samples*

---

### Description

Function plotting a barplot showing number of OTUs per samples

### Usage

```
plotlySampleBarplot(  
  MRobj,  
  col_by = NULL,  
  xaxisTitle = "",  
  yaxisTitle = "",  
  pwidth = 600,  
  pheight = 450,  
  sortbyfreq = FALSE,  
  pheno_sort = NULL,  
  x_levels = NULL  
)
```

### Arguments

|            |                                                                             |
|------------|-----------------------------------------------------------------------------|
| MRobj      | containing data to plot                                                     |
| col_by     | phenotype to color bars by; default is NULL                                 |
| xaxisTitle | name of xaxis; default is ""                                                |
| yaxisTitle | name of yaxis; default is ""                                                |
| pwidth     | overall plot width; default is 600                                          |
| pheight    | overall plot height; default is 450                                         |
| sortbyfreq | boolean determining if bars should be sorted by frequency; default is FALSE |
| pheno_sort | order of pheno levels to sort by; ignored if sortbyfreq is TRUE             |
| x_levels   | character vector holding x values in order to be shown                      |

### Value

plotly plot object

### Examples

```
data("mouseData", package = "metagenomeSeq")  
plotlySampleBarplot(mouseData)
```

---

|                   |                      |
|-------------------|----------------------|
| plotSingleFeature | <i>Plot features</i> |
|-------------------|----------------------|

---

## Description

This function plots the reads of a particular feature or set of features.

## Usage

```
plotSingleFeature(
  aggdat,
  feature = "other",
  x_var = "SAMPLE_ID",
  ind = seq_len(10),
  plotTitle = NULL,
  ylab = "Reads",
  xlab = NULL,
  facet1 = NULL,
  facet2 = NULL,
  log = FALSE,
  showPoints = FALSE,
  fixedHeight = NULL,
  x_levels = NULL,
  pwidth = 500
)
```

## Arguments

|             |                                                                                 |
|-------------|---------------------------------------------------------------------------------|
| aggdat      | aggregated MRExperiment                                                         |
| feature     | Feature to plot.                                                                |
| x_var       | Phenotype to aggregate over on X-axis. Default by "SAMPLE_ID".                  |
| ind         | Indices of top abundant features to plot. Needed to determine appropriate color |
| plotTitle   | Plot title. Default shows no title.                                             |
| ylab        | Y-axis label. Default is "Reads"                                                |
| xlab        | X-axis label. If NULL, x_var will be used as label.                             |
| facet1      | Phenotype for facet 1.                                                          |
| facet2      | Phenotype for facet 2.                                                          |
| log         | Log2 transform data. Default is FALSE.                                          |
| showPoints  | add points for each sample on plot                                              |
| fixedHeight | sets a specific plot height (differential analysis)                             |
| x_levels    | restrict to specific levels of x_var (differential analysis)                    |
| pwidth      | overall plot width; default is 650                                              |

## Value

plotly plot object

**Author(s)**

Janina Reeder

**Examples**

```
data("mouseData", package = "metagenomeSeq")
aggdat <- aggFeatures(mouseData, level = "genus")
plotSingleFeature(aggdat, feature = "Prevotella", x_var = "diet")
```

---

|          |                      |
|----------|----------------------|
| readData | <i>Reads in data</i> |
|----------|----------------------|

---

**Description**

This function reads in an MRexperiment object saved as an RDS file, a Biom file, or a tab - delimited count matrix with features as rows and samples as columns.

**Usage**

```
readData(filepath, type = "RDS")
```

**Arguments**

|          |                                                                                                |
|----------|------------------------------------------------------------------------------------------------|
| filepath | Relative or absolute file path of data object.                                                 |
| type     | The type of file to be read; default is "RDS", other options are "RDATA", "BIOM", "TAB", "CSV" |

**Value**

An MRexperiment object.

---

|              |                                                |
|--------------|------------------------------------------------|
| relAbundance | <i>Relative abundance plot module - server</i> |
|--------------|------------------------------------------------|

---

**Description**

Relative abundance plot module - server

**Usage**

```
relAbundance(
  input,
  output,
  session,
  aggDat,
  featLevel,
  intraSettings,
  normalizedData,
  reset
)
```

**Arguments**

|                |                                                     |
|----------------|-----------------------------------------------------|
| input          | shiny input                                         |
| output         | shiny output                                        |
| session        | shiny session                                       |
| aggDat         | aggregated MRExperiment                             |
| featLevel      | chosen feature level (aggregation level)            |
| intraSettings  | analysis input settings passed over to this module  |
| normalizedData | boolean indicating whether data has been normalized |
| reset          | boolean reactive which resets the module if TRUE    |

**Value**

list storing plot clicks and number of features displayed (passed to feature plot module) as well as the R code to make plot

---

|                |                                            |
|----------------|--------------------------------------------|
| relAbundanceUI | <i>Relative abundance plot module - UI</i> |
|----------------|--------------------------------------------|

---

**Description**

Relative abundance plot module - UI

**Usage**

```
relAbundanceUI(id)
```

**Arguments**

|    |                      |
|----|----------------------|
| id | namespace identifier |
|----|----------------------|

**Value**

box containing the ui code

**Author(s)**

Janina Reeder

---

|                    |                                                                                   |
|--------------------|-----------------------------------------------------------------------------------|
| replaceWithUnknown | <i>Helper function to replace any un-annotated features with the term unknown</i> |
|--------------------|-----------------------------------------------------------------------------------|

---

**Description**

Helper function to replace any un-annotated features with the term unknown

**Usage**

```
replaceWithUnknown(featcol)
```

**Arguments**

featcol                vector of entried to be replaced where needed (fData column)

**Value**

modified featcol

**Author(s)**

Janina Reeder

**Examples**

```
data("mouseData", package = "metagenomeSeq")
featcol <- fData(mouseData)[["genus"]]
featcol[featcol == "NA"] <- NA
replaceWithUnknown(featcol)
```

---

|            |                                 |
|------------|---------------------------------|
| reportList | <i>Report tab module server</i> |
|------------|---------------------------------|

---

**Description**

Report tab module server

**Usage**

```
reportList(
  input,
  output,
  session,
  dataSource,
  preprocessRep,
  qcRep,
  analysisRep,
  aggIndex,
  reset
)
```

**Arguments**

|               |                                                             |
|---------------|-------------------------------------------------------------|
| input         | module input                                                |
| output        | module output                                               |
| session       | app session                                                 |
| dataSource    | R code to obtain data for rendering                         |
| preprocessRep | R code containing preprocessing steps of data               |
| qcRep         | R Code to generate QC plots                                 |
| analysisRep   | R Code to generate all analyses saved to reports            |
| aggIndex      | boolean value representing aggregation steps in analysisRep |
| reset         | boolean reactive which resets the module if TRUE            |

**Value**

report list server fragment - no return value

**Author(s)**

Janina Reeder

---

|              |                      |
|--------------|----------------------|
| reportListUI | <i>report tab ui</i> |
|--------------|----------------------|

---

**Description**

report tab ui

**Usage**

```
reportListUI(id)
```

**Arguments**

|    |                      |
|----|----------------------|
| id | namespace identifier |
|----|----------------------|

**Value**

fluidRow holding ui elements

**Author(s)**

Janina Reeder

**Examples**

```
reportListUI("reportlist_id")
```

---

|           |                   |
|-----------|-------------------|
| reportRow | <i>Report Row</i> |
|-----------|-------------------|

---

**Description**

Report Row

**Usage**

```
reportRow(input, output, session, type, content)
```

**Arguments**

|         |                                                        |
|---------|--------------------------------------------------------|
| input   | module input                                           |
| output  | module output                                          |
| session | app session                                            |
| type    | boolean indicating whether checkbox should be included |
| content | R code to show                                         |

**Value**

reactive boolean indicating whether row is selected

**Author(s)**

Janina Reeder

---

|             |                                                                                      |
|-------------|--------------------------------------------------------------------------------------|
| reportRowUI | <i>Report row module consisting of a checkbox, image and description/R code area</i> |
|-------------|--------------------------------------------------------------------------------------|

---

**Description**

Report row module consisting of a checkbox, image and description/R code area

**Usage**

```
reportRowUI(id, type)
```

**Arguments**

|      |                                                           |
|------|-----------------------------------------------------------|
| id   | namespace identifier                                      |
| type | boolean indicating if a selector checkbox should be added |

**Value**

div holding the UI code

**Author(s)**

Janina Reeder

---

|                  |                                                                                             |
|------------------|---------------------------------------------------------------------------------------------|
| rollDownFeatures | <i>Helper function which rolls down annotated from closest higher order with annotation</i> |
|------------------|---------------------------------------------------------------------------------------------|

---

**Description**

Helper function which rolls down annotated from closest higher order with annotation

**Usage**

```
rollDownFeatures(featrow)
```

**Arguments**

featrow                vector of entries to be replaced where needed (fData row)

**Value**

modified featurerow

**Author(s)**

Janina Reeder

**Examples**

```
data("mouseData", package = "metagenomeSeq")
featrow <- fData(mouseData)[5,]
rollDownFeatures(featrow)
```

---

|             |                                                |
|-------------|------------------------------------------------|
| runDiffTest | <i>Performs differential abundance testing</i> |
|-------------|------------------------------------------------|

---

**Description**

This function performs differential abundance testing between groups of a specified phenotype. Four methods are available: limma, Kruskal-Wallis, ZILN and DESeq2 (see details).

**Usage**

```
runDiffTest(
  aggdat,
  level,
  phenotype,
  phenolevels = NULL,
  log = TRUE,
  coef = NULL,
  method = c("limma", "Kruskal-Wallis", "DESeq2")
)
```

**Arguments**

|             |                                                                                                                                                                                                                                                                    |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| aggdat      | aggregated MRExperiment                                                                                                                                                                                                                                            |
| level       | Feature level.                                                                                                                                                                                                                                                     |
| phenotype   | Phenotype to test.                                                                                                                                                                                                                                                 |
| phenolevels | levels of the phenotype to restrict the comparison to                                                                                                                                                                                                              |
| log         | Log2 transform data. Default is TRUE.                                                                                                                                                                                                                              |
| coef        | Numeric which indicates which pairwise comparison to analyze when there are more than two groups. Corresponds to the column number of the model matrix produced by <code>designPairs()</code> . If NULL, a test of any difference between all groups is performed. |
| method      | Differential testing method. One of "limma" (default), "Kruskal-Wallis", or "DESeq2".                                                                                                                                                                              |

**Details**

limma is a differential expression tool for microarray data using linear models. It can also be applied to microbiome data.

The Kruskal-Wallis test is a non-parametric rank test which examines if groups come from the same distribution. A significant result indicates at least one group is distributionally different than another group.

ZILN is a zero-inflated log-normal model implemented in `fitFeatureModel()` of the `metagenomeSeq` package.

DESeq2 performs differential gene expression analysis based on the negative binomial distribution

**Value**

data.frame holding results of the differential analysis

**Examples**

```
data("mouseData", package = "metagenomeSeq")
aggdat <- aggFeatures(mouseData, level = "genus")
runDiffTest(aggdat = aggdat, level = "genus",
            phenotype = "diet", method = "Kruskal-Wallis")
```

---

`runMicrobiomeExplorer` *Main function to start the Microbiome Explorer Shiny app via a command line call*

---

**Description**

Main function to start the Microbiome Explorer Shiny app via a command line call

**Usage**

```
runMicrobiomeExplorer()
```

**Value**

the shiny application

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