Package 'autonomics'

December 1, 2025

Type Package

Title Unified Statistical Modeling of Omics Data

Version 1.19.0

Description This package unifies access to Statistal Modeling of Omics Data.
Across linear modeling engines (lm, lme, lmer, limma, and wilcoxon).
Across coding systems (treatment, difference, deviation, etc).
Across model formulae (with/without intercept, random effect, interaction or nesting).
Across omics platforms (microarray, rnaseq, msproteomics, affinity proteomics, metabolomics).
Across projection methods (pca, pls, sma, lda, spls, opls).
Across clustering methods (hclust, pam, cmeans).
Across survival methods (coxph, survdiff, coin).
It provides a fast enrichment analysis implementation.

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Encoding UTF-8

LazyData true

VignetteBuilder knitr

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PrincipalComponent, Regression, DifferentialExpression,
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MassSpectrometry,

BugReports
https://gitlab.uni-marburg.de/fb20/ag-graumann/software/autonomics/issues

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Depends R (>= 4.0)

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ggplot2, ggrepel, graphics, grDevices, grid, gridExtra, limma,
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parallel, RColorBrewer, rlang, R.utils, readxl, S4Vectors,
scales, stats, stringi, SummarizedExperiment, survival, tidyr,
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Suggests affy, AnnotationDbi, AnnotationHub, apcluster, Biobase, BiocManager, BiocStyle, Biostrings, coin, diagram, DBI, e1071, ensembldb, GenomicDataCommons, GenomicRanges, GEOquery, ggstance, ggridges, ggtext, hgu95av2.db, ICSNP, jsonlite, knitr, lmerTest, MASS, mclust, mixOmics, mixtools, mpm, nlme, OlinkAnalyze, org.Hs.eg.db, org.Mm.eg.db, patchwork, pcaMethods, pheatmap, progeny, propagate, RCurl, RSQLite, remotes, rmarkdown, ropls, Rsubread, readODS, rtracklayer, statmod, testthat, UniProt.ws, writexl, XML

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Author Aditya Bhagwat [aut, cre],
Richard Cotton [aut],
Vanessa Beutgen [ctb],
Witold Szymanski [ctb],
Shahina Hayat [ctb],
Laure Cougnaud [ctb],
Hinrich Goehlmann [sad],
Karsten Suhre [sad],
Johannes Graumann [aut, sad]

Maintainer Aditya Bhagwat <aditya.bhagwat@uni-marburg.de>

Contents

`.coxph` *Fit onefeature survival*

Description

Fit onefeature survival

Usage

```
.coxph(sd, formula)

.survdiff(sd, formula)

.logrank(sd, formula)
```

Arguments

`sd`	data.table
`formula`	model formula

Examples

```
# Dataset
     sd <- survobj()
   sd %<>% sumexp_to_longdt( svars = c('timetoevent', 'event', 'age', 'sex'), assay = 'exprs2levels')
     sd[, value := code(factor(value), 'code_control')]
     sd[,   age := code(factor(age  ), 'code_control')]
     sd[,   sex := code(factor(sex  ), 'code_control')]

# Singlefactor - coxph, survdiff, logrank
    .survdiff(sd, survival::Surv(timetoevent, event) ~ value)
     .logrank(sd, survival::Surv(timetoevent, event) ~ value)
       .coxph(sd, survival::Surv(timetoevent, event) ~ value)
       .coxph(sd, survival::Surv(timetoevent, event) ~ age/value)
```

.densities *Densities*

Description

Densities

Usage

```
.densities(x, xpred = x)

densities(x, xpred = x, plot = TRUE, color = "#F8766D")
```

Arguments

x	numeric vector: data points
xpred	numeric vector: prediction points
plot	whether to plot
color	string

Value

numeric vector with same length as xpred

Examples

```
 set.seed(1)
 x <- c(rnorm(20, 3), rnorm(20,7), rnorm(20, 11))
 xpred <- seq(min(x), max(x), length.out = 100)
.densities(x, xpred)  # innerfun
 densities(x, xpred)  # outerfun
```

.extract_p_features *Extract coefficient features*

Description

Extract coefficient features

Usage

```
.extract_p_features(
  object,
  coefs,
  p = 0.05,
  fit = fits(object),
  combiner = "|",
  features = NULL,
  verbose = TRUE
)

.extract_fdr_features(
  object,
  coefs,
  fdr = 0.05,
  fit = fits(object),
  combiner = "|",
  features = NULL,
  verbose = TRUE
)

.extract_effectsize_features(
  object,
  coefs,
  effectsize = 1,
  fit = fits(object),
  combiner = "|",
  features = NULL,
  verbose = TRUE
)

.extract_n_features(
  object,
  coefs,
  combiner = "|",
  n,
  fit = fits(object)[1],
  features = NULL,
  verbose = TRUE
)

extract_contrast_features(
  object,
  fit = fits(object)[1],
  coefs = autonomics::coefs(object, fit = fit),
  combiner = "|",
  decreasing = FALSE,
  p = 1,
```

```
  fdr = 1,
  effectsize = 0,
  sign = c(-1, +1),
  n = 4,
  features = NULL,
  verbose = TRUE
)
```

Arguments

object	SummarizedXExperiment
coefs	NULL/character: subset of coefs(object)
p	p threshold
fit	character: subset of fits(object)
combiner	'|' or '&': how to combine multiple fits/coefs
features	features to include no matter what (character vector)
verbose	TRUE or FALSE
fdr	fdr threshold
effectsize	effectsize threshold
n	number of top features (Inf means all)
decreasing	TRUE or FALSE
sign	effect sign

Value

SummarizedExperiment

Examples

```
# Read and Fit
    file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
    object <- read_metabolon(file)
    object %<>% linmod_limma()
    fdt(object) %<>% add_adjusted_pvalues('fdr')
# Single coef
    object0 <- object
    object %<>% .extract_p_features(         coefs = 't1-t0', p = 0.05)
    object %<>% .extract_fdr_features(       coefs = 't1-t0', fdr = 0.05)
    object %<>% .extract_effectsize_features(coefs = 't1-t0', effectsize = 1)
    object %<>% .extract_n_features(         coefs = 't1-t0', n = 1)
    object <- object0
   object %<>% extract_contrast_features(coefs = 't1-t0', p = 0.05, fdr = 0.05, effectsize = 1, sign = -1, n = 1)
# Multiple coefs
    object <- object0
    object %<>% .extract_p_features(         coefs = c('t1-t0', 't2-t0'), p = 0.05)
    object %<>% .extract_fdr_features(       coefs = c('t1-t0', 't2-t0'), fdr = 0.01)
    object %<>% .extract_effectsize_features(coefs = c('t1-t0', 't2-t0'), effectsize = 1)
```

```
  object %<>% .extract_n_features(         coefs = c('t1-t0', 't2-t0'), n = 1)
  object <- object0
object %<>% extract_contrast_features(coefs = c('t1-t0', 't2-t0'), p = 0.05, fdr = 0.01, effectsize = 1, sign = -
```

.fit_survival *Fit/Plot survival*

Description

Fit/Plot survival

Usage

```
.fit_survival(
  object,
  formula = as.formula(sprintf("~%s", assayNames(object)[1])),
  coefs = NULL,
  engine = c("coxph", "survdiff", "logrank")[1],
  drop = TRUE,
  coding = "code_control",
  verbose = TRUE
)

fit_survival(
  object,
  formula = as.formula(sprintf("~%s", assayNames(object)[1])),
  engine = c("coxph", "survdiff", "logrank")[1],
  drop = TRUE,
  coding = "code_control",
  coefs = NULL,
  verbose = TRUE,
  outdir = NULL,
  plot = FALSE,
  order = coefs(object, fit = engine)[1],
  stats = coefs(object, fit = engine),
  dodge = 0,
  n = if (svar_formula(formula, object)) 1 else min(nrow(object), 2),
  n_col = n %>% min(nrow(object)) %>% sqrt() %>% ceiling() %>% min(4),
  n_row = n %>% min(ncol(object)) %>% sqrt() %>% floor() %>% min(4),
  width = 3 * n_col,
  height = 3 * n_row,
  writefunname = "write_xl"
)

prep_survival(
  object,
  formula = as.formula(sprintf("~%s", assayNames(object)[1])),
```

```
  assaylevels = NULL,
  engine = c("coxph", "survdiff", "logrank") %>% intersect(fits(object)) %>%
    extract(1),
  order = autonomics::coefs(object, fit = engine)[1],
  stats = autonomics::coefs(object, fit = engine),
  n = if (svar_formula(formula, object)) 1 else min(nrow(object), 9)
)

plot_survival(
  object,
  formula = as.formula(sprintf("~%s", assayNames(object)[1])),
  assaylevels = NULL,
  engine = c("coxph", "survdiff", "logrank") %>% intersect(fits(object)) %>%
    extract(1),
  order = autonomics::coefs(object, fit = engine)[1],
  stats = autonomics::coefs(object, fit = engine),
 title = sprintf("%s ~ %s", engine, formula2str(formula) %>% substr(2, nchar(.))),
  dodge = 0,
  file = NULL,
  n = if (svar_formula(formula, object)) 1 else min(nrow(object), 4),
  n_col = n %>% min(nrow(object)) %>% sqrt() %>% ceiling() %>% min(4),
  n_row = n %>% min(ncol(object)) %>% sqrt() %>% floor() %>% min(4),
  width = 3 * n_col,
  height = 3 * n_row
)
```

Arguments

object	SummarizedExperiment
formula	model formula: contains svars/assayNames
coefs	NULL or character (coefs to be stored in object)
engine	'coxph', 'survdiff' or 'logrank'
drop	TRUE or FALSE : whether to drop var in coefname
coding	string: codingfunname
verbose	TRUE or FALSE
outdir	output directory
plot	TRUE or FALSE
order	NULL/character (coefs to order plots on)
stats	coefs to print stats for
dodge	number
n	number of features to plot
n_col	number of columns
n_row	number of rows
width	number

height	number
writefunname	'write_xl' or 'write_ods'
assaylevels	NULL or vector: assaylevels to be used (for plotting)
title	string
file	filepath

Value

SummarizedExperiment/ggplot

Examples

```
# Formula
    # Samplevar-based
          fit_survival(survobj(), ~age)           # age
          fit_survival(survobj(), ~sex)           # sex
       fit_survival(survobj(), ~age + sex)    # age across  sexlevels, sex across agelevels
          fit_survival(survobj(), ~age / sex)     # sex within  agelevel
       fit_survival(survobj(), ~age * sex)    # sex between agelevels (=age between sexlevels)

    # Assayvar-based
          fit_survival(survobj(), ~exprs)         #   numerical coding
          fit_survival(survobj(), ~exprs2bins)    #     integer coding
          fit_survival(survobj(), ~exprs2levels)  # categorical coding

    # Samplevar/Assayvar-based
       fit_survival(survobj(), ~age+exprs2levels, order = 'senior-junior'       ) #  age effect across exprlevels
       fit_survival(survobj(), ~age+exprs2levels, order = '2-1'              ) # expr effect across agelevels
       fit_survival(survobj(), ~age/exprs2levels, order = 'senior:2-1'         ) # expr effect within agelevel
       fit_survival(survobj(), ~age*exprs2levels, order = 'senior-junior:2-1'    ) # expr effect differences betwe

# Other arguments
    # engine: 'coxph' -> 'survdiff'
          fit_survival(survobj(), ~ exprs2levels)                         # coxph
          fit_survival(survobj(), ~ exprs2levels, engine = 'survdiff')   # survdiff

    # drop: drop varname in coefnames -> dont
          fit_survival(survobj(), ~ exprs2levels)                # 2-1
          fit_survival(survobj(), ~ exprs2levels, drop = FALSE)  # exprs2levels2-1

    # coding: code_control -> contr.treatment
         fit_survival(survobj(), ~ exprs2levels)                          # code_control
       fit_survival(survobj(), ~ exprs2levels, coding = 'contr.treatment') # contr.treatment

    # outdir: print to object/screen -> print to xlsx/pdf
       fit_survival(survobj(), ~ exprs2levels)                                    # print to object/screen
       fit_survival(survobj(), ~ exprs2levels, outdir = tempdir())                      # print to  xlsx/pdf
       fit_survival(survobj(), ~ exprs2levels, outdir = tempdir(), writefunname = 'write_ods') # print to   ods/pdf

    # plot: plot -> dont
          fit_survival(survobj(), ~ exprs2levels)                # plot
```

```
      fit_survival(survobj(), ~ exprs2levels, plot = FALSE)  # dont

# order: order on first coef -> order on custom coef
   fit_survival(survobj(), ~ age+exprs2levels)             # order on 'senior-junior'
      fit_survival(survobj(), ~ age+exprs2levels, order = '2-1')   # order on '2-1'

# stats: show stats for all coefs -> show stats for custom coefs
   fit_survival(survobj(), ~ age+exprs2levels)                 # show stats for 'senior-junior' and 'bin2-bin
   fit_survival(survobj(), ~ age+exprs2levels, stats = 'senior-junior') # show stats for 'senior-junior'

# dodge: overlap curves -> dodge curves
      fit_survival(survobj(), ~ age+exprs2levels)            # overlap curves
      fit_survival(survobj(), ~ age+exprs2levels, dodge = 2) # dodge curves

# n: (plot) top2 -> top4
      fit_survival(survobj(), ~ age+exprs2levels)         # top2
      fit_survival(survobj(), ~ age+exprs2levels, n = 4)  # top4

# n_row n_col: 1 row 2 col -> 2 row 1 col
      fit_survival(survobj(), ~ age+exprs2levels)                      # 1 row 2 col
     fit_survival(survobj(), ~ age+exprs2levels, n_row = 2, n_col = 1) # 2 row 1 col
```

`.merge` *Clean Merge*

Description

Clean Merge

Usage

```
.merge(dt1, dt2, by)
```

Arguments

dt1	data.table
dt2	data.table
by	string

Examples

```
require(data.table)
dt1 <- data.table(feature_id = c('PG1', 'PG2'), gene    = c('G1', 'G2'))
dt2 <- data.table(feature_id = c('PG1', 'PG2'), protein = c('P1', 'P2'))
dt1 %<>% .merge(dt2, by = 'feature_id')
dt1
```

.read_compounddiscoverer

Read compound discoverer files as-is

Description

Read compound discoverer files as-is

Usage

```
.read_compounddiscoverer(
  file,
  quantity = guess_compounddiscoverer_quantity(file),
  colname_format = NULL,
  mod_extract = NULL,
  verbose = TRUE
)
```

Arguments

file	compoumd discoverer file
quantity	string
colname_format	function to reformat column names
mod_extract	function to extract MS modi from sample names
verbose	TRUE / FALSE

Value

data.table

.read_compounddiscoverer_masslist

Read compound discoverer masslist files as-is

Description

Read compound discoverer masslist files as-is

Usage

```
.read_compounddiscoverer_masslist(file, verbose = TRUE)
```

Arguments

file	compoumd discoverer masslist file
verbose	TRUE / FALSE

Value

data.table

`.read_diann_precursors` *Read diann*

Description

Read diann

Usage

```
.read_diann_precursors(
  file,
  Global.Q = 0.01,
  Q = 0.01,
  Global.PG.Q = 0.01,
  PG.Q = 0.05,
  Global.Peptidoform.Q = 0.01,
  Peptidoform.Q = 0.01,
  Lib.Q = 0.01,
  Lib.PG.Q = 0.01,
  Lib.Peptidoform.Q = 0.01,
  verbose = TRUE
)

.read_diann_proteingroups(
  file,
  Global.Q = 0.01,
  Q = 0.01,
  Global.PG.Q = 0.01,
  PG.Q = 0.05,
  Global.Peptidoform.Q = 0.01,
  Peptidoform.Q = 0.01,
  Lib.Q = 0.01,
  Lib.PG.Q = 0.01,
  Lib.Peptidoform.Q = 0.01,
  verbose = TRUE
)
```

```
read_diann_proteingroups(
  file,
  Global.Q = 0.01,
  Q = 0.01,
  Global.PG.Q = 0.01,
  PG.Q = 0.05,
  Global.Peptidoform.Q = 0.01,
  Peptidoform.Q = 0.01,
  Lib.Q = 0.01,
  Lib.PG.Q = 0.01,
  Lib.Peptidoform.Q = 0.01,
  simplify_snames = TRUE,
  rm_contaminants = TRUE,
  impute = FALSE,
  plot = FALSE,
  pca = plot,
  pls = plot,
  fit = if (plot) "limma" else NULL,
  formula = ~subgroup,
  block = NULL,
  coefs = NULL,
  contrasts = NULL,
  palette = NULL,
  verbose = TRUE
)

read_diann(...)
```

Arguments

`file`	DIA-NN report file (tsv or parquet)
`Global.Q`	Global.Q cutoff
`Q`	Q cutoff
`Global.PG.Q`	Global.PG.Q cutoff
`PG.Q`	PG.Q cutoff
`Global.Peptidoform.Q`	Global.Peptidoform.Q cutoff
`Peptidoform.Q`	Peptidoform.Q cutoff
`Lib.Q`	Lib.Q cutoff
`Lib.PG.Q`	Lib.PG.Q cutoff
`Lib.Peptidoform.Q`	Lib.Peptidoform.Q cutoff
`verbose`	TRUE or FALSE
`simplify_snames`	TRUE or FALSE: simplify (drop common parts in) samplenames ?

rm_contaminants	TRUE or FALSE: rm contaminants ?
impute	TRUE or FALSE: impute group-specific NA values ?
plot	TRUE or FALSE
pca	TRUE or FALSE: run pca ?
pls	TRUE or FALSE: run pls ?
fit	model engine: 'limma', 'lm', 'lme(r)', 'wilcoxon' or NULL
formula	model formula
block	model blockvar: string or NULL
coefs	model coefficients of interest: character vector or NULL
contrasts	coefficient contrasts of interest: character vector or NULL
palette	color palette: named string vector
...	used to maintain deprecated functions

Details

Defaults for various Q value cutoffs corresppond to recommendations by the DIA-NN teen for DIA-NN v.2 (as of 03.2025). Of these, the reader of the legacy file format (flat tab seperated values, pre-DIA-NN v.2) only utilizes Lib.PG.Q.

Value

data.table or SummarizedExperiment

Examples

```
# Read
   file <- download_data('dilution.report.tsv')
   .read_diann_precursors(file)         #    precursors longdt
   .read_diann_proteingroups(file)      # proteingroups longdt
   fdt(read_diann_proteingroups(file))  # proteingroups sumexp
# Compare
    PR <- .read_diann_precursors(file)
    PG <- .read_diann_proteingroups(file)
    PG[intensity==top1] # matches      : 24975 (85%) proteingroups
    PG[intensity!=top1] # doesnt match :  4531 (15%) proteingroups
    RUN <- 'IPT_HeLa_1_DIAstd_Slot1-40_1_9997'
    PR[uniprot=='Q96JP5;Q96JP5-2' & run == RUN, 1:6] #    match:    8884 ==   8884
    PR[uniprot=='P36578'          & run == RUN, 1:6] # no match:  650887 != 407978
  PR[intensity != top1][feature_id == unique(feature_id)[1]][run == unique(run)[1]][1:2, 1:6]
  PR[intensity != top1][feature_id == unique(feature_id)[2]][run == unique(run)[1]][1:2, 1:6]
  PR[intensity != top1][feature_id == unique(feature_id)[3]][run == unique(run)[1]][1:3, 1:6]
```

`.read_maxquant_proteingroups` *Read proteingroups/phosphosites as-is*

Description

Read proteingroups/phosphosites as-is

Usage

```
.read_maxquant_proteingroups(
  file,
  quantity = guess_maxquant_quantity(file),
  verbose = TRUE
)

.read_maxquant_phosphosites(
  file,
  profile,
  quantity = guess_maxquant_quantity(file),
  verbose = TRUE
)
```

Arguments

`file`	proteingroups / phosphosites file
`quantity`	string
`verbose`	TRUE / FALSE
`profile`	proteingroups file

Value

data.table

Examples

```
profile <- system.file('extdata/billing19.proteingroups.txt', package = 'autonomics')
fosfile <- system.file('extdata/billing19.phosphosites.txt',  package = 'autonomics')
prodt <- .read_maxquant_proteingroups(file = profile)
fosdt <- .read_maxquant_phosphosites( file = fosfile, profile = profile)
```

`.read_metabolon` *Read metabolon xlsxfile*

Description

Read metabolon xlsxfile

Usage

```
.read_metabolon(
  file,
  sheet = "OrigScale",
  fidvar = "BIOCHEMICAL",
  sidvar = "(CLIENT_IDENTIFIER|Client ID)",
  sfile = NULL,
  by.x = "sample_id",
  by.y = NULL,
  groupvar = NULL,
  verbose = TRUE
)

read_metabolon(
  file,
  sheet = "OrigScale",
  fidvar = "BIOCHEMICAL",
  sidvar = "(CLIENT_IDENTIFIER|Client ID)",
  sfile = NULL,
  by.x = "sample_id",
  by.y = NULL,
  groupvar = NULL,
  fnamevar = "BIOCHEMICAL",
  kegg_pathways = FALSE,
  smiles = FALSE,
  impute = TRUE,
  plot = FALSE,
  pca = plot,
  pls = plot,
  label = "feature_id",
  fit = if (plot) "limma" else NULL,
  formula = as.formula("~ subgroup"),
  block = NULL,
  coefs = NULL,
  contrasts = NULL,
  palette = NULL,
  verbose = TRUE
)
```

Arguments

file	metabolon xlsx file
sheet	excel sheet (number or string)
fidvar	featureid var
sidvar	samplid var
sfile	sample file
by.x	‘file‘ mergeby column
by.y	‘sfile‘ mergeby column
groupvar	string
verbose	TRUE or FALSE
fnamevar	featurename fvar
kegg_pathways	TRUE or FALSE: add kegg pathways?
smiles	TRUE or FALSE: add smiles?
impute	TRUE or FALSE: impute group-specific NA values?
plot	TRUE or FALSE
pca	TRUE or FALSE
pls	TRUE or FALSE
label	fvar
fit	model engine: ’limma’, ’lm’, ’lme(r)’, ’wilcoxon’ or NULL
formula	model formula
block	model blockvar: string or NULL
coefs	model coefficients of interest: character vector or NULL
contrasts	coefficient contrasts of interest: character vector or NULL
palette	NULL or colorvector

Value

SummarizedExperiment

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
read_metabolon(file, plot = TRUE, block = 'Subject')
```

`.read_rectangles` *Read omics data from rectangular file*

Description

Read omics data from rectangular file

Usage

```
.read_rectangles(
  file,
  sheet = 1,
  fid_rows,
  fid_cols,
  sid_rows,
  sid_cols,
  expr_rows,
  expr_cols,
  fvar_rows = NULL,
  fvar_cols = NULL,
  svar_rows = NULL,
  svar_cols = NULL,
  fdata_rows = NULL,
  fdata_cols = NULL,
  sdata_rows = NULL,
  sdata_cols = NULL,
  transpose = FALSE,
  verbose = TRUE
)

read_rectangles(
  file,
  sheet = 1,
  fid_rows,
  fid_cols,
  sid_rows,
  sid_cols,
  expr_rows,
  expr_cols,
  fvar_rows = NULL,
  fvar_cols = NULL,
  svar_rows = NULL,
  svar_cols = NULL,
  fdata_rows = NULL,
  fdata_cols = NULL,
  sdata_rows = NULL,
  sdata_cols = NULL,
```

```
  transpose = FALSE,
  sfile = NULL,
  sfileby = NULL,
  subgroupvar = character(0),
  verbose = TRUE
)
```

Arguments

file	string: name of text (txt, csv, tsv, adat) or excel (xls, xlsx) file
sheet	integer/string: only relevant for excel files
fid_rows	numeric vector: featureid rows
fid_cols	numeric vector: featureid cols
sid_rows	numeric vector: sampleid rows
sid_cols	numeric vector: sampleid cols
expr_rows	numeric vector: expr rows
expr_cols	numeric vector: expr cols
fvar_rows	numeric vector: fvar rows
fvar_cols	numeric vector: fvar cols
svar_rows	numeric vector: svar rows
svar_cols	numeric vector: svar cols
fdata_rows	numeric vector: fdata rows
fdata_cols	numeric vector: fdata cols
sdata_rows	numeric vector: sdata rows
sdata_cols	numeric vector: sdata cols
transpose	TRUE or FALSE (default)
verbose	TRUE (default) or FALSE
sfile	sample file
sfileby	sample file mergeby column
subgroupvar	subgroupvar in sfile

Value

SummarizedExperiment

Examples

```
# RNASEQ
   file <- system.file('extdata/billing19.rnacounts.txt', package = 'autonomics')
   read_rectangles( file, fid_rows = 2:25,     fid_cols = 2,
                          sid_rows = 1,        sid_cols = 5:28,
                         expr_rows = 2:25 ,   expr_cols = 5:28,
                         fvar_rows = 1,       fvar_cols = 1:4,
                        fdata_rows = 2:25 ,  fdata_cols = 1:4,   transpose = FALSE)
```

```
# LCMSMS PROTEINGROUPS
   file <- system.file('extdata/billing19.proteingroups.txt', package = 'autonomics')
   read_rectangles(  file,
                     fid_rows = 2:21,    fid_cols = 383,
                     sid_rows = 1,       sid_cols = seq(124, 316, by = 6),
                    expr_rows = 2:21,   expr_cols = seq(124, 316, by = 6),
                     fvar_rows = 1,      fvar_cols = c(2, 6, 7, 383),
                   fdata_rows = 2:21,  fdata_cols = c(2, 6, 7, 383),
                   transpose  = FALSE )
# SOMASCAN
   file <- system.file('extdata/atkin.somascan.adat', package = 'autonomics')
   read_rectangles(file, fid_rows = 30,         fid_cols = 23:42,
                         sid_rows = 42:108,     sid_cols = 4,
                        expr_rows = 42:108,    expr_cols = 23:42,
                        fvar_rows = 28:40,     fvar_cols = 22,
                        svar_rows = 41,        svar_cols = 1:21,
                       fdata_rows = 28:40,    fdata_cols = 23:42,
                       sdata_rows = 42:108,   sdata_cols = 1:21,  transpose  = TRUE)
# METABOLON
   file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
   read_rectangles(file, sheet = 2,
                     fid_rows = 11:30,     fid_cols = 2,
                     sid_rows = 4,         sid_cols = 15:81,
                    expr_rows = 11:30,    expr_cols = 15:81,
                     fvar_rows = 10,       fvar_cols = 1:14,
                     svar_rows = 1:10,     svar_cols = 14,
                   fdata_rows = 11:30,   fdata_cols = 1:14,
                   sdata_rows = 1:10,    sdata_cols = 15:81,
                    transpose = FALSE )
```

`.read_rnaseq_bams` *Read rnaseq counts/bams*

Description

Read rnaseq counts/bams

Usage

```
.read_rnaseq_bams(
  dir,
  paired,
  genome,
  nthreads = detectCores(),
  sfile = NULL,
  by.y = NULL,
  ensdb = NULL,
  verbose = TRUE
)
```

```
.read_rnaseq_counts(
  file,
  fid_col = 1,
  sfile = NULL,
  by.y = NULL,
  ensdb = NULL,
  verbose = TRUE
)

read_rnaseq_bams(
  dir,
  paired,
  genome,
  nthreads = detectCores(),
  sfile = NULL,
  by.y = NULL,
  block = NULL,
  formula = as.formula("~ subgroup"),
  min_count = 10,
  pseudo = 0.5,
  ensdb = NULL,
  tpm = FALSE,
  cpm = TRUE,
  log2 = TRUE,
  plot = FALSE,
  label = "feature_id",
  pca = plot,
  pls = plot,
  fit = if (plot) "limma" else NULL,
  voom = cpm,
  coefs = NULL,
  contrasts = NULL,
  palette = NULL,
  verbose = TRUE
)

read_rnaseq_counts(
  file,
  fid_col = 1,
  sfile = NULL,
  by.y = NULL,
  formula = as.formula("~ subgroup"),
  block = NULL,
  min_count = 10,
  pseudo = 0.5,
  tpm = FALSE,
  ensdb = NULL,
```

```
  cpm = !tpm,
  log2 = TRUE,
  plot = FALSE,
  label = "feature_id",
  pca = plot,
  pls = plot,
  fit = if (plot) "limma" else NULL,
  voom = cpm,
  coefs = NULL,
  contrasts = NULL,
  palette = NULL,
  verbose = TRUE
)
```

Arguments

dir	read_rnaseq_bams: bam/sam dir
paired	read_rnaseq_bams: TRUE/FALSE : paired end reads ?
genome	read_rnaseq_bams: 'mm10', 'hg38', etc. or GTF file
nthreads	read_rnaseq_bams: nthreads used by Rsubread::featureCounts()
sfile	sample file
by.y	sample file mergeby column
ensdb	EnsDb with genesizes : e.g. AnnotationHub::AnnotationHub[['AH64923']]
verbose	TRUE or FALSE: message?
file	count file
fid_col	featureid column (number or string)
block	model blockvar: string or NULL
formula	model formula
min_count	min feature count required in some samples
pseudo	pseudocount added to prevent -Inf log2 values
tpm	TRUE or FALSE : add tpm to assays (counts / libsize / genelength) ?
cpm	TRUE or FALSE: add cpm to assays (counts / effectivelibsize) ?
log2	TRUE or FALSE: log2 transform ?
plot	TRUE or FALSE: plot?
label	fvar
pca	TRUE or FALSE: perform and plot pca?
pls	TRUE or FALSE: run pls ?
fit	model engine: 'limma', 'lm', 'lme(r)', 'wilcoxon' or NULL
voom	model weights to be computed? TRUE/FALSE
coefs	model coefficients of interest: string vector or NULL
contrasts	model coefficient contrasts of interest: string vector or NULL
palette	color palette : named string vector

Value

SummarizedExperiment

Author(s)

Aditya Bhagwat, Shahina Hayat

Examples

```
# read_rnaseq_bams
  if (installed('Rsubread')){
      dir <- download_data('billing16.bam.zip')
      object <- read_rnaseq_bams(dir, paired = TRUE, genome = 'hg38')
      object <- read_rnaseq_bams(dir, paired = TRUE, genome = 'hg38', plot = TRUE)
  }
# read_rnaseq_counts
  file <- system.file('extdata/billing19.rnacounts.txt', package = 'autonomics')
  object <- read_rnaseq_counts(file, fit = 'limma', coefs = 'E15-E00')
  object <- read_rnaseq_counts(file, fit = 'limma', coefs = 'E15-E00', voom = FALSE)
 object <- read_rnaseq_counts(file, fit = 'limma', coefs = 'E15-E00', voom = FALSE, cpm = FALSE)
 object <- read_rnaseq_counts(file, fit = 'limma', coefs = 'E15-E00', voom = FALSE, cpm = FALSE,
                                    log2 = FALSE)
  object <- read_rnaseq_counts(file, plot = TRUE)

# read_rnaseq_counts(tpm = TRUE)
  ## Not run:
  ah <- AnnotationHub::AnnotationHub()
  ensdb <- ah[['AH64923']]
 object <- read_rnaseq_counts(file, fit = 'limma', coefs = 'E02-E00', tpm = TRUE, ensdb = ensdb)

## End(Not run)
```

.read_somascan *Read somascan adatfile*

Description

Read somascan adatfile

Usage

```
.read_somascan(
  file,
  fidvar = "Target",
  sidvar = "SampleId",
  sfile = NULL,
  by.x = NULL,
  by.y = NULL,
  groupvar = "SampleGroup",
```

```
  verbose = TRUE
)

read_somascan(
  file,
  fidvar = "Target",
  sidvar = "SampleId",
  sfile = NULL,
  by.x = NULL,
  by.y = NULL,
  groupvar = "SampleGroup",
  fname_var = "EntrezGeneSymbol",
  sample_type = "Sample",
  feature_type = "Protein",
  sample_quality = c("FLAG", "PASS"),
  feature_quality = c("FLAG", "PASS"),
  rm_na_svars = FALSE,
  rm_single_value_svars = FALSE,
  plot = FALSE,
  label = "feature_id",
  pca = plot,
  pls = plot,
  fit = if (plot) "limma" else NULL,
  formula = as.formula(sprintf("~ %s", groupvar)),
  block = NULL,
  coefs = NULL,
  contrasts = NULL,
  palette = NULL,
  verbose = TRUE
)
```

Arguments

file	somascan (adat) file
fidvar	featureid var
sidvar	sampleid var
sfile	sample file
by.x	‘file‘ mergeby column
by.y	‘sfile‘ mergeby column
groupvar	string
verbose	TRUE or FALSE: message?
fname_var	featurename var: string
sample_type	subset of c(’Sample’,’QC’,’Buffer’,’Calibrator’)
feature_type	subset of c(’Protein’, ’Hybridization Control Elution’,’Rat Protein’)
sample_quality	subset of c(’PASS’, ’FLAG’, ’FAIL’)

feature_quality	subset of c('PASS', 'FLAG', 'FAIL')
rm_na_svars	TRUE or FALSE: rm NA svars?
rm_single_value_svars	TRUE or FALSE: rm single value svars?
plot	TRUE or FALSE: plot ?
label	fvar
pca	TRUE or FALSE: run pca?
pls	TRUE or FALSE: run pls?
fit	model engine: 'limma', 'lm', 'lme(r)','wilcoxon' or NULL
formula	model formula
block	model blockvar
coefs	model coefficients of interest: character vector or NULL
contrasts	coefficient contrasts of interest: character vector or NULL
palette	character vector or NULL

Value

Summarizedexperiment

Examples

```
file <- system.file('extdata/atkin.somascan.adat', package = 'autonomics')
read_somascan(file, plot = TRUE, block = 'Subject')
```

---

abstract_fit *Abstract model fit*

Description

Abstract model fit

Usage

```
abstract_fit(
  object,
  sep = guess_fitsep(fdt(object)),
  fit = fits(object),
  coef = coefs(object, fit = fit),
  significancevar = "p",
  significance = 0.05
)
```

Arguments

object	SummarizedExperiment
sep	string
fit	character vector
coef	character vector
significancevar	'p' or 'fdr'
significance	fraction : pvalue cutoff

Value

SummarizedExperiment

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file, fit = 'limma', coef = 't3-t0')
fdt(object)
fdt(abstract_fit(object))
```

---

add_adjusted_pvalues *Add adjusted pvalues*

Description

Add adjusted pvalues

Usage

```
add_adjusted_pvalues(object, ...)

## S3 method for class 'data.table'
add_adjusted_pvalues(
  object,
  method = "fdr",
  fit = fits(object),
  coefs = autonomics::coefs(object, fit = fit),
  verbose = TRUE,
  ...
)

## S3 method for class 'SummarizedExperiment'
add_adjusted_pvalues(
  object,
  method = "fdr",
  fit = fits(object),
```

```
  coefs = autonomics::coefs(object, fit = fit),
  verbose = TRUE,
  ...
)

## S3 method for class '`NULL`'
add_adjusted_pvalues(object, ...)
```

Arguments

object	SummarizedExperiment or (feature) data.table
...	for s3 dispatch
method	'fdr', 'bonferroni', ... (see 'p.adjust.methods')
fit	'limma', 'lm', 'lme', 'lmer'
coefs	coefficient (string)
verbose	TRUE or FALSE

Value

SummarizedExperiment

Examples

```
file <- system.file('extdata/fukuda20.proteingroups.txt', package = 'autonomics')
object <- read_maxquant_proteingroups(file)
fdt(object) %<>% extract(, 1:2)
object %<>% linmod_limma()
object %<>% extract(order(fdt(.)$`p~Adult-X30dpt~limma`), )
 fdt(object)
(fdt(object) %<>% add_adjusted_pvalues('fdr'))
(fdt(object) %<>% add_adjusted_pvalues('fdr'))     # smart enough not to add second column
(fdt(object)  %>% add_adjusted_pvalues('bonferroni'))
```

---

add_assay_means *Add assay means*

Description

Add assay means

Usage

```
add_assay_means(object, assay = assayNames(object)[1], bin = TRUE)
```

Arguments

object	SummarizedExperiment or NULL
assay	string
bin	TRUE or FALSE

Value

SummarizedExperiment

Examples

```
file <- system.file('extdata/fukuda20.proteingroups.txt', package = 'autonomics')
object <- read_maxquant_proteingroups(file)
fdt(object) %<>% extract(, 1:2)
fdt(object)
object %<>% add_assay_means(SummarizedExperiment::assayNames(.))
fdt(object)
```

---

add_facetvars *Add facetvars*

Description

Add facetvars

Usage

```
add_facetvars(
  object,
  fit = fits(object)[1],
  coefs = autonomics::coefs(object, fit = fit)
)
```

Arguments

object	SummarizedExperiment
fit	string
coefs	string vector

Value

SummarizedExperiment

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file, fit = 'limma')
object %<>% add_adjusted_pvalues()
fdt(object)
fdt(add_facetvars(object))
```

`add_opentargets_by_uniprot` *Add opentargets annotations*

Description

Add opentargets annotations

Usage

```
add_opentargets_by_uniprot(
  object,
  cols = c("genesymbol", "genename", "function"),
  verbose = TRUE
)
```

Arguments

`object`	SummarizedExperiment
`cols`	character vector
`verbose`	TRUE or FALSE

Value

SummarizedExperiment

Examples

```
file <- system.file('extdata/billing19.proteingroups.txt', package = 'autonomics')
object <- read_maxquant_proteingroups(file)
object %<>% add_opentargets_by_uniprot()
```

add_psp *Add psp*

Description

Add PhosphoSitePlus literature counts

Usage

```
add_psp(
  object,
  pspfile = file.path(R_user_dir("autonomics", "cache"), "phosphositeplus",
    "Phosphorylation_site_dataset.gz")
)
```

Arguments

object	SummarizedExperiment
pspfile	phosphositeplus file

Details

Go to www.phosphosite.org
Register and Login.
Download Phosphorylation_site_dataset.gz'.
Save into: file.path(R_user_dir('autonomics','cache'),'phosphositeplus')

Value

SummarizedExperiment

Examples

```
fosfile <- system.file('extdata/billing19.phosphosites.txt',  package = 'autonomics')
profile <- system.file('extdata/billing19.proteingroups.txt', package = 'autonomics')
object <- read_maxquant_phosphosites(fosfile = fosfile, profile = profile)
fdt(object)
object %<>% add_psp()
fdt(object)
```

add_smiles *Add smiles*

Description

Add smiles

Usage

```
add_smiles(object)
```

Arguments

object	character/factor vector with pubchem ids

Value

character/factor vector

References

https://pubchemdocs.ncbi.nlm.nih.gov/pug-rest-tutorial

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file)
# add_smiles(object[1:10, ]) # seems down
```

altenrich *Alternative Enrichment Analysis*

Description

Alternative Enrichment Analysis

Usage

```
altenrich(
  object,
  pathwaydt,
  genevar = "gene",
  genesep = "[ ,;]",
  coef = autonomics::coefs(object)[1],
  fit = fits(object)[1],
  significancevar = "p",
```

```
  significance = 0.05,
  effectsize = 0,
  n = 3,
  genes = FALSE,
  verbose = TRUE
)
```

Arguments

object	SummarizedExperiment
pathwaydt	data.table, e.g. read_msigdt
genevar	gene fvar
genesep	string or NULL
coef	string in coefs(object)
fit	'limma', 'lm', 'lme', 'lmer', 'wilcoxon'
significancevar	'p' or 'fdr'
significance	significance cutoff
effectsize	effectsize cutoff
n	no of detected genes required (for geneset to be examined)
genes	whether to record genes
verbose	whether to msg

Details

This is an alternative enrichent analysis implementation. It is more modular: uses four times .enrichment(VERBOSE)? as backend. But also four times slower than enrichment, so not recommended. It is retaind for testing purposes.

This alternative enrichment implementation

See Also

[enrichment()]

---

analysis *Get/set analysis*

Description

Get/set analysis

Usage

```
analysis(object)

## S4 method for signature 'SummarizedExperiment'
analysis(object)

analysis(object) <- value

## S4 replacement method for signature 'SummarizedExperiment,list'
analysis(object) <- value
```

Arguments

object	SummarizedExperiment
value	list

Value

analysis details (get) or updated object (set)

Examples

```
file <- system.file('extdata/billing19.proteingroups.txt', package = 'autonomics')
object <- read_maxquant_proteingroups(file)
analysis(object)
```

---

analyze *Analyze*

Description

Analyze

Usage

```
analyze(
  object,
  pca = TRUE,
  pls = TRUE,
  fit = "limma",
  formula = ~subgroup,
  drop = varlevels_dont_clash(object, all.vars(formula)),
  coding = "code_control",
  contrasts = NULL,
  coefs = contrast_coefs(object, formula = formula, drop = drop, coding = coding),
  block = NULL,
  weightvar = if ("weights" %in% assayNames(object)) "weights" else NULL,
```

```
  plot = pca & !is.null(fit),
  label = "feature_id",
  palette = NULL,
  verbose = TRUE
)
```

Arguments

object	SummarizedExperiment
pca	TRUE / FALSE: perform pca ?
pls	TRUE / FALSE: perform pls ?
fit	linmod engine: 'limma', 'lm', 'lme(r)', 'lmer', 'wilcoxon'
formula	model formula
drop	TRUE / FALSE : drop varname in designmat ?
coding	string: codingfunname • contr.treatment: intercept = y0, coefi = yi - y0 • contr.treatment.explicit: intercept = y0, coefi = yi - y0 • code_control: intercept = ymean, coefi = yi - y0 • contr.diff: intercept = y0, coefi = yi - y(i-1) • code_diff: intercept = ymean, coefi = yi - y(i-1) • code_diff_forward: intercept = ymean, coefi = yi - y(i+) • code_deviation: intercept = ymean, coefi = yi - ymean (drop last) • code_deviation_first: intercept = ymean, coefi = yi - ymean (drop first) • code_helmert: intercept = ymean, coefi = yi - mean(y0:(yi-1)) • code_helmert_forward: intercept = ymean, coefi = yi - mean(y(i+1):yp)
contrasts	model coefficient contrasts of interest: string vector or NULL
coefs	model coefficients of interest: string vector or NULL
block	model blockvar
weightvar	NULL or name of weight matrix in assays(object)
plot	TRUE / FALSE
label	fvar
palette	NULL or colorvector
verbose	TRUE / FALSE: message?

Value

SummarizedExperiment

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file)
object %<>% analyze()
```

annotate_compounddiscoverer *Read compound discoverer output*

Description

Read compound discoverer output

Usage

```
annotate_compounddiscoverer(
  x,
  dir = getwd(),
 files = list.files(path = dir, pattern = ".*masslist.*\\.xslx$", ignore.case = TRUE,
    full.names = TRUE),
  verbose = TRUE
)
```

Arguments

x	SummarizedExperiment (read_compounddiscoverer)
dir	compound discoverer output directory
files	compound discoverer masslist files
verbose	TRUE or FALSE : message ?

Value

SummarizedExperiment

annotate_maxquant *Annotate maxquant*

Description

Annotate maxquant data.table

Usage

```
annotate_maxquant(
  dt,
  uniprothdrs,
  contaminanthdrs,
  maxquanthdrs,
  restapi = FALSE,
  verbose = TRUE
)
```

Arguments

dt	data.table : output of read_maxquant_(proteingroups|phosphosites)
uniprothdrs	data.table : output of read_uniprotdt
contaminanthdrs	data.table : output of read_uniprotdt
maxquanthdrs	data.table : output of read_uniprotdt
restapi	logical(1) : use uniprot restapi to complete missing annotations ?
verbose	logical(1) : message ?

Details

Uncollapse, annotate, curate, recollapse, name

Value

data.table

Examples

```
# Fukuda 2020: contaminants + maxquanthdrs
#-----------------------------------------
        file <- system.file('extdata/fukuda20.proteingroups.txt', package = 'autonomics')
            dt <- .read_maxquant_proteingroups(file)
            dt[, 1:2]
     uniprothdrs <- NULL
 contaminanthdrs <- read_contaminantdt()
    maxquanthdrs <- parse_maxquant_hdrs(dt$`Fasta headers`); dt$`Fasta headers` <- NULL
          dt %<>% annotate_maxquant(uniprothdrs, contaminanthdrs, maxquanthdrs)
          dt[                 , 1:9]
          dt[    reverse== '+', 1:9]
          dt[contaminant== '+', 1:9]

# Billing 2019: uniprothdrs + contaminants + maxquanthdrs
#--------------------------------------------------------
profile <- system.file('extdata/billing19.proteingroups.txt', package = 'autonomics')
fosfile <- system.file('extdata/billing19.phosphosites.txt',  package = 'autonomics')
 upfile <- system.file('extdata/uniprot_hsa_20140515.fasta',  package = 'autonomics')
prodt <- .read_maxquant_proteingroups(profile);         prodt[, 1:2]
fosdt <- .read_maxquant_phosphosites(fosfile, profile); fosdt[, 1:3]
    uniprothdrs <- read_uniprotdt(upfile)
contaminanthdrs <- read_contaminantdt()
   maxquanthdrs <- parse_maxquant_hdrs(prodt$`Fasta headers`)
annotate_maxquant(prodt, uniprothdrs, contaminanthdrs, maxquanthdrs)[, 1:8]
annotate_maxquant(fosdt, uniprothdrs, contaminanthdrs, maxquanthdrs)[, 1:8]
```

annotate_uniprot_rest *Annotate uniprot/ensp*

Description

Annotate uniprot/ensp

Usage

```
annotate_uniprot_rest(x, columns = UNIPROTCOLS, verbose = TRUE)
```

Arguments

x	character vector
columns	character vector
verbose	TRUE or FALSE

Value

data.table(dbid, uniprot, reviewed, protein, gene, canonical, isoform, fragment, existence, organism, full)

Examples

```
# works, but sometimes fails during check
annotate_uniprot_rest( x = c('P00761', 'Q32MB2') )
annotate_uniprot_rest( x = c('ENSBTAP00000006074', 'ENSP00000377550') )
```

assert_is_valid_sumexp *Assert that x is a valid SummarizedExperiment*

Description

Assert that x is a valid SummarizedExperiment

Usage

```
assert_is_valid_sumexp(x, .xname = get_name_in_parent(x))
```

Arguments

x	SummarizedExperiment
.xname	see get_name_in_parent

Value

TRUE or FALSE

Examples

```
# VALID
    file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
    x <- read_metabolon(file)
    assert_is_valid_sumexp(x)
# NOT VALID
    rownames(SummarizedExperiment::colData(x)) <- NULL
    # assert_is_valid_sumexp(x)
```

AUTONOMICS_DATASETS *Data used in examples/vignette/tests/longtests*

Description

Data used in examples/vignette/tests/longtests

Usage

```
AUTONOMICS_DATASETS
```

Format

An object of class `character` of length 19.

Examples

```
AUTONOMICS_DATASETS
```

---

awblinmod *General Linear Modeling (across-within-between interface)*

Description

General Linear Modeling (across-within-between interface)

Usage

```
awblinmod(
  object,
  engine,
  modelvars,
  across = TRUE,
  within = if (length(modelvars) == 1) FALSE else TRUE,
  between = if (length(modelvars) == 1) FALSE else TRUE,
  coding = c("code_control", "code_diff"),
  drop = TRUE,
  verbose = TRUE,
  ...
)

awblinmod_limma(object, ...)

awblinmod_lm(object, ...)

awblinmod_lme(object, ...)

awblinmod_lmer(object, ...)
```

Arguments

object	SummarizedExperiment
engine	'limma', 'lm', 'lme', or 'lmer'
modelvars	svars
across	TRUE/FALSE: fit across model (additive) ?
within	TRUE/FALSE: fit within model (nested) ?
between	TRUE/FALSE: fit between model (interaction) ?
coding	character: codingfunname
drop	TRUE or FALSE
verbose	TRUE or FALSE
...	passed to linmod

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file)
svars(object)
awblinmod_limma(object, modelvars = c('Diabetes', 'Time'), block = 'Subject')
awblinmod_lme(  object, modelvars = c('Diabetes', 'Time'), block = 'Subject')
awblinmod_lmer( object, modelvars = c('Diabetes', 'Time'), block = 'Subject')
awblinmod_lm(   object, modelvars = c('Diabetes', 'Time'))
awblinmod(object, engine = 'limma', modelvars = 'Time')
awblinmod(object, engine = 'limma', modelvars = c('Diabetes', 'Time'))
```

biplot *Biplot*

Description

Biplot

Usage

```
biplot(
  object,
  method = biplot_methods(object)[1],
  by = biplot_by(object, method)[1],
  dims = biplot_dims(object, method, by)[1:2],
  color = if (method %in% DIMREDSUPER) by else "subgroup",
  labelcolors = FALSE,
  shape = NULL,
  size = NULL,
  alpha = NULL,
  group = NULL,
  linetype = NULL,
  label = NULL,
  feature_label = "feature_id",
  fixed = list(shape = 15, size = 3),
  nx = 0,
  ny = 0,
  colorpalette = make_svar_palette(object, color),
  alphapalette = make_alpha_palette(object, alpha),
  title = paste0(method, "~", by),
  theme = ggplot2::theme(plot.title = element_text(hjust = 0.5), panel.grid =
    element_blank())
)
```

Arguments

object	SummarizedExperiment
method	'pca', 'pls', 'lda', 'spls', 'opls', 'sma'
by	svar
dims	numeric vector: e.g. 1:2
color	svar
labelcolors	TRUE or FALSE
shape	svar
size	svar
alpha	svar

group	svar
linetype	svar
label	svar
feature_label	fvar
fixed	fixed plot aesthetics
nx	number of x features to plot
ny	number of y features to plot
colorpalette	character vector
alphapalette	character vector
title	string
theme	ggplot2::theme output

Value

ggplot object

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file)
object %<>% pca(ndim = 4)
object %<>% pls(ndim = 4)
biplot(object)
biplot(object, nx = 1)
biplot(object, dims = 3:4, nx = 1)
biplot(object, method = 'pls')
biplot(object, method = 'pls', dims = 3:4)
biplot(object, method = 'pls', dims = 3:4, group = 'Subject')
```

---

biplot_corrections *Biplot batch corrections*

Description

Biplot batch corrections

Usage

```
biplot_corrections(
  object,
  method = "pca",
  by = "sample_id",
  color = "subgroup",
  covariates = character(0),
  varcols = ceiling(sqrt(1 + length(covariates))),
  plot = TRUE
)
```

Arguments

object	SummarizedExperiment
method	'pca', 'pls', 'lda', or 'sma'
by	svar
color	variable mapped to color (symbol)
covariates	covariates to be batch-corrected
varcols	number of covariate columns
plot	TRUE/FALSE: plot?

Value

grid object

See Also

biplot_covariates

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file, pca = TRUE, plot = FALSE)
biplot_corrections(object, color = 'subgroup', covariates = c('Sex', 'Diabetes', 'Subject', 'Time'))
```

---

biplot_covariates *Biplot covariates*

Description

Biplot covariates

Usage

```
biplot_covariates(
  object,
  method = "pca",
  by = "sample_id",
  block = NULL,
  covariates = "subgroup",
  ndim = 6,
  dimcols = 1,
  varcols = length(covariates),
  plot = TRUE
)
```

Arguments

object	SummarizedExperiment
method	'pca', 'pls', 'lda', or 'sma'
by	svar
block	svar
covariates	covariates: mapped to color or batch-corrected
ndim	number of dimensions to plot
dimcols	number of dimension columns
varcols	number of covariate columns
plot	TRUE or FALSE: whether to plot

Value

ggplot object

See Also

biplot_corrections

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file, pca = TRUE)
biplot_covariates(object, covariates = 'subgroup', ndim = 12, dimcols = 3)
biplot_covariates(object, covariates = c('Sex', 'Diabetes', 'Subject', 'Time'))
biplot_covariates(object, covariates = c('Sex', 'Diabetes', 'Subject', 'Time'), ndim = 2)
biplot_covariates(object, covariates = c('subgroup'), dimcols = 3)
```

---

block2limma *block2limma*

Description

block2limma

Usage

```
block2limma(block, ...)

## S3 method for class '`NULL`'
block2limma(block, ...)

## S3 method for class 'character'
block2limma(block, ...)
```

```
## S3 method for class 'list'
block2limma(block, ...)

## S3 method for class 'formula'
block2limma(block, ...)
```

Arguments

block	block: charactervector or formula
...	required for s3 dispatch

Examples

```
block2limma( block = c(     'subject',          'batch'     ))
block2limma( block = c(`1`= 'subject',     `1`= 'batch'     ))
block2limma( block = list(   subject = ~1,       batch = ~1 ))
block2limma( block =      ~(1|subject)         + (1|batch)   )
```

`block2lm` *block2lm*

Description

block2lm

Usage

```
block2lm(block, formula, ...)

## S3 method for class '`NULL`'
block2lm(block, formula, ...)

## S3 method for class 'character'
block2lm(block, formula, ...)

## S3 method for class 'list'
block2lm(block, formula, ...)

## S3 method for class 'formula'
block2lm(block, formula, ...)
```

Arguments

block	block: charactervector or formula
formula	model formula
...	required for s3 dispatch

Examples

```
block2lm( block = NULL,                              formula = ~ subgroup)
block2lm( block = c('subject', 'batch'),             formula = ~ subgroup)
block2lm( block = c(`1`= 'subject', `1`= 'batch'),   formula = ~ subgroup)
block2lm( block = ~(1|subject)  +  (1|batch),        formula = ~ subgroup)
block2lm( block = list(subject = ~1,   batch = ~1 ), formula = ~ subgroup)
```

---

block2lme *block2lme*

Description

block2lme

Usage

```
block2lme(block, ...)

## S3 method for class 'list'
block2lme(block, ...)

## S3 method for class 'formula'
block2lme(block, ...)

## S3 method for class 'character'
block2lme(block, ...)
```

Arguments

block	block: charactervector or formula
...	required for s3 dispatch

Examples

```
block2lme( block = c(     'subject',      'batch'))
block2lme( block = c(`1`= 'subject', `1`= 'batch'))
block2lme( block =   ~(1|subject) + (1|batch)     )
block2lme( block = list(subject = ~1, batch = ~1 ))
```

block2lmer *block2lmer*

Description

block2lmer

Usage

```
block2lmer(block, formula, ...)

## S3 method for class 'formula'
block2lmer(block, formula = NULL, ...)

## S3 method for class 'character'
block2lmer(block, formula = NULL, ...)

## S3 method for class 'list'
block2lmer(block, formula = NULL, ...)
```

Arguments

block	block: charactervector or formula
formula	model formula
...	required for s3 dispatch

Examples

```
block2lmer( block = c('subject', 'batch'))
block2lmer( block = c('subject', 'batch'), formula = ~ subgroup)

block2lmer( block = c(`1`= 'subject', `1`= 'batch'))
block2lmer( block = c(`1`= 'subject', `1`= 'batch'),   formula = ~ subgroup)

block2lmer( block = ~(1|subject)  +  (1|batch))
block2lmer( block = ~(1|subject)  +  (1|batch),        formula = ~ subgroup)

block2lmer( block = list(subject = ~1,   batch = ~1 ))
block2lmer( block = list(subject = ~1,   batch = ~1 ), formula = ~ subgroup)
```

block_has_two_levels *Block has two levels*

Description

Block has two levels

Usage

```
block_has_two_levels(block, data)
```

Arguments

block	string
data	data.table

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file)
data <- sumexp_to_longdt(object, svars = 'Subject')
data %<>% extract(feature_id == feature_id[1])
block_has_two_levels(block = 'Subject', data)
```

center *Center samples*

Description

Center samples

Usage

```
center(
  object,
  selector = rep(TRUE, nrow(object)) == TRUE,
  fun = "median",
  verbose = TRUE
)

center_mean(object, ...)

center_median(object, ...)
```

Arguments

object	SummarizedExperiment
selector	logical vector (length = nrow(object))
fun	aggregation function (string)
verbose	TRUE/FALSE
...	parameters handed through to center()

Value

SummarizedExperiment

Examples

```
require(matrixStats)
file <- system.file('extdata/fukuda20.proteingroups.txt', package = 'autonomics')
object <- read_maxquant_proteingroups(file)
fdt(object)$housekeeping <- FALSE
fdt(object)$housekeeping[order(rowVars(values(object)))[1:5]] <- TRUE
values(object)[, object$subgroup=='Adult'] %<>% magrittr::add(5)
plot_sample_densities(object)
plot_sample_densities(center(object))
plot_sample_densities(center(object, housekeeping))
```

---

code *Contrast Code Factor*

Description

Contrast Code Factor for General Linear Model

Usage

```
code(object, ...)

## S3 method for class 'factor'
code(object, coding, verbose = TRUE, ...)

## S3 method for class 'character'
code(object, coding, verbose = TRUE, ...)

## S3 method for class 'logical'
code(object, coding, verbose = TRUE, ...)

## S3 method for class 'numeric'
code(object, coding, verbose = TRUE, ...)
```

```
## S3 method for class 'data.table'
code(object, coding, vars = names(object), verbose = TRUE, ...)

contr.treatment.explicit(n)

code_control(n)

contr.diff(n)

code_diff(n)

code_diff_forward(n)

code_deviation(n)

code_deviation_first(n)

code_helmert(n)

code_helmert_forward(n)
```

Arguments

object	factor vector
...	used for s3 dispatch
coding	string: codingfunname • contr.treatment: intercept = y0, coefi = yi - y0 • contr.treatment.explicit: intercept = y0, coefi = yi - y0 • code_control: intercept = ymean, coefi = yi - y0 • contr.diff: intercept = y0, coefi = yi - y(i-1) • code_diff: intercept = ymean, coefi = yi - y(i-1) • code_diff_forward: intercept = ymean, coefi = yi - y(i+) • code_deviation: intercept = ymean, coefi = yi - ymean (drop last) • code_deviation_first: intercept = ymean, coefi = yi - ymean (drop first) • code_helmert: intercept = ymean, coefi = yi - mean(y0:(yi-1)) • code_helmert_forward: intercept = ymean, coefi = yi - mean(y(i+1):yp)
verbose	TRUE or FALSE
vars	svars
n	character vector

Details

A General Linear Model contains:
* An Intercept Coefficient: expressing some form of sample average
* For each numeric variable: a slope coefficient
* For each k-leveled factor: (k-1) Contrast Coefficients.

The interpretation of (intercept and contrast) coefficients depends on the contrast coding function used. Several contrast coding functions are available in 'stats' and 'codingMatrices' But their (function and coefficient) namings are a bit confusing and unsystematic. Instead, the functions below offer an intuitive interface (to the otherwise powerful stats/codingMatrices packages). The names of these functions reflect the contrast coding used (treatment, backward, sum, or helmert contrasts). They also reflect the intercept interpretation (either first factor's first level or grand mean). They all produce intuitive coefficient names (e.g. 't1-t0' rather than just 't1'). They all have unit scaling (a coefficient of 1 means a backward of 1).

Value

(explicitly coded) factor vector

Examples

```
# Coding functions
    x <- factor(paste0('t', 0:3))
    xlevels <- levels(x)
    contr.treatment(         xlevels)
    contr.treatment.explicit(xlevels)
    contr.diff(              xlevels)
    code_control(            xlevels)
    code_diff(               xlevels)
    code_diff_forward(       xlevels)
    code_deviation(          xlevels)
    code_deviation_first(    xlevels)
    code_helmert(            xlevels)
    code_helmert_forward(    xlevels)

# Code
    x %<>% code('contr.treatment')
    x %<>% code('contr.treatment.explicit')
    x %<>% code('contr.diff')
    x %<>% code('code_control')
    x %<>% code('code_diff')
    x %<>% code('code_diff_forward')
    x %<>% code('code_deviation')
    x %<>% code('code_deviation_first')
    x %<>% code('code_helmert')
    x %<>% code('code_helmert_forward')

# Model
    file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
    object <- read_metabolon(file)
    object %<>% linmod_limma(coding = 'contr.treatment') # default
    object %<>% linmod_limma(coding = 'contr.treatment.explicit')
    object %<>% linmod_limma(coding = 'contr.diff')
    object %<>% linmod_limma(coding = 'code_control')
    object %<>% linmod_limma(coding = 'code_diff')
    object %<>% linmod_limma(coding = 'code_diff_forward')
    object %<>% linmod_limma(coding = 'code_deviation')
    object %<>% linmod_limma(coding = 'code_deviation_first')
```

```
object %<>% linmod_limma(coding = 'code_helmert')
object %<>% linmod_limma(coding = 'code_helmert_forward')
```

`collapsed_entrezg_to_symbol`
Collapsed entrezg to genesymbol

Description

Collapsed entrezg to genesymbol

Usage

```
collapsed_entrezg_to_symbol(x, sep, orgdb)
```

Arguments

x	charactervector
sep	string
orgdb	OrgDb

Value

character vector

Examples

```
if (installed('org.Hs.eg.db')){
    x <- c('7448/3818/727', '5034/9601/64374')
    orgdb <- org.Hs.eg.db::org.Hs.eg.db
    collapsed_entrezg_to_symbol(x, sep = '/', orgdb = orgdb)
}
```

`COMPOUNDDISCOVERER_PATTERNS`
compound discoverer quantity patterns

Description

compound discoverer quantity patterns

Usage

```
COMPOUNDDISCOVERER_PATTERNS
```

Format

An object of class character of length 2.

Examples

```
COMPOUNDDISCOVERER_PATTERNS
```

`contrastdt` *Get contrastdt*

Description

Get contrastdt

Usage

```
contrastdt(
  object,
  fitcoef,
  annocols = fvars(object) %>% extract(!stri_detect_fixed(., "~")),
  assays = assayNames(object)[0],
  verbose = TRUE
)
```

Arguments

object	SummarizedExperiment
fitcoef	e.g. 't2-t1~limma'
annocols	annotation fvars
assays	subset of assayNames(object)
verbose	TRUE or FALSE

Value

data.table

Examples

```
object <- survobj()
object %<>% linmod_limma(~sex/age)
contrastdt(object,        fitcoef = 'm:senior-junior~limma')
contrastdt(object[, 1:2], fitcoef = 'm:senior-junior~limma', assays = SummarizedExperiment::assayNames(object)[1]
contrastdt(object[, 1:2], fitcoef = 'm:senior-junior~limma', assays = SummarizedExperiment::assayNames(object)[1:
```

contrast_coefs *Get model coefs*

Description

Get model coefs

Usage

```
contrast_coefs(
  object,
  formula = default_formula(object),
  drop = varlevels_dont_clash(object, all.vars(formula)),
  coding = "code_control",
 design = create_design(object, formula = formula, drop = drop, coding = coding, verbose
    = FALSE)
)

model_coefs(
  object,
  formula = default_formula(object),
  drop = varlevels_dont_clash(object, all.vars(formula)),
  coding = "code_control",
 design = create_design(object, formula = formula, drop = drop, coding = coding, verbose
    = FALSE)
)
```

Arguments

object	SummarizedExperiment
formula	formula
drop	TRUE or FALSE
coding	string: codingfunname
design	design matrix

Value

SummarizedExperiment

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file)
object %<>% linmod_limma()
   model_coefs(object)
contrast_coefs(object)
```

contrast_subgroup_cols *Row/Col contrasts*

Description

Row/Col contrasts

Usage

```
contrast_subgroup_cols(object, subgroupvar)

contrast_subgroup_rows(object, subgroupvar)
```

Arguments

object	SummarizedExperiment
subgroupvar	subgroup svar

Value

matrix

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file)
object$subgroup <- paste0(object$Diabetes, '.', object$Time)
subgroup_matrix(object, subgroupvar = 'subgroup')
contrast_subgroup_cols(object, subgroupvar = 'subgroup')
contrast_subgroup_rows(object, subgroupvar = 'subgroup')
```

counts *Get/Set counts*

Description

Get / Set counts matrix

Usage

```
counts(object)

## S4 method for signature 'SummarizedExperiment'
counts(object)

counts(object) <- value

## S4 replacement method for signature 'SummarizedExperiment,matrix'
counts(object) <- value

## S4 replacement method for signature 'SummarizedExperiment,numeric'
counts(object) <- value

## S4 replacement method for signature 'SummarizedExperiment,NULL'
counts(object) <- value
```

Arguments

object	SummarizedExperiment
value	count matrix (features x samples)

Value

count matrix (get) or updated object (set)

Examples

```
file <- system.file('extdata/billing19.rnacounts.txt', package = 'autonomics')
object <- read_rnaseq_counts(file)
counts(object)[1:3, 1:3]
counts(object) <- values(object)
```

---

counts2cpm *Convert between counts and cpm/tpm*

Description

Convert between counts and cpm/tpm

Usage

```
counts2cpm(x, libsize = scaledlibsizes(x))

cpm2counts(x, libsize)
```

Arguments

x	count/cpm matrix
libsize	(scaled) libsize vector

Value

cpm/tpm/count matrix

Examples

```
file <- system.file('extdata/billing19.rnacounts.txt', package = 'autonomics')
object <- read_rnaseq_counts(file)
libsize <- scaledlibsizes(counts(object))
tpm <- counts2tpm(counts(object), genesize = 1)
cpm <- counts2cpm(counts(object), libsize)
counts  <- cpm2counts(cpm, libsize)
sum(counts(object) - counts)
```

---

counts2tpm *counts to tpm*

Description

counts to tpm

Usage

```
counts2tpm(x, genesize)
```

Arguments

x	count matrix
genesize	genesize vector (kilobase)

Value

tpm matrix

Examples

```
file <- system.file('extdata/billing19.rnacounts.txt', package = 'autonomics')
object <- read_rnaseq_counts(file)
counts(object)[1:3, 1:3]
counts2tpm(counts(object), genesize = 1)[1:3, 1:3]
```

count_in *Count/Collapse in/outside intersection*

Description

Count/Collapse in/outside intersection

Usage

```
count_in(x, ...)

## S3 method for class 'character'
count_in(x, y, ...)

## S3 method for class 'factor'
count_in(x, y, ...)

## S3 method for class 'list'
count_in(x, y, ...)

collapse_in(x, ...)

## S3 method for class 'character'
collapse_in(x, y, sep, ...)

## S3 method for class 'factor'
collapse_in(x, y, sep, ...)

## S3 method for class 'list'
collapse_in(x, y, sep, ...)

count_out(x, ...)

## S3 method for class 'character'
count_out(x, y, ...)

## S3 method for class 'factor'
count_out(x, y, ...)

## S3 method for class 'list'
count_out(x, y, ...)
```

Arguments

x	character OR list
...	used for S3 dispatch

y	character
sep	string

Value

number OR numeric

Examples

```
# Sets
   contrast1 <- c('a', 'b', 'c', 'd')
     pathway <- c('c', 'd', 'e', 'f')
   contrast2 <- c('e', 'f', 'g', 'h')

# Count outside
   count_out(contrast1, pathway)
   count_out(list(contrast1 = contrast1, contrast2 = contrast2), pathway)

# Count inside
   count_in(contrast1, pathway)
   count_in(list(contrast1 = contrast1, contrast2 = contrast2), pathway)

# Collapse inside
   collapse_in(contrast1, pathway, sep = ' ')
   collapse_in(list(contrast1 = contrast1, contrast2 = contrast2), pathway, sep = ' ')
```

---

cpm *Get/Set cpm*

Description

Get / Set cpm matrix

Usage

```
cpm(object)

## S4 method for signature 'SummarizedExperiment'
cpm(object)

cpm(object) <- value

## S4 replacement method for signature 'SummarizedExperiment,matrix'
cpm(object) <- value

## S4 replacement method for signature 'SummarizedExperiment,numeric'
cpm(object) <- value
```

Arguments

object	SummarizedExperiment
value	cpm matrix (features x samples)

Value

cpm matrix (get) or updated object (set)

Examples

```
file <- system.file('extdata/billing19.rnacounts.txt', package = 'autonomics')
object <- read_rnaseq_counts(file)
cpm(object)[1:3, 1:3]
cpm(object) <- values(object)
```

---

create_design *Create design matrix*

Description

Create design matrix for statistical analysis

Usage

```
create_design(object, ...)

## S3 method for class 'SummarizedExperiment'
create_design(
  object,
  formula = default_formula(object),
  drop = varlevels_dont_clash(object, all.vars(formula)),
  coding = "code_control",
  verbose = TRUE,
  ...
)

## S3 method for class 'data.table'
create_design(
  object,
  formula = default_formula(object),
  drop = varlevels_dont_clash(object, all.vars(formula)),
  coding = "code_control",
  verbose = TRUE,
  ...
)
```

Arguments

object	SummarizedExperiment or data.frame
...	required to s3ify
formula	formula with svars
drop	whether to drop predictor names
coding	string: codingfunname • contr.treatment: intercept = y0, coefi = yi - y0 • contr.treatment.explicit: intercept = y0, coefi = yi - y0 • code_control: intercept = ymean, coefi = yi - y0 • contr.diff: intercept = y0, coefi = yi - y(i-1) • code_diff: intercept = ymean, coefi = yi - y(i-1) • code_diff_forward: intercept = ymean, coefi = yi - y(i+) • code_deviation: intercept = ymean, coefi = yi - ymean (drop last) • code_deviation_first: intercept = ymean, coefi = yi - ymean (drop first) • code_helmert: intercept = ymean, coefi = yi - mean(y0:(yi-1)) • code_helmert_forward: intercept = ymean, coefi = yi - mean(y(i+1):yp)
verbose	whether to message

Value

design matrix

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file)
unique(create_design(object))
unique(create_design(object, ~ Time))
unique(create_design(object, ~ Time, coding = 'code_control'))
unique(create_design(object, ~ Time, coding = 'code_diff'))
unique(create_design(object, ~ Time + Diabetes))
unique(create_design(object, ~ Time / Diabetes))
unique(create_design(object, ~ Time * Diabetes))
```

DATADIR *Download autonomics example data*

Description

Download autonomics example data

Usage

```
DATADIR

download_data(
  filename = NULL,
  localdir = file.path(DATADIR, split_extract_fixed(filename, ".", 1)),
  verbose = TRUE,
  force = FALSE
)
```

Arguments

filename	file name

'atkin.somascan.adat'	Halama, 2018	effects of hypoglycemia
'atkin.metabolon.xlsx'		
'billing16.bam.zip'	Billing, 2016	stemcell comparison
'billing16.rnacounts.txt'		
'billing16.somascan.adat'		
'billing16.proteingroups.txt'		
'billing19.rnacounts.txt'	Billing, 2016	stemcell differentiation
'billing19.proteingroups.txt'		
'billing19.phosphosites.txt'		
'ddglucose.proteingroups.txt'	Omics Module	glycolysis inhibitor
'fukuda20.proteingroups.txt'	Fukuda, 2020	zebrafish development
'halama18.metabolon.xlsx'	Halama, 2018	glutaminase inhibitor

localdir	local dir to save file to
verbose	TRUE / FALSE
force	TRUE / FALSE

Format

An object of class character of length 1.

Value

local file path

Examples

```
# Show available datasets
    download_data()

# atkin 2018 - hypoglycemia - pubmed 30525282
    # download_data('atkin.somascan.adat')            # somascan  intensities
    # download_data('atkin.metabolon.xlsx')           # metabolon intensities

# billing16 - stemcell characterization - pubmed 26857143
```

```
    # download_data('billing16.proteingroups.txt')      # proteingroup ratios
    # download_data('billing16.somascan.adat')          # somascan  intensities
    # download_data('billing16.rnacounts.txt')          # rnaseq    counts
    # download_data('billing16.bam.zip')                # rnaseq    alignments

# billing19 - stemcell differentiation - pubmed 31332097
    # download_data('billing19.proteingroups.txt')    # proteingroup ratios
    # download_data('billing19.phosphosites.txt')     # phosphosite  ratios
    # download_data('billing19.rnacounts.txt')        # rnaseq       counts

# fukuda20 - heart regeneration - pubmed PXD016235
    # download_data('fukuda20.proteingroups.txt')       # proteingroup LFQ

# halama18 - glutaminase inhibition - pubmed 30525282
    # download_data('halama18.metabolon.xlsx')          # metabolon intensities
```

`defaultmsigfile` *Default msigdb file*

Description

Default msigdb file

Usage

```
defaultmsigfile()
```

Value

file

`default_formula` *Create default formula*

Description

Create default formula

Usage

```
default_formula(object)
```

Arguments

`object`	SummarizedExperiment

Value

formula

Examples

```
# Abundances
    file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
    object <- read_metabolon(file)
    default_formula(object)
    file <- download_data('billing16.proteingroups.txt')
    object <- read_maxquant_proteingroups(file)
    default_formula(object)
```

---

default_geom *Default geom*

Description

Default geom

Usage

```
default_geom(object, x, block = NULL)
```

Arguments

object	SummarizedExperiment
x	svar
block	svar or NULL

Value

character vector

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file)
object$Age <- runif(min = 20, max = 60, n = ncol(object))
svars(object)
default_geom(object, x = 'Age')
default_geom(object, x = c('Age', 'Diabetes'))
default_geom(object, x = c('Age', 'Diabetes'), block = 'Subject')
```

default_sfile *Default sfile*

Description

Default sfile

Usage

```
default_sfile(file)
```

Arguments

file	data file

Value

sample file

Examples

```
file <- system.file('extdata/billing19.proteingroups.txt', package = 'autonomics')
default_sfile(file)
```

demultiplex *Demultiplex snames*

Description

Demultiplex maxquant samplenames

Usage

```
demultiplex(x, verbose = FALSE)
```

Arguments

x	character vector
verbose	TRUE or FALSE

Details

WT(L).KD(H).R1{H/L} -> KD_WT.R1 WT(1).KD(2).R1{1} -> WT.R1 WT.R1 -> WT.R1

Value

character

Examples

```
# uniplexed / intensity / ratio
   demultiplex(c('KD.R1','OE.R1'))
   demultiplex(c('WT(L).KD(M).OE(H).R1{M}',  'WT(L).KD(M).OE(H).R1{H}'))
   demultiplex(c('WT(L).KD(M).OE(H).R1{M/L}','WT(L).KD(M).OE(H).R1{H/L}'))
# run / replicate
   demultiplex(c('WT(L).OE(H).R1{L}',    'WT(L).OE(H).R1{H}'))     # run
   demultiplex(c('WT.R1(L).OE.R1(H){L}', 'WT.R1(L).OE.R1(H){H}'))  # repl
# label / index
   demultiplex(c('WT(L).OE(H).R1{L}',    'WT(L).OE(H).R1{H}'))     # label
   demultiplex(c('WT(1).OE(2).R1{1}',    'WT(1).OE(2).R1{2}'))     # index
# with unused channels
   demultiplex('WT(1).KD(2).OE(3).R1{6}')
```

---

dequantify *Dequantify maxquant snames*

Description

Drop quantity ('Reporter intensity').
Encode {channel} as suffix.

Usage

```
dequantify(x, quantity = guess_maxquant_quantity(x), verbose = FALSE)
```

Arguments

x	character
quantity	'ratio', 'normalizedratio', 'LFQ intensity', 'intensity', 'labeledintensity' 'reporterintensity', 'correctedreporterintensit
verbose	TRUE or FALSE

Details

```
           Ratio H/L WT(L).KD(H).R1  ->  WT(L).KD(H).R1{H/L}              LFQ intensity WT.R1  ->  WT.R1
Reporter intensity 0 WT(126).KD(127).R1  ->  WT(1).KD(2).R1{1}
```

Value

character

Examples

```
dequantify(c('Ratio H/L WT(L).KD(M).OE(H).R1',            # Ratios
             'Ratio M/L WT(L).KD(M).OE(H).R1'))
dequantify(c('Ratio H/L normalized WT(L).KD(M).OE(H).R1',  # Norm. Ratios
             'Ratio M/L normalized WT(L).KD(M).OE(H).R1'))
dequantify(c('LFQ intensity WT.R1',                        # LFQ intensity
             'LFQ intensity KD.R1'))
dequantify(c('Reporter intensity 1 WT(126).KD(127).R1',    # Rep.intensities
             'Reporter intensity 2 WT(126).KD(127).R1'))
```

---

dequantify_compounddiscoverer

dequantify_compounddiscoverer compound discoverer snames

Description

Drop quantity.

Usage

```
dequantify_compounddiscoverer(
  x,
  quantity = guess_compounddiscoverer_quantity(x),
  verbose = FALSE
)
```

Arguments

x	character
quantity	'area', 'normalizedarea'
verbose	TRUE or FALSE

Details

```
Norm. Area: 20230908_F143_HILICNEG.raw (F11)  ->  20230908_F143_HILICNEG.raw (F11)
Area: 20230908_F143_HILICNEG.raw (F11)  ->  20230908_F143_HILICNEG.raw (F11)
```

Value

character

Examples

```
dequantify_compounddiscoverer("Norm. Area: 20230908_F143_HILICNEG.raw (F11)") # Norm. Area
dequantify_compounddiscoverer("Area: 20230908_F143_HILICNEG.raw (F11)")       # Area
```

DIMREDUN *Dimension Reduction Methods*

Description

Dimension Reduction Methods

Usage

```
DIMREDUN

DIMREDSUPER

DIMREDENGINES
```

Format

An object of class `character` of length 2.

An object of class `character` of length 4.

An object of class `character` of length 6.

Details

- `DIMREDUN: c('pca', 'sma')`
- `DIMREDSUPER: c('lda', 'pls', 'opls', 'spls')`
- `DIMREDENGINES: c('pca', 'sma', 'lda', 'pls', 'opls', 'spls')`

download_gtf *Download GTF file*

Description

Download GTF file with feature annotations

Usage

```
download_gtf(
  organism,
  release = 100,
  gtffile = sprintf("%s/gtf/%s", R_user_dir("autonomics", "cache"),
    basename(make_gtf_url(organism, release) %>% substr(1, nchar(.) - 3)))
)
```

Arguments

organism	'Homo sapiens', 'Mus musculus' or 'Rattus norvegicus'
release	GTF release (number)
gtffile	string: path to local GTF file

Value

gtffile path

Examples

```
organism <- 'Homo sapiens'
# download_gtf(organism)
```

---

download_mcclain21 *Download mcclain21 data*

Description

Download mcclain21 data

Usage

```
download_mcclain21(
  counts_or_samples = "counts",
  localdir = file.path(DATADIR, "mcclain21"),
  force = FALSE
)
```

Arguments

counts_or_samples	'counts' or 'samples'
localdir	dirname
force	TRUE or FALSE

Details

Mc clain 2021: COVID19 transcriptomics:

Examples

```
download_mcclain21('counts')
download_mcclain21('samples')
```

dt2mat *'data.table' to 'matrix'*

Description

Convert between 'data.table' and 'matrix'

Usage

```
dt2mat(x)

mat2dt(x, idvar)
```

Arguments

x	data.table / matrix
idvar	idvar string

Value

matrix / data.table

Examples

```
x <- data.table::data.table(
        gene    = c('ENSG001', 'ENSG002', 'ENSG003'),
        sampleA = c(1787, 10, 432),
        sampleB = c(1143,  3, 268))
dt2mat(x)
mat2dt(dt2mat(x), 'gene')
```

enrichment *Enrichment analysis*

Description

Are selected genes enriched in pathway?

Usage

```
enrichment(
  object,
  pathwaydt,
  fit = fits(object)[1],
  coef = coefs(object, fit = fit)[1],
  var = abstractvar(object, fit = fit, coef = coef),
```

```
  levels = fdt(object)[[var]] %>% base::levels() %>% extract(-1),
  genevar = "gene",
  genesep = "[ ,;]",
  n = 3,
  verbose = TRUE,
  genes = FALSE
)
```

Arguments

object	SummarizedExperiment
pathwaydt	pathway data.table
fit	string
coef	string
var	selection fvar
levels	selection levels
genevar	gene fvar
genesep	gene separator (string)
n	number
verbose	whether to msg
genes	whether to report genes

Details

Four enrichment analyses per geneset using the Fisher Exact Test (see four pvalues). Results are returned in a data.table

in	: genes in pathway
in.det	: detected genes in pathway
in.sel	: up/downregulated genes in pathway
in.up(.genes)	: upregulated genes in pathway
in.down(.genes)	: downregulated genes in pathway
out	: genes outside pathway
det	: detected genes (in + out)
sel	: up/downregulated genes (in + out)
up	: upregulated genes (in + out)
down	: downregulated genes (in + out)
p.coef.upDET	: prob to randomly select this many (or more) upregulated genes (among detected genes)
p.coef.downDET	: prob to randomly select this many (or more) downregulated genes (among detected genes)
p.coef.selDET	: prob to randomly select this many (or more) up OR downregulated genes (among detected genes)
p.coef.selGEN	: prob to randomly select this many (or more) up OR downregulated genes (among genome genes)
p.detGEN	: prob to randomly select this many (or more) detected genes (among genome genes)

Examples

```
# Read
    pathwaydt <- read_msigdt(collections = 'C5:GO:BP')
    file <- system.file('extdata/atkin.somascan.adat', package = 'autonomics')
    object <- read_somascan(file, fit = 'limma', coefs = 't1-t0')
    fvars(object) %<>% gsub('EntrezGeneSymbol', 'gene', .)
    object %<>% abstract_fit()
    varlevels <- c('flat', 'down', 'up')
  enrichdt1 <- enrichment(object, pathwaydt, var = 't1-t0~limma')              # 2:n factor
  enrichdt2 <- enrichment(object, pathwaydt, var = 't1-t0~limma', levels = varlevels)  # 1:n factor
   enrichdt3 <-  altenrich(object, pathwaydt)               # alternative implementation
    cols <- intersect(names(enrichdt1), names(enrichdt3))
   all(enrichdt1[, cols, with = FALSE]  ==  enrichdt3[, cols, with = FALSE])   # identical
```

---

ens2org *taxon/ens to organism*

Description

taxon/ens to organism

Usage

```
ens2org(x)

taxon2org(x)
```

Arguments

x	character vector

Value

character vector

Examples

```
taxon2org( x = c('9606', '9913') )
  ens2org( x = c('ENSP00000377550', 'ENSBTAP00000038329') )
```

entrezg_to_symbol *Entrezg to genesymbol*

Description

Entrezg to genesymbol

Usage

```
entrezg_to_symbol(x, orgdb)
```

Arguments

x	charactervector
orgdb	OrgDb

Value

character vector

Examples

```
if (installed('org.Hs.eg.db')){
    orgdb <- org.Hs.eg.db::org.Hs.eg.db
    entrezg_to_symbol(x = c('7448', '3818', '727'), orgdb)
}
```

extract_rectangle *Extract rectangle from omics file, data.table, or matrix*

Description

Extract rectangle from omics file, data.table, or matrix

Usage

```
extract_rectangle(x, ...)

## S3 method for class 'character'
extract_rectangle(
  x,
  rows = seq_len(nrows(x, sheet = sheet)),
  cols = seq_len(ncols(x, sheet = sheet)),
  verbose = FALSE,
  transpose = FALSE,
  drop = FALSE,
```

```
  sheet = 1,
  ...
)

## S3 method for class 'data.table'
extract_rectangle(
  x,
  rows = seq_len(nrow(x)),
  cols = seq_len(ncol(x)),
  transpose = FALSE,
  drop = FALSE,
  ...
)

## S3 method for class 'matrix'
extract_rectangle(
  x,
  rows = seq_len(nrow(x)),
  cols = seq_len(ncol(x)),
  transpose = FALSE,
  drop = FALSE,
  ...
)
```

Arguments

x	omics datafile or datatable
...	allow for S3 method dispatch
rows	numeric vector
cols	numeric vector
verbose	logical
transpose	logical
drop	logical
sheet	numeric or string

Value

matrix

Examples

```
# FROM FILE: extract_rectangle.character
#=======================================
   x <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
   extract_rectangle(x, rows = 11:30, cols = 15:81, sheet = 2)[ 1:3, 1:3 ]  # exprs
   extract_rectangle(x, rows = 11:30, cols = 2,     sheet = 2)[ 1:3,     ]  # fids
   extract_rectangle(x, rows = 4,     cols = 15:81, sheet = 2)[    , 1:3 ]  # sids
   extract_rectangle(x, rows = 10:30, cols = 1:14,  sheet = 2)[ 1:3, 1:3 ]  # fdt
```

```
  extract_rectangle(x, rows = 1:10,  cols = 14:81, sheet = 2, transpose = TRUE)[1:3, 1:3] # sdt

# FROM MATRIX: extract_rectangle.matrix
#=====================================
   x <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
   x %<>% extract_rectangle(sheet = 2)
   extract_rectangle(x, rows = 11:30,  cols = 15:81, sheet = 2)[ 1:3, 1:3 ]  # exprs
   extract_rectangle(x, rows = 11:30,  cols = 2,     sheet = 2)[ 1:3,     ]  # fids
   extract_rectangle(x, rows = 4,      cols = 15:81, sheet = 2)[    , 1:3 ]  # sids
   extract_rectangle(x, rows = 10:30,  cols = 1:14,  sheet = 2)[ 1:3, 1:3 ]  # fdt
  extract_rectangle(x, rows = 1:10,  cols = 14:81, sheet = 2, transpose = TRUE)[1:3, 1:3] # sdt
```

`factorize` *Factorize/Bin*

Description

Factorize/Bin

Usage

```
factorize(x, ...)

## S3 method for class 'logical'
factorize(x, ...)

## S3 method for class 'character'
factorize(x, ...)

## S3 method for class 'factor'
factorize(x, ...)

## S3 method for class 'numeric'
factorize(
  x,
  method = "quantile",
  k = switch(method, quantile = 3, mclust = NULL, mixtools = 3),
  numericlevels = TRUE,
  ...
)

## S3 method for class 'matrix'
factorize(
  x,
  method = "quantile",
  k = switch(method, quantile = 3, mclust = NULL, mixtools = 3),
  numericlevels = TRUE,
  ...
```

```
)

## S3 method for class 'SummarizedExperiment'
factorize(
  x,
  assay = assayNames(x)[1],
  method = "quantile",
  k = switch(method, quantile = 3, mclust = NULL, mixtools = 3),
  numericlevels = TRUE,
  drop = TRUE,
  verbose = TRUE,
  ...
)

factorize_assay(
  x,
  assay = assayNames(x)[1],
  method = "quantile",
  k = switch(method, quantile = 3, mclust = NULL, mixtools = 3),
  verbose = TRUE,
  ...
)

bin(x, ...)

## S3 method for class 'logical'
bin(x, ...)

## S3 method for class 'character'
bin(x, ...)

## S3 method for class 'factor'
bin(x, ...)

## S3 method for class 'numeric'
bin(
  x,
  method = "quantile",
  k = switch(method, quantile = 3, mclust = NULL, mixtools = 3),
  numericlevels = TRUE,
  ...
)

## S3 method for class 'matrix'
bin(
  x,
  method = "quantile",
  k = switch(method, quantile = 3, mclust = NULL, mixtools = 3),
```

```
  numericlevels = TRUE,
  ...
)

## S3 method for class 'SummarizedExperiment'
bin(
  x,
  assay = assayNames(x)[1],
  method = "quantile",
  k = switch(method, quantile = 3, mclust = NULL, mixtools = 3),
  verbose = TRUE,
  ...
)

bin_assay(
  x,
  assay = assayNames(x)[1],
  method = "quantile",
  k = switch(method, quantile = 3, mclust = NULL, mixtools = 3),
  verbose = TRUE
)
```

Arguments

x	vector, matrix or SummarizedExperiment
...	(S3 dispatch)
method	'quantile', 'mclust', or 'mixtools'
k	number of bins/levels
numericlevels	TRUE (levels: 1,2, ...) or FALSE (levels: 2.1+, 3.2+, ...)
assay	string
drop	whether to drop assayname in levels ('1','2') or not ('exprs1', 'exprs2') when factorizing
verbose	TRUE or FALSE

Details

'bin' transform into numeric bins : c(1,2,3,4,5,6) -> c(1, 1, 2, 2, 3, 3) 'factorize' transform into factor levels: c(1,2,3,4,5,6) -> c('1','1','2','2','3','3')

Value

vector, matrix or SummarizedExperiment

Examples

```
# data
    file <- system.file('extdata/fukuda20.proteingroups.txt', package = 'autonomics')
```

```
    object <- read_maxquant_proteingroups(file, impute = TRUE)
    fdt(object)

# logical
    fdt(object)$imputed
    fdt(object)$imputed %>% factorize()
    fdt(object)$imputed %>% bin()

# character
    as.character(fdt(object)$imputed)
    as.character(fdt(object)$imputed) %>% factorize()
    as.character(fdt(object)$imputed) %>% bin()

# factor
    factor(fdt(object)$imputed)
    factor(fdt(object)$imputed) %>% factorize()
    factor(fdt(object)$imputed) %>% bin()

# numeric
    fdt(object)$pepcounts
    fdt(object)$pepcounts %>% factorize()
    fdt(object)$pepcounts %>% bin()

# Matrix/SummarizedExperiment
    values(object)
    values(object) %>% factorize()
           object  %>% factorize()
    values(object) %>% bin()
           object  %>% bin()
```

`fcluster` *Cluster features*

Description

Cluster features

Usage

```
fcluster(
  object,
  distmat = NULL,
  method = "cmeans",
  k = 2:10,
  verbose = TRUE,
  plot = TRUE,
  label = if ("gene" %in% fvars(object)) "gene" else "feature_id",
  alpha = 1,
  nrow = if (length(method) > 1) length(method) else NULL,
  ncol = NULL
)
```

Arguments

object	SummarizedExperiment
distmat	distance matrix
method	'cmeans'
k	number of clusters
verbose	TRUE or FALSE
plot	TRUE or FALSE
label	fvar
alpha	fraction
nrow	number
ncol	number

Value

SummarizedExperiment

SummarizedExperiment

Examples

```
object <- twofactor_sumexp()
distmat <- fdist(object)
fcluster(object)                                          # membership-based colors
fcluster(object, distmat)                                 # silhouette-based colors
fcluster(object, distmat, method = c('cmeans', 'hclust', 'pamk'))  # more methods
```

---

fdata *Get/Set sample/feature data*

Description

Get/Set sample/feature data

Usage

```
fdata(object)

sdata(object)

fdt(object)

sdt(object)

## S4 method for signature 'SummarizedExperiment'
fdata(object)
```

```
## S4 method for signature 'SummarizedExperiment'
sdata(object)

## S4 method for signature 'SummarizedExperiment'
fdt(object)

## S4 method for signature 'SummarizedExperiment'
sdt(object)

fdata(object) <- value

sdata(object) <- value

fdt(object) <- value

sdt(object) <- value

## S4 replacement method for signature 'SummarizedExperiment,data.frame'
fdata(object) <- value

## S4 replacement method for signature 'SummarizedExperiment,data.frame'
sdata(object) <- value

## S4 replacement method for signature 'SummarizedExperiment,DataFrame'
sdata(object) <- value

## S4 replacement method for signature 'SummarizedExperiment,data.table'
fdt(object) <- value

## S4 replacement method for signature 'SummarizedExperiment,data.table'
sdt(object) <- value
```

Arguments

object	SummarizedExperiment
value	data.frame/data.table

Value

data.frame/data.table (get) or updated object (set)

Examples

```
# Read data
    file <- system.file('extdata/billing19.proteingroups.txt', package = 'autonomics')
    object <- read_maxquant_proteingroups(file)
# sdt/fdt
    sdt(object)[1:3, ]
```

```
    fdt(object)[1:3, ]
    sdt(object) %<>% cbind(b=1)
    fdt(object) %<>% cbind(b=1)
    sdt(object)
    fdt(object)
# sdata/fdata
    sdata(object)[1:3, ]
    fdata(object)[1:3, ]
    sdata(object) %<>% cbind(a=1)
    fdata(object) %<>% cbind(a=1)
    sdata(object)[1:3, ]
    fdata(object)[1:3, ]
```

`fdr2p` *fdr to p*

Description

fdr to p

Usage

```
fdr2p(fdr)
```

Arguments

`fdr`	fdr values

Examples

```
# Read/Fit
   file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
   object <- read_metabolon(file)
   object %<>% linmod_limma()
   pcol <- pvar(fdt(object), fit = 'limma', coef = 't3-t0')
   object %<>% extract(order(fdt(.)[[pcol]]), )
   object %<>% extract(1:10, )
   fdt(object) %<>% extract(, 1)
   object %<>% linmod_limma()
# fdr2p
   fdt(object)[[pcol]]
   fdt(object)[[pcol]] %>% p.adjust(method = 'fdr')
   fdt(object)[[pcol]] %>% p.adjust(method = 'fdr') %>% fdr2p()
```

`filter_exprs_replicated_in_some_subgroup` *Filter features with replicated expression in some subgroup*

Description

Filter features with replicated expression in some subgroup

Usage

```
filter_exprs_replicated_in_some_subgroup(
  object,
  subgroupvar = "subgroup",
  assay = assayNames(object)[1],
  comparator = if (contains_ratios(object)) "!=" else ">",
  lod = 0,
  nsample = 2,
  nsubgroup = 1,
  verbose = TRUE
)
```

Arguments

`object`	SummarizedExperiment
`subgroupvar`	subgroup svar
`assay`	string
`comparator`	'>' or '!='
`lod`	number: limit of detection
`nsample`	number
`nsubgroup`	number
`verbose`	TRUE or FALSE

Value

Filtered SummarizedExperiment

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file)
object %<>% filter_exprs_replicated_in_some_subgroup()
filter_exprs_replicated_in_some_subgroup(object, character(0))
filter_exprs_replicated_in_some_subgroup(object, NULL)
```

filter_features *Filter features on condition*

Description

Filter features on condition

Usage

```
filter_features(object, condition, verbose = TRUE)
```

Arguments

object	SummarizedExperiment
condition	filter condition
verbose	logical

Value

filtered eSet

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file)
filter_features(object, SUPER_PATHWAY == 'Lipid')
```

filter_medoid *Filter medoid sample*

Description

Filter medoid sample

Usage

```
filter_medoid(object, by = NULL, verbose = FALSE)
```

Arguments

object	SummarizedExperiment
by	svar
verbose	whether to message

Value

SummarizedExperiment

Examples

```
file <- system.file('extdata/billing19.rnacounts.txt', package = 'autonomics')
object <- read_rnaseq_counts(file, plot = FALSE)
object %<>% filter_medoid(by = 'subgroup', verbose=TRUE)
```

---

filter_samples *Filter samples on condition*

Description

Filter samples on condition

Usage

```
filter_samples(object, condition, verbose = TRUE, record = TRUE, drop = TRUE)
```

Arguments

object	SummarizedExperiment
condition	filter condition
verbose	TRUE/FALSE
record	TRUE/FALSE
drop	TRUE/FALSE : whether to drop levels

Value

filtered SummarizedExperiment

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file)
filter_samples(object, subgroup != 't0', verbose = TRUE)
```

`fits` *Get fit models*

Description

Get fit models

Usage

```
fits(object, ...)

## S3 method for class 'data.table'
fits(object, ...)

## S3 method for class 'SummarizedExperiment'
fits(object, ...)

## S3 method for class '`NULL`'
fits(object, ...)

coefs(object, ...)

## S3 method for class 'factor'
coefs(object, intercept = FALSE, ...)

## S3 method for class 'data.table'
coefs(object, fit = fits(object), intercept = FALSE, ...)

## S3 method for class 'SummarizedExperiment'
coefs(object, fit = fits(object), intercept = FALSE, ...)

## S3 method for class '`NULL`'
coefs(object, ...)

fitcoefs(object)
```

Arguments

`object`	SummarizedExperiment or data.table
`...`	S3 dispatch
`intercept`	TRUE or FALSE : whether to include the intercept
`fit`	'limma', 'lm', 'lme', 'lmer', 'wilcoxon'

Value

character vector

Examples

```
object <- survobj()
object %<>% linmod_limma(~sex+age)
fits(object)
coefs(object)                                    # sumexp
coefs(fdt(object))                               # data.table
coefs(code(factor(object$age), 'code_control'))  # factor
fitcoefs(object)
```

`fix_xlgenes` *Fix excel genes*

Description

Fix excel genes

Usage

```
fix_xlgenes(x)
```

Arguments

x	character

Value

character

Examples

```
x <- c('FAM46B', '15-Sep', '2-Mar', 'MARCHF6')
x
fix_xlgenes(x)
```

`flevels` *Get fvar levels*

Description

Get fvar levels

Usage

```
flevels(object, fvar)
```

Arguments

object	SummarizedExperiment
fvar	feature variable

Value

fvar values

Examples

```
file <- system.file('extdata/billing19.proteingroups.txt', package = 'autonomics')
object <- read_maxquant_proteingroups(file)
head(flevels(object, 'feature_id'))
```

---

fnames *Get/Set fnames*

Description

Get/Set feature names

Usage

```
fnames(object)

## S4 method for signature 'SummarizedExperiment'
fnames(object)

fnames(object) <- value

## S4 replacement method for signature 'SummarizedExperiment,character'
fnames(object) <- value
```

Arguments

object	SummarizedExperiment, eSet, or EList
value	character vector with feature names

Value

feature name vector (get) or updated object (set)

Examples

```
file <- system.file('extdata/billing19.proteingroups.txt', package = 'autonomics')
object <- read_maxquant_proteingroups(file)
fnames(object) %<>% paste0('protein_', .)
object
```

formula2str *formula to string*

Description

formula to string

Usage

```
formula2str(formula)
```

Arguments

formula	formula

Value

string

Examples

```
formula2str(~0+subgroup)
```

ftype *Feature type*

Description

Feature type

Usage

```
ftype(
  object,
  formula = default_formula(object),
  drop = varlevels_dont_clash(object, all.vars(formula)),
  fit = fits(object)[1],
  coding = "code_control"
)
```

Arguments

object	SummarizedExperiment
formula	model formula
drop	TRUE or FALSE
fit	'limma', 'lm', 'lme', 'wilcoxon'
coding	coding function

Value

SummarizedExperiment

Examples

```
file <- download_data('atkin.metabolon.xlsx')
object <- read_metabolon(file)
object %<>% linmod_limma(block = 'Subject', coefs = model_coefs(object)) # model_coefs !
object %<>% ftype()          # model_coefs not contrast_coefs !
fdt(object)                  # because intercept is required to recreate predictions
```

---

fvalues *Get fvalues*

Description

Get fvar values

Usage

```
fvalues(object, fvar)
```

Arguments

object	SummarizedExperiment
fvar	feature variable

Value

fvar values

Examples

```
file <- system.file('extdata/billing19.proteingroups.txt', package = 'autonomics')
object <- read_maxquant_proteingroups(file)
head(fvalues(object, 'feature_id'))
fvalues(object, NULL)
```

fvars *Get/Set fvars*

Description

Get/Set feature variables

Usage

```
fvars(object)

## S4 method for signature 'SummarizedExperiment'
fvars(object)

fvars(object) <- value

## S4 replacement method for signature 'SummarizedExperiment,character'
fvars(object) <- value
```

Arguments

object	SummarizedExperiment
value	character vector with feature variables

Value

feature variables vector (get) or updated object (set)

Examples

```
file <- system.file('extdata/billing19.proteingroups.txt', package = 'autonomics')
object <- read_maxquant_proteingroups(file)
fvars(object)[1] %<>% paste0('1')
fvars(object)[1]
```

genome_to_orgdb *Get corresponding orgdb*

Description

Get corresponding orgdb

Usage

```
genome_to_orgdb(genome)
```

Arguments

genome	'hg38', 'hg19', 'mm10', or 'mm9'

Value

OrgDb

Examples

```
if (requireNamespace('org.Hs.eg.db', quiet = TRUE)){
    class(genome_to_orgdb('hg38'))
}
```

---

group_by_level *group by level*

Description

group by level

Usage

```
group_by_level(x, ...)

## S3 method for class 'character'
group_by_level(x, ...)

## S3 method for class 'factor'
group_by_level(x, ...)

## S3 method for class 'data.table'
group_by_level(x, var, idvar, ...)
```

Arguments

x	named logical/character/factor
...	S3 dispatch
var	string
idvar	string

Value

unnamed character

Examples

```
t1 <- c( KLF5 = 'up',  F11 = 'up', RIG = 'flat',   ABT1 = 'down')
dt <- data.table( gene = c( 'KL5', 'F11', 'RIG',  'ABT1' ),
                  t1 = c( 'up',  'up',  'flat', 'down' ) )
group_by_level(t1)               #  character
group_by_level(factor(t1))       #     factor
group_by_level(dt, 't1', 'gene')  # data.table
```

`guess_compounddiscoverer_quantity` *Guess compound discoverer quantity from snames*

Description

Guess compound discoverer quantity from snames

Usage

```
guess_compounddiscoverer_quantity(x)
```

Arguments

x	character vector

Value

string: value from names(COMPOUNDDISCOVERER_PATTERNS)

Examples

```
## Not run:
# file
    file <- system.file('extdata/fukuda20.proteingroups.txt', package = 'autonomics')
    guess_compounddiscoverer_quantity(file)

## End(Not run)

# character vector
    x <- "Area: 20230908_F143_HILICNEG.raw (F11)"
    guess_compounddiscoverer_quantity(x)

    x <- "Norm. Area: 20230908_F143_HILICNEG.raw (F11)"
    guess_compounddiscoverer_quantity(x)
```

guess_fitsep *guess fitsep*

Description

guess fitsep

Usage

```
guess_fitsep(object, ...)

## S3 method for class 'data.table'
guess_fitsep(object, ...)

## S3 method for class 'SummarizedExperiment'
guess_fitsep(object, ...)
```

Arguments

object	data.table or SummarizedExperiment
...	S3 dispatch

Value

string

Examples

```
file <- system.file('extdata/fukuda20.proteingroups.txt', package = 'autonomics')
object <- read_maxquant_proteingroups(file)
object %<>% linmod_limma()
guess_fitsep(object)
```

guess_maxquant_quantity *Guess maxquant quantity from snames*

Description

Guess maxquant quantity from snames

Usage

```
guess_maxquant_quantity(x)
```

Arguments

x	character vector

Value

string: value from names(MAXQUANT_PATTERNS)

Examples

```
# file
    file <- system.file('extdata/fukuda20.proteingroups.txt', package = 'autonomics')
    guess_maxquant_quantity(file)

# character vector
    x <- "Ratio M/L normalized STD(L)_E00(M)_E01(H)_R1"
    guess_maxquant_quantity(x)

    x <- "Ratio M/L STD(L)_E00(M)_E01(H)_R1"
    guess_maxquant_quantity(x)

    x <- "LFQ intensity E00.R1"
    guess_maxquant_quantity(x)

    x <- "Reporter intensity corrected 0 STD(0)E00(1)E01(2)_R1"
    guess_maxquant_quantity(x)

    x <- "Reporter intensity 0 STD(0)E00(1)E01(2)_R1"
    guess_maxquant_quantity(x)

    x <- "Intensity H STD(L)_E00(M)_E01(H)_R1"
    guess_maxquant_quantity(x)
```

---

guess_sep *Guess separator*

Description

Guess separator

Usage

```
guess_sep(x, ...)

## S3 method for class 'numeric'
guess_sep(x, ...)

## S3 method for class 'character'
guess_sep(x, separators = c(".", "_"), verbose = FALSE, ...)
```

```
## S3 method for class 'factor'
guess_sep(x, ...)

## S3 method for class 'SummarizedExperiment'
guess_sep(x, var = "sample_id", separators = c(".", "_"), verbose = FALSE, ...)
```

Arguments

x	character vector or SummarizedExperiment
...	used for proper S3 method dispatch
separators	character vector: possible separators to look for
verbose	TRUE or FALSE
var	svar or fvar

Value

separator (string) or NULL (if no separator could be identified)

Examples

```
# charactervector
   guess_sep(c('PERM_NON.R1[H/L]', 'PERM_NON.R2[H/L]'))
   guess_sep(c('WT_untreated_1', 'WT_untreated_2'))
   guess_sep(c('group1', 'group2.R1'))
# SummarizedExperiment
   file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
   object <- read_metabolon(file)
   guess_sep(object)
```

---

has_multiple_levels *Variable has multiple levels?*

Description

Variable has multiple levels?

Usage

```
has_multiple_levels(x, ...)

## S3 method for class 'character'
has_multiple_levels(x, .xname = get_name_in_parent(x), ...)

## S3 method for class 'factor'
has_multiple_levels(x, .xname = get_name_in_parent(x), ...)
```

```
## S3 method for class 'numeric'
has_multiple_levels(x, .xname = get_name_in_parent(x), ...)

## S3 method for class 'data.table'
has_multiple_levels(
  x,
  y,
  .xname = get_name_in_parent(x),
  .yname = get_name_in_parent(y),
  ...
)

## S3 method for class 'SummarizedExperiment'
has_multiple_levels(
  x,
  y,
  .xname = get_name_in_parent(x),
  .yname = get_name_in_parent(y),
  ...
)
```

Arguments

x	vector, data.table or SummarizedExperiment
...	required for s3 dispatch
.xname	string
y	string
.yname	string

Value

TRUE or false

Examples

```
# numeric
    a <- numeric();                          has_multiple_levels(a)
    a <- c(1, 1);                            has_multiple_levels(a)
    a <- c(1, 2);                            has_multiple_levels(a)
# character
    a <- character();                        has_multiple_levels(a)
    a <- c('A', 'A');                        has_multiple_levels(a)
    a <- c('A', 'B');                        has_multiple_levels(a)
# factor
    a <- factor();                           has_multiple_levels(a)
    a <- factor(c('A', 'A'));                has_multiple_levels(a)
    a <- factor(c('A', 'B'));                has_multiple_levels(a)
# data.table
    dt <- data.table(a = factor());          has_multiple_levels(dt, 'b')
```

```
    dt <- data.table(a = factor());               has_multiple_levels(dt, 'a')
    dt <- data.table(a = factor());               has_multiple_levels(dt, 'a')
    dt <- data.table(a = factor(c('A', 'A')));    has_multiple_levels(dt, 'a')
    dt <- data.table(a = factor(c('A', 'B')));    has_multiple_levels(dt, 'a')
# sumexp
    object <- matrix(1:9, nrow = 3)
    rownames(object) <- sprintf('f%d', 1:3)
    colnames(object) <- sprintf('s%d', 1:3)
    object <- list(exprs = object)
    object %<>% SummarizedExperiment::SummarizedExperiment()
    object$subgroup <- c('A', 'A', 'A');          has_multiple_levels(object, 'group')
    object$subgroup <- c('A', 'A', 'A');         has_multiple_levels(object, 'subgroup')
    object$subgroup <- c('A', 'B', 'A');         has_multiple_levels(object, 'subgroup')
```

`hdlproteins` *hdl proteomewatch proteins*

Description

hdl proteomewatch proteins

Usage

```
hdlproteins()
```

Value

string vector: HDLProteomeWatch protein entries

Examples

```
hdlproteins()
```

`impute` *Impute*

Description

Impute NA values

Usage

```
impute(object, ...)

## S3 method for class 'numeric'
impute(object, shift = 2.5, width = 0.3, verbose = TRUE, plot = FALSE, ...)

## S3 method for class 'matrix'
impute(
  object,
  shift = 2.5,
  width = 0.3,
  verbose = TRUE,
  plot = FALSE,
  n = min(9, ncol(object)),
  palette = make_colors(colnames(object)),
  ...
)

## S3 method for class 'SummarizedExperiment'
impute(
  object,
  assay = assayNames(object)[1],
  by = "subgroup",
  shift = 2.5,
  width = 0.3,
  frac = 0.5,
  verbose = TRUE,
  plot = FALSE,
  palette = make_colors(colnames(object)),
  n = min(9, ncol(object)),
  ...
)
```

Arguments

object	numeric vector, SumExp
...	required for s3 dispatch
shift	number: sd units
width	number: sd units
verbose	TRUE or FALSE
plot	TRUE or FALSE
n	number of samples to plot
palette	color vector
assay	string
by	svar

frac	fraction: fraction of available samples should be greater than this value for a subgroup to be called available

Details

Imputes NA values from N(mean - 2.5 sd, 0.3 sd)

Value

numeric vector, matrix or SumExp

Examples

```
# Simple Design
   file <- system.file('extdata/fukuda20.proteingroups.txt', package = 'autonomics')
   object <- read_maxquant_proteingroups(file)
   impute(values(object)[, 1], plot = TRUE)[1:3]              # vector
   impute(values(object),      plot = TRUE)[1:3, 1:3]         # matrix
   impute(object, plot = TRUE)                                # sumexp
# Complex Design
   subgroups <- sprintf('%s_STD', c('E00','E01','E02','E05','E15','E30','M00'))
   file <- system.file('extdata/billing19.proteingroups.txt', package = 'autonomics')
   object <- read_maxquant_proteingroups(file, subgroups = subgroups)
   impute(values(object)[1:3, 1   ])     # vector
   impute(values(object)[1:3, 1:5 ])     # matrix
   impute( object )                      # sumexp
```

---

installed *Is package installed?*

Description

Is package installed?

Usage

```
installed(pkg)
```

Arguments

pkg	package (string)

Value

TRUE or FALSE

invert_subgroups *Invert subgroups*

Description

Invert expressions , subgroups, and sample ids

Usage

```
invert_subgroups(
  object,
  subgroups = slevels(object, "subgroup"),
  sep = guess_sep(object, "subgroup")
)
```

Arguments

object	SummarizedExperiment
subgroups	character vector: subgroup levels to be inversed
sep	string: collapsed string separator

Value

character vector or SummarizedExperiment

Examples

```
file <- system.file('extdata/fukuda20.proteingroups.txt', package = 'autonomics')
object <- read_maxquant_proteingroups(file)
invert_subgroups(object)
```

is_character_matrix *Is character matrix*

Description

Is character matrix

Usage

```
is_character_matrix(x, .xname = get_name_in_parent(x))

assert_character_matrix(x, .xname = get_name_in_parent(x))
```

Arguments

x	matrix
.xname	string

Value

TRUE or false

Examples

```
object <- survobj()
is_character_matrix(SummarizedExperiment::assays(object)$exprs)
is_character_matrix(SummarizedExperiment::assays(object)$exprs2bins)
is_character_matrix(SummarizedExperiment::assays(object)$exprs2levels)
```

---

is_collapsed_subset *Is collapsed subset*

Description

Is collapsed subset

Usage

```
is_collapsed_subset(x, y, sep = ";")
```

Arguments

x	character vector
y	character vector
sep	string

Value

character vector

Examples

```
x <- c(              'H3BNX8;H3BRM5', 'G5E9Y3')
y <- c('P20674;H3BNX8;H3BV69;H3BRM5', 'G5E9Y3;Q8WWN8;B4DIT1')
is_collapsed_subset(x, y)
```

is_compounddiscoverer_output *Is compounddiscoverer output?*

Description

Is compounddiscoverer output?

Usage

```
is_compounddiscoverer_output(x, .xname = get_name_in_parent(x))
```

Arguments

x	file
.xname	name of x

Examples

```
file <- NULL;                                                    is_compounddiscoverer_output(file)
file <- 3;                                                      is_compounddiscoverer_output(file)
file <- 'blabla.tsv';                                              is_compounddiscoverer_output(file)
file <- download_data('dilution.report.tsv');                             is_compounddiscoverer_output(file)
file <- download_data('multiorganism.combined_protein.tsv');                   is_compounddiscoverer_output(file)
file <- system.file('extdata/fukuda20.proteingroups.txt', package = 'autonomics'); is_compounddiscoverer_output(
file <- system.file('extdata/billing19.phosphosites.txt', package = 'autonomics'); is_compounddiscoverer_output(
```

is_correlation_matrix *Assert correlation matrix*

Description

Assert correlation matrix

Usage

```
is_correlation_matrix(
  x,
  .xname = get_name_in_parent(x),
  severity = getOption("assertive.severity", "stop")
)

assert_correlation_matrix(x, .xname = get_name_in_parent(x))
```

Arguments

x	correlation matrix
.xname	string
severity	'warning' or 'stop'

Value

TRUE or false

Examples

```
x <- matrix(c(1,0.7, 0.3, 1), nrow = 2)
rownames(x) <- c('gene1', 'gene2')
colnames(x) <- c('gene1', 'gene2')
is_correlation_matrix(x)
is_correlation_matrix({x[1,1] <- -2; x})
```

---

is_diann_report *Is diann report ?*

Description

Is diann report ?

Usage

```
is_diann_report(x, .xname = get_name_in_parent(x))

assert_diann_report(x, .xname = get_name_in_parent(x))

assert_fragpipe_tsv(x, .xname = get_name_in_parent(x))

assert_maxquant_proteingroups(x, .xname = get_name_in_parent(x))

assert_maxquant_phosphosites(x, .xname = get_name_in_parent(x))

assert_compounddiscoverer_output(x, .xname = get_name_in_parent(x))
```

Arguments

x	file
.xname	name of x

Examples

```
file <- NULL;                                                    is_diann_report(file)
file <- 3;                                                       is_diann_report(file)
file <- 'blabla.tsv';                                            is_diann_report(file)
file <- system.file('extdata/fukuda20.proteingroups.txt', package = 'autonomics'); is_diann_report(file)
file <- system.file('extdata/billing19.phosphosites.txt', package = 'autonomics'); is_diann_report(file)
file <- download_data('multiorganism.combined_protein.tsv');          is_diann_report(file)
file <- download_data('dilution.report.tsv');                      is_diann_report(file)
```

---

is_fastadt *Is fastadt*

Description

Is fastadt

Usage

```
is_fastadt(x, .xname = get_name_in_parent(x))

assert_fastadt(x, .xname = get_name_in_parent(x))
```

Arguments

x	fasta data.table
.xname	string

Examples

```
fastafile <- system.file('extdata/uniprot_hsa_20140515.fasta', package = 'autonomics')
x <- read_uniprotdt(fastafile)
# is_fastadt(x)  # slow
```

---

is_file *Is a file?*

Description

Is a file (and not a dir)

Usage

```
is_file(file)
```

Arguments

file	filepath

Details

This function distinguishies between dir and file. Others dont: is.file, fs::file_exists, assertive::is_existing_file

Examples

```
dir  <- tempdir();  dir.create(dir, showWarnings = FALSE)
file <- tempfile(); invisible(file.create(file))
is_file(dir)
is_file(file)
```

---

is_fraction *Is fraction*

Description

Is fraction

Usage

```
is_fraction(x, .xname = get_name_in_parent(x))

assert_is_fraction(x, .xname = get_name_in_parent(x))
```

Arguments

x	number
.xname	string

Value

TRUE or false

Examples

```
is_fraction(0.1)          # YES
is_fraction(1)            # YES
is_fraction(1.2)          # NO - more than 1
is_fraction(c(0.1, 0.2))  # NO - vector
```

is_fragpipe_tsv *Is fragpipe file?*

Description

Is fragpipe file?

Usage

```
is_fragpipe_tsv(x, .xname = get_name_in_parent(x))
```

Arguments

x	file
.xname	name of x

Examples

```
file <- NULL;                                                    is_fragpipe_tsv(file)
file <- 3;                                                       is_fragpipe_tsv(file)
file <- 'blabla.tsv';                                            is_fragpipe_tsv(file)
file <- download_data('dilution.report.tsv');                       is_fragpipe_tsv(file)
file <- system.file('extdata/fukuda20.proteingroups.txt', package = 'autonomics'); is_fragpipe_tsv(file)
file <- system.file('extdata/billing19.phosphosites.txt', package = 'autonomics'); is_fragpipe_tsv(file)
file <- download_data('multiorganism.combined_protein.tsv');               is_fragpipe_tsv(file)
```

is_imputed *Get/set is_imputed*

Description

Get/Set is_imputed

Usage

```
is_imputed(object)

## S4 method for signature 'SummarizedExperiment'
is_imputed(object)

is_imputed(object) <- value

## S4 replacement method for signature 'SummarizedExperiment,matrix'
is_imputed(object) <- value

## S4 replacement method for signature 'SummarizedExperiment,NULL'
is_imputed(object) <- value
```

Arguments

object	SummarizedExperiment
value	matrix

Value

matrix (get) or updated object (set)

Examples

```
file <- system.file('extdata/billing19.proteingroups.txt', package = 'autonomics')
object <- read_maxquant_proteingroups(file, impute = TRUE)
sum(is_imputed(object))
```

---

is_maxquant_phosphosites

Is maxquant phosphosites file?

Description

Is maxquant phosphosites file?

Usage

```
is_maxquant_phosphosites(x, .xname = get_name_in_parent(x))
```

Arguments

x	file
.xname	name of x

Examples

```
file <- NULL;                                                  is_maxquant_phosphosites(file)
file <- 3;                                                   is_maxquant_phosphosites(file)
file <- 'blabla.tsv';                                           is_maxquant_phosphosites(file)
file <- download_data('dilution.report.tsv');                           is_maxquant_phosphosites(file)
file <- download_data('multiorganism.combined_protein.tsv');                is_maxquant_phosphosites(file)
file <- system.file('extdata/fukuda20.proteingroups.txt', package = 'autonomics'); is_maxquant_phosphosites(file
file <- system.file('extdata/billing19.phosphosites.txt', package = 'autonomics'); is_maxquant_phosphosites(file
```

is_maxquant_proteingroups *Is maxquant proteingroups file?*

Description

Is maxquant proteingroups file?

Usage

```
is_maxquant_proteingroups(x, .xname = get_name_in_parent(x))
```

Arguments

x	file
.xname	name of x

Examples

```
file <- NULL;                                                    is_maxquant_proteingroups(file)
file <- 3;                                                      is_maxquant_proteingroups(file)
file <- 'blabla.tsv';                                              is_maxquant_proteingroups(file)
file <- download_data('dilution.report.tsv');                             is_maxquant_proteingroups(file)
file <- download_data('multiorganism.combined_protein.tsv');                   is_maxquant_proteingroups(file)
file <- system.file('extdata/billing19.phosphosites.txt', package = 'autonomics'); is_maxquant_proteingroups(fil
file <- system.file('extdata/fukuda20.proteingroups.txt', package = 'autonomics'); is_maxquant_proteingroups(fil
```

is_non_numeric *Are all variables non-numeric ?*

Description

Are all variables non-numeric ?

Usage

```
is_non_numeric(x)

all_non_numeric(object, formula)
```

Arguments

x	vector
object	SummarizedExperiment
formula	formula

Value

TRUE or FALSE

Examples

```
all_non_numeric(survobj(), ~ age)
all_non_numeric(survobj(), ~ exprs2levels)
all_non_numeric(survobj(), ~ age/exprs2levels)
all_non_numeric(survobj(), ~ age/exprs)
```

---

is_positive_number *Is positive number*

Description

Is positive number

Usage

```
is_positive_number(x, .xname = get_name_in_parent(x))

assert_positive_number(x, .xname = get_name_in_parent(x))

is_weakly_positive_number(x, .xname = get_name_in_parent(x))

assert_weakly_positive_number(x, .xname = get_name_in_parent(x))
```

Arguments

x	number
.xname	name of x

Value

TRUE or false

Examples

```
is_positive_number( 3)
is_positive_number(-3)
is_positive_number( 0)
is_weakly_positive_number(0)
assert_positive_number(3)
```

`is_scalar_subset` *Is scalar subset*

Description

Is scalar subset

Usage

```
is_scalar_subset(
  x,
  y,
  .xname = get_name_in_parent(x),
  .yname = get_name_in_parent(y)
)

assert_scalar_subset(
  x,
  y,
  .xname = get_name_in_parent(x),
  .yname = get_name_in_parent(y)
)
```

Arguments

`x`	scalar
`y`	SummarizedExperiment
`.xname`	name of x
`.yname`	name of y

Examples

```
file <- system.file('extdata/fukuda20.proteingroups.txt', package = 'autonomics')
object <- read_maxquant_proteingroups(file)
is_scalar_subset('subgroup',     svars(object))
is_scalar_subset('subject',      svars(object))
assert_scalar_subset('subgroup', svars(object))
```

is_sig *Is significant?*

Description

Is significant?

Usage

```
is_sig(
  object,
  fit = fits(object)[1],
  contrast = coefs(object),
  quantity = "fdr"
)
```

Arguments

object	SummarizedExperiment
fit	subset of autonomics::TESTS
contrast	subset of colnames(metadata(object)[[fit]])
quantity	value in dimnames(metadata(object)[[fit]])[3]

Value

matrix: -1 (downregulated), +1 (upregulatd), 0 (not fdr significant)

Examples

```
file <- system.file('extdata/fukuda20.proteingroups.txt', package = 'autonomics')
object <- read_maxquant_proteingroups(file)
object %<>% linmod_lm()
object %<>% linmod_limma()
issig <- is_sig(object, fit = c('lm','limma'), contrast = 'Adult-X30dpt')
plot_contrast_venn(issig)
```

is_valid_formula *Is valid formula*

Description

Is valid formula

Usage

```
is_valid_formula(
  x,
  y,
  .xname = get_name_in_parent(x),
  .yname = get_name_in_parent(y)
)

assert_valid_formula(
  x,
  y,
  .xname = get_name_in_parent(x),
  .yname = get_name_in_parent(y)
)
```

Arguments

x	formula
y	SummarizedExperiment
.xname	string
.yname	string

Value

TRUE or false

Examples

```
object <- matrix(1:9, nrow = 3)
rownames(object) <- sprintf('f%d', 1:3)
colnames(object) <- sprintf('s%d', 1:3)
object <- list(exprs = object)
object %<>% SummarizedExperiment::SummarizedExperiment()
object$group    <- 'group0'
object$subgroup <- c('A', 'B', 'C')
svars(object)
    is_valid_formula( 'condition',   object)   # not formula
    is_valid_formula( ~condition,    object)   # not svar
    is_valid_formula( ~group,        object)   # not multilevel
    is_valid_formula( ~subgroup,     object)   # TRUE
    is_valid_formula( ~0+subgroup,   object)   # TRUE
    is_valid_formula( ~1,            object)   # TRUE
assert_valid_formula( ~subgroup,     object)
```

keep_estimable_features *Keep estimable features*

Description

Keep estimable features

Usage

```
keep_estimable_features(
  object,
  formula = ~1,
  block = NULL,
  coding = "code_control",
  verbose = TRUE
)
```

Arguments

object	SummarizedExperiment
formula	model formula
block	blockvar specification as string/character, list or formula
coding	coding function name (string)
verbose	TRUE or FALSE

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file)
keep_estimable_features(object, formula = ~ subgroup, block = 'Subject')
```

label2index *Convert labels into indices*

Description

Convert labels into indices

Usage

```
label2index(x)
```

Arguments

x	‘character‘

Examples

```
label2index(x = 'Reporter intensity 0 WT(0).KD(1).OE(2).R1')
label2index(x = 'Reporter intensity 1 WT(1).KD(2).OE(3).R1')
label2index(x = 'Reporter intensity 0 WT(126).KD(127).OE(128).R1')
label2index(x = 'Reporter intensity 1 WT(126).KD(127).OE(128).R1')
label2index(x = 'Reporter intensity 1 Mix1')
```

---

left.vars *Get factor variables*

Description

Get factor variables

Usage

```
left.vars(formula)

right.vars(formula)

factor.vars(formula, object)

## S4 method for signature 'formula,SummarizedExperiment'
factor.vars(formula, object)

## S4 method for signature 'formula,data.table'
factor.vars(formula, object)
```

Arguments

formula	formula
object	SummarizedExperiment or data.table

Value

character vector

Examples

```
object <- survobj()
formula <- survival::Surv(timetoevent, event) ~ age/exprs2levels
   all.vars(formula)
  left.vars(formula)
 right.vars(formula)
factor.vars(formula, object)
```

LINMOD *General Linear Model*

Description

General Linear Model

Usage

```
LINMOD(
  object,
  formula = as.formula("~ subgroup"),
  engine = "limma",
  drop = varlevels_dont_clash(object, all.vars(formula)),
  coding = "code_control",
 design = create_design(object, formula = formula, drop = drop, coding = coding, verbose
    = FALSE),
  block = NULL,
  coefs = contrast_coefs(object, design = design),
  contrasts = NULL,
  weightvar = if ("weights" %in% assayNames(object)) "weights" else NULL,
  suffix = paste0("~", engine),
  verbose = TRUE,
  outdir = NULL,
  writefun = "write_xl",
  plotvolcano = FALSE,
  plotexprs = FALSE,
  argsvolcano = list(),
  argsexprs = list(),
  ...
)

linmod_limma(
  object,
  formula = as.formula("~ subgroup"),
  drop = varlevels_dont_clash(object, all.vars(formula)),
  coding = "code_control",
 design = create_design(object, formula = formula, drop = drop, coding = coding, verbose
    = FALSE),
  contrasts = NULL,
  coefs = if (is.null(contrasts)) contrast_coefs(design = design) else NULL,
  block = NULL,
  weightvar = if ("weights" %in% assayNames(object)) "weights" else NULL,
  reset = TRUE,
  suffix = "~limma",
  verbose = TRUE
)
```

```
fit_limma(...)

linmod_lm(
  object,
  formula = as.formula("~ subgroup"),
  drop = varlevels_dont_clash(object, all.vars(formula)),
  coding = "code_control",
  design = NULL,
  block = NULL,
  coefs = contrast_coefs(object, formula = formula, coding = coding, drop = drop),
  weightvar = if ("weights" %in% assayNames(object)) "weights" else NULL,
  reset = TRUE,
  suffix = "~lm",
  contrasts = NULL,
  verbose = TRUE
)

fit_lm(...)

linmod_lme(
  object,
  formula = as.formula("~ subgroup"),
  drop = varlevels_dont_clash(object, all.vars(formula)),
  coding = "code_control",
  design = NULL,
  block = NULL,
  coefs = contrast_coefs(object, formula = formula, coding = coding, drop = drop),
  weightvar = if ("weights" %in% assayNames(object)) "weights" else NULL,
  reset = TRUE,
  opt = "optim",
  suffix = "~lme",
  contrasts = NULL,
  verbose = TRUE
)

fit_lme(...)

linmod_lmer(
  object,
  formula = as.formula("~ subgroup"),
  drop = varlevels_dont_clash(object, all.vars(formula)),
  coding = "code_control",
  design = NULL,
  block = NULL,
  coefs = contrast_coefs(object, formula = formula, coding = coding, drop = drop),
  weightvar = if ("weights" %in% assayNames(object)) "weights" else NULL,
  reset = TRUE,
```

```
  suffix = "~lmer",
  contrasts = NULL,
  verbose = TRUE
)

fit_lmer(...)

linmod_wilcoxon(
  object,
  formula = as.formula("~ subgroup"),
  drop = NULL,
  coding = "code_control",
  design = NULL,
  block = NULL,
  coefs = NULL,
  contrasts = NULL,
  weightvar = NULL,
  reset = TRUE,
  suffix = "~wilcoxon",
  verbose = TRUE
)

fit_wilcoxon(...)
```

Arguments

object	SummarizedExperiment
formula	model formula
engine	'limma', 'lm', 'lme', 'lmer', or 'wilcoxon'
drop	TRUE or FALSE
coding	string: codingfunname • 'contr.treatment': intercept = y0, coefi = yi - y0 • 'contr.treatment.explicit': intercept = y0, coefi = yi - y0 • 'code_control': intercept = ymean, coefi = yi - y0 • 'contr.diff': intercept = y0, coefi = yi - y(i-1) • 'code_diff': intercept = ymean, coefi = yi - y(i-1) • 'code_diff_forward': intercept = ymean, coefi = yi - y(i+) • 'code_deviation': intercept = ymean, coefi = yi - ymean (drop last) • 'code_deviation_first': intercept = ymean, coefi = yi - ymean (drop first) • 'code_helmert': intercept = ymean, coefi = yi - mean(y0:(yi-1)) • 'code_helmert_forward': intercept = ymean, coefi = yi - mean(y(i+1):yp)
design	design matrix
block	block svar. Formated as string ('Subject') - all engines), list(Subject = ~ 1) -lme, or formula () ~ (1|Subject)) - lmer.
coefs	NULL or character vector: model coefs to record

contrasts	NULL or character vector: posthoc contrasts to record
weightvar	NULL or name of weight matrix in assays(object)
suffix	string: pvar suffix ("limma" in "p~t2~limma")
verbose	whether to msg
outdir	NULL or dir
writefun	'write_xl' or 'write_ods'
plotvolcano	TRUE or FALSE
plotexprs	TRUE or FALSE
argsvolcano	list: volcano args
argsexprs	list: expr args
...	used for s3 dispatch
reset	TRUE/FALSE whether to wipe earlier modeling results
opt	lme options

Value

Updated SummarizedExperiment

Examples

```
# Standard usage
  file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
  object <- read_metabolon(file)
  LINMOD(object)                                # Default
  LINMOD(object, ~subgroup )                    # Custom formula
  LINMOD(object, ~subgroup, block = 'Subject')  # Block effect

# Alternative engines: argument 'engine' or dedicated function
  linmod_limma(   object, ~subgroup, block =     'Subject'     )  # Default engine
  linmod_lm(      object, ~subgroup, block =     'Subject'     )  # Traditional
  linmod_lme(    object, ~subgroup, block =    'Subject'    )  # Powerful random effects
  linmod_lme(     object, ~subgroup, block = list(Subject = ~1))  #     using lme formula
 linmod_lmer(   object, ~subgroup, block =    'Subject'    ) # Yet more powerful random effects
  linmod_lmer(    object, ~subgroup, block =  ~ (1|Subject)    )  #     using lmer formula
  linmod_wilcoxon(object, ~subgroup, block =     'Subject'     )  # Non-parametric

# Alternative coding: backward diffs instead of baseline
  linmod_limma(object, ~ subgroup, block = 'Subject', coding = 'code_diff')
  linmod_lme(  object, ~ subgroup, block = 'Subject', coding = 'code_diff')
  linmod_lmer( object, ~ subgroup, block = 'Subject', coding = 'code_diff')

# Posthoc contrasts: limma-only, flexible, but sometimes approximate
  linmod_limma(object,     ~ subgroup, block = 'Subject', coding = 'code_control')
  linmod_limma(object, ~ 0 + subgroup, block = 'Subject', contrasts = 't1-t0')
      # flexible, but only approximate
      # stat.ethz.ch/pipermail/bioconductor/2014-February/057682.html
```

```
# Top-level function also plots and writes
  LINMOD(object, block = 'Subject', coefs = 't1-t0')
  LINMOD(object, block = 'Subject', coefs = 't1-t0', plotvolcano = TRUE)
  LINMOD(object, block = 'Subject', coefs = 't1-t0',   plotexprs = TRUE)
 LINMOD(object, block = 'Subject', coefs = 't1-t0', plotvolcano = TRUE, plotexprs = TRUE)
LINMOD(object, block = 'Subject', coefs = 't1-t0', plotvolcano = TRUE, plotexprs = TRUE, outdir = tempdir())
```

LINMODENGINES *Linear Modeling Engines*

Description

Linear Modeling Engines

Usage

```
LINMODENGINES
```

Format

An object of class `character` of length 5.

Examples

```
LINMODENGINES
```

---

list2mat *list to matrix*

Description

list to matrix

Usage

```
list2mat(x)
```

Arguments

x	list

Value

matrix

Examples

```
x <- list(roundfruit = c('apple', 'orange'), redfruit = c('apple', 'strawberry'))
list2mat(x)
```

list_files *list files*

Description

list.files for programming

Usage

```
list_files(dir, full.names)
```

Arguments

dir	directory
full.names	TRUE or FALSE

Details

Adds a small layer on list.files. Returning NULL rather than character(0) when no files. Making it better suited for programming.

log2counts *Get/Set log2counts*

Description

Get / Set log2counts matrix

Usage

```
log2counts(object)

## S4 method for signature 'SummarizedExperiment'
log2counts(object)

log2counts(object) <- value

## S4 replacement method for signature 'SummarizedExperiment,matrix'
log2counts(object) <- value

## S4 replacement method for signature 'SummarizedExperiment,numeric'
log2counts(object) <- value
```

Arguments

object	SummarizedExperiment
value	log2count matrix (features x samples)

Value

log2count matrix (get) or updated object (set)

Examples

```
file <- system.file('extdata/billing19.rnacounts.txt', package = 'autonomics')
object <- read_rnaseq_counts(file)
log2counts(object)[1:3, 1:3]
log2counts(object) <- values(object)
```

---

log2cpm *Get/Set log2cpm*

Description

Get / Set log2cpm matrix

Usage

```
log2cpm(object)

## S4 method for signature 'SummarizedExperiment'
log2cpm(object)

log2cpm(object) <- value

## S4 replacement method for signature 'SummarizedExperiment,matrix'
log2cpm(object) <- value

## S4 replacement method for signature 'SummarizedExperiment,numeric'
log2cpm(object) <- value
```

Arguments

object	SummarizedExperiment
value	log2cpm matrix (features x samples)

Value

log2cpm matrix (get) or updated object (set)

Examples

```
file <- system.file('extdata/billing19.rnacounts.txt', package = 'autonomics')
object <- read_rnaseq_counts(file)
log2cpm(object)[1:3, 1:3]
log2cpm(object) <- values(object)
```

`log2diffs` *Get/Set log2diffs*

Description

Get/Set log2diffs

Usage

```
log2diffs(object)

## S4 method for signature 'SummarizedExperiment'
log2diffs(object)

log2diffs(object) <- value

## S4 replacement method for signature 'SummarizedExperiment,matrix'
log2diffs(object) <- value

## S4 replacement method for signature 'SummarizedExperiment,numeric'
log2diffs(object) <- value
```

Arguments

`object`	SummarizedExperiment
`value`	occupancy matrix (features x samples)

Value

occpuancy matrix (get) or updated object (set)

Examples

```
file <- system.file('extdata/fukuda20.proteingroups.txt', package = 'autonomics')
object <- read_maxquant_proteingroups(file)
log2diffs(object)[1:3, 1:3]
```

log2proteins *Get/Set log2proteins*

Description

Get/Set log2proteins

Usage

```
log2proteins(object)

## S4 method for signature 'SummarizedExperiment'
log2proteins(object)

log2proteins(object) <- value

## S4 replacement method for signature 'SummarizedExperiment,matrix'
log2proteins(object) <- value

## S4 replacement method for signature 'SummarizedExperiment,numeric'
log2proteins(object) <- value
```

Arguments

object	SummarizedExperiment
value	occupancy matrix (features x samples)

Value

occpuancy matrix (get) or updated object (set)

Examples

```
file <- system.file('extdata/fukuda20.proteingroups.txt', package = 'autonomics')
object <- read_maxquant_proteingroups(file)
log2proteins(object)[1:3, 1:3]
```

log2sites *Get/Set log2sites*

Description

Get/Set log2sites

Usage

```
log2sites(object)

## S4 method for signature 'SummarizedExperiment'
log2sites(object)

log2sites(object) <- value

## S4 replacement method for signature 'SummarizedExperiment,matrix'
log2sites(object) <- value

## S4 replacement method for signature 'SummarizedExperiment,numeric'
log2sites(object) <- value
```

Arguments

object	SummarizedExperiment
value	occupancy matrix (features x samples)

Value

occpuancy matrix (get) or updated object (set)

Examples

```
file <- system.file('extdata/fukuda20.proteingroups.txt', package = 'autonomics')
object <- read_maxquant_proteingroups(file)
log2sites(object)[1:3, 1:3]
```

---

log2tpm *Get/Set log2tpm*

Description

Get / Set log2tpm matrix

Usage

```
log2tpm(object)

## S4 method for signature 'SummarizedExperiment'
log2tpm(object)

log2tpm(object) <- value

## S4 replacement method for signature 'SummarizedExperiment,matrix'
log2tpm(object) <- value
```

```
## S4 replacement method for signature 'SummarizedExperiment,numeric'
log2tpm(object) <- value
```

Arguments

object	SummarizedExperiment
value	log2tpm matrix (features x samples)

Value

log2tpm matrix (get) or updated object (set)

Examples

```
file <- system.file('extdata/billing19.rnacounts.txt', package = 'autonomics')
object <- read_rnaseq_counts(file)
log2tpm(object) <- values(object)
log2tpm(object)[1:3, 1:3]
```

---

log2transform *Transform values*

Description

Transform values

Usage

```
log2transform(
  object,
  assay = assayNames(object)[1],
  pseudo = 0,
  verbose = FALSE
)

exp2transform(object, assay = assayNames(object)[1], verbose = FALSE)

zscore(object, verbose = FALSE)

sscale(mat, verbose = FALSE)

fscale(mat, verbose = FALSE)

quantnorm(object, verbose = FALSE)

invnorm(object, verbose = FALSE)

vsn(object, delog = TRUE, relog = delog, verbose = FALSE)
```

Arguments

object	SummarizedExperiment
assay	character vector : assays for which to perform transformation
pseudo	number : pseudo value to be added prior to transformation
verbose	TRUE or FALSE : whether to msg
mat	matrix
delog	TRUE or FALSE (vsn)
relog	TRUE or FALSE (vsn)

Value

Transformed sumexp

Examples

```
file <- system.file('extdata/fukuda20.proteingroups.txt', package = 'autonomics')
object <- read_maxquant_proteingroups(file)

object                                %>% plot_sample_densities()
invnorm(object)                       %>% plot_sample_densities()

object                                %>% plot_sample_densities()
quantnorm(object)                     %>% plot_sample_densities()

object                                %>% plot_sample_densities()
#vsn(object)                           %>% plot_sample_densities()  # dataset too small

object                                %>% plot_sample_densities()
zscore(object)                        %>% plot_sample_densities()

object                                %>% plot_sample_densities()
exp2transform(object)                 %>% plot_sample_densities()
log2transform(exp2transform(object))  %>% plot_sample_densities()
```

---

logical2factor *logical to factor*

Description

logical to factor

Usage

```
logical2factor(x, true = get_name_in_parent(x), false = paste0("not", true))

factor2logical(x)
```

Arguments

x	logical vector
true	string : truelevel
false	string : falselevel

Value

factor

Examples

```
t1up <- c( TRUE,   FALSE,  TRUE)
t1   <- c('flat', 'down', 'up' )  %>%  factor(., .)
t1up
logical2factor(t1up)
factor2logical(t1)
```

---

make_alpha_palette *Make alpha palette*

Description

Make alpha palette

Usage

```
make_alpha_palette(object, alpha)
```

Arguments

object	SummarizedExperiment
alpha	string

Value

character vector

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file)
make_alpha_palette(object, 'Time')
```

make_colors *Make colors*

Description

Make colors

Usage

```
make_colors(
  varlevels,
  sep = guess_sep(varlevels),
  show = FALSE,
  verbose = FALSE
)
```

Arguments

varlevels	character vector
sep	string
show	TRUE or FALSE: whether to plot
verbose	TRUE or FALSE: whether to msg

Examples

```
make_colors(c('A',   'B',   'C',  'D'  ), show = TRUE)
make_colors(c('A.1', 'B.1', 'A.2','B.2'), show = TRUE)
```

make_volcano_dt *Create volcano datatable*

Description

Create volcano datatable

Usage

```
make_volcano_dt(
  object,
  fit = fits(object)[1],
  coefs = coefs(object, fit = fit)[1],
  shape = "imputed",
  size = NULL,
  alpha = NULL,
  label = if ("gene" %in% fvars(object)) "gene" else "feature_id"
)
```

Arguments

object	SummarizedExperiment
fit	'limma', 'lme', 'lm', 'wilcoxon'
coefs	character vector: coefs for which to plot volcanoes
shape	fvar or NULL
size	fvar or NULL
alpha	fvar or NULL
label	fvar or NULL

Value

data.table

Examples

```
file <- system.file('extdata/fukuda20.proteingroups.txt', package = 'autonomics')
object <- read_maxquant_proteingroups(file, impute = TRUE, fit = 'limma')
make_volcano_dt(object, fit = 'limma', coefs = 'Adult-X30dpt')
```

---

map_fvalues *Map fvalues*

Description

Map fvalues

Usage

```
map_fvalues(object, fvalues, from = "uniprot", to = "feature_id", sep = ";")
```

Arguments

object	SummarizedExperiment
fvalues	uncollapsed string vector
from	string (fvar)
to	string (svar)
sep	collapse separator

Value

string vector

Examples

```
file <- system.file('extdata/fukuda20.proteingroups.txt', package = 'autonomics')
object <- read_maxquant_proteingroups(file)
fdt(object)
map_fvalues(object, c('Q6DHL5', 'Q6PFS7'), from = 'uniprot', to = 'feature_id', sep = ';')
```

---

matrix2sumexp *Convert matrix into SummarizedExperiment*

Description

Convert matrix into SummarizedExperiment

Usage

```
matrix2sumexp(x, verbose = TRUE)
```

Arguments

x	matrix
verbose	TRUE/FALSE

Value

SummarizedExperiment

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
x <- values(read_metabolon(file))
object <- matrix2sumexp(x)
object %<>% pca()
biplot(object, color = 'subgroup')
```

MAXQUANT_PATTERNS *maxquant quantity patterns*

Description

maxquant quantity patterns

Usage

```
MAXQUANT_PATTERNS
```

Format

An object of class `character` of length 7.

Examples

```
MAXQUANT_PATTERNS
```

`mclust_breaks` *Mixture/Quantile breaks*

Description

Mixture/Quantile breaks

Usage

```
mclust_breaks(x, k = NULL)

mixtools_breaks(x, k = 2)

quantile_breaks(x, k = 3, probs = seq_len(k - 1)/k)
```

Arguments

`x`	numeric
`k`	number
`probs`	probabilities

Examples

```
set.seed(1)
x <- c(rnorm(20, 3), rnorm(20,7), rnorm(20, 11))
  mclust_breaks(x)
mixtools_breaks(x, k = 3)
quantile_breaks(x)
```

mdsplot *Feature correlations/distances*

Description

Feature correlations/distances

Usage

```
mdsplot(distmat, title = NULL)

fcor(object, verbose = TRUE)

scor(object, verbose = TRUE)

fdist(object, method = "cor")

sdist(object, method = "cor")
```

Arguments

distmat	distance matrix
title	NULL or string
object	SummarizedExperiment
verbose	TRUE or FALSE
method	'cor', 'euclidian', etc

Value

matrix

Examples

```
# Correlations
    object <- twofactor_sumexp()
    scor(object)               %>%  pheatmap::pheatmap()
    fcor(object)               %>%  pheatmap::pheatmap()
# Distances
    sdist(object, 'cor')       %>% mdsplot('samples: cor')
    sdist(object, 'euclidian') %>% mdsplot('samples: euclidian')
    fdist(object, 'cor')       %>% mdsplot('features: cor')
    fdist(object, 'euclidian') %>% mdsplot('features: euclidian')
```

`merge_compounddiscoverer` *merge compound discoverer files*

Description

merge compound discoverer files

Usage

```
merge_compounddiscoverer(x, quantity = NULL, verbose = TRUE)
```

Arguments

x	'list'
quantity	''area', 'normalizedarea''
verbose	'TRUE' or 'FALSE'

Value

'data.table'

`merge_sample_excel` *Merge sample excel*

Description

Merge sample excel

Usage

```
merge_sample_excel(
  object,
  sfile,
  range = NULL,
  by.x = "sample_id",
  by.y = "sample_id"
)
```

Arguments

object	SummarizedExperiment
sfile	sample file
range	string
by.x	string
by.y	string

Value

SummarizedExperiment

`merge_sample_file` *Merge sample / feature file*

Description

Merge sample / feature file

Usage

```
merge_sample_file(
  object,
  sfile = NULL,
  by.x = "sample_id",
  by.y = "sample_id",
  all.x = TRUE,
  select = NULL,
  stringsAsFactors = FALSE,
  verbose = TRUE
)

merge_ffile(
  object,
  ffile = NULL,
  by.x = "feature_id",
  by.y = "feature_id",
  all.x = TRUE,
  select = NULL,
  stringsAsFactors = FALSE,
  verbose = TRUE
)
```

Arguments

`object`	SummarizedExperiment
`sfile`	string : sample file path
`by.x`	string : object mergevar
`by.y`	string : file mergevvar
`all.x`	TRUE / FALSE : whether to keep samples / feature without annotation
`select`	character : [sf]file columns to select
`stringsAsFactors`	TRUE / FALSE
`verbose`	TRUE / FALSE
`ffile`	string : ffile path

Value

SummarizedExperiment

Examples

```
file <- system.file('extdata/billing19.proteingroups.txt', package = 'autonomics')
subgroups <-  c('E00','E01', 'E02','E05','E15','E30', 'M00')
subgroups %<>% paste0('_STD')
object <- read_maxquant_proteingroups(file, subgroups = subgroups)
sfile <- paste0(tempdir(),'/', basename(tools::file_path_sans_ext(file)))
sfile %<>% paste0('.samples.txt')
dt <- data.table(sample_id = object$sample_id,
                 day = split_extract_fixed(object$subgroup, '_', 1))
data.table::fwrite(dt, sfile)
sdt(object)
sdt(merge_sample_file(object, sfile))
```

---

merge_sdata *Merge sample/feature dt*

Description

Merge sample/feature dt

Usage

```
merge_sdata(
  object,
  dt,
  by.x = "sample_id",
  by.y = names(dt)[1],
  all.x = TRUE,
  verbose = TRUE
)

merge_sdt(
  object,
  dt,
  by.x = "sample_id",
  by.y = "sample_id",
  all.x = TRUE,
  verbose = TRUE
)

merge_fdata(
  object,
  dt,
  by.x = "feature_id",
```

```
  by.y = names(dt)[1],
  all.x = TRUE,
  verbose = TRUE
)

merge_fdt(
  object,
  dt,
  by.x = "feature_id",
  by.y = "feature_id",
  all.x = TRUE,
  verbose = TRUE
)
```

Arguments

object	SummarizedExperiment
dt	data.frame, data.table, DataFrame
by.x	string : object mergevar
by.y	string : df mergevar
all.x	TRUE / FALSE : whether to keep samples / features without annotation
verbose	TRUE / FALSE : whether to msg

Value

SummarizedExperiment

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file)
sdt(object)
sdt(merge_sdt(object, data.table(sample_id = object$sample_id,
                                 number = seq_along(object$sample_id))))
```

---

message_df *message dataframe*

Description

message dataframe using sprintf syntax. Use place holder '

Usage

```
message_df(format_string, x)
```

Arguments

format_string	sprintf style format string
x	data.frame

Value

nothing returned

Examples

```
x <- data.frame(feature_id = c('F001', 'F002'), symbol = c('FEAT1', 'FEAT2'))
message_df('\t%s', x)

x <- c(rep('PASS', 25), rep('FAIL', 25))
message_df(format_string = '%s', table(x))
```

---

modelvar *Get model variable*

Description

Get model variable

Usage

```
modelvar(object, ...)

## S3 method for class 'data.table'
modelvar(
  object,
  quantity,
  fit = fits(object),
  coef = autonomics::coefs(object, fit = fit),
  ...
)

## S3 method for class 'SummarizedExperiment'
modelvar(
  object,
  quantity,
  fit = fits(object),
  coef = autonomics::coefs(object, fit = fit),
  ...
)

## S3 method for class '`NULL`'
modelvar(object, ...)
```

```
effectvar(
  object,
  fit = fits(object),
  coef = autonomics::coefs(object, fit = fit)
)

tvar(object, fit = fits(object), coef = autonomics::coefs(object, fit = fit))

pvar(object, fit = fits(object), coef = autonomics::coefs(object, fit = fit))

fdrvar(object, fit = fits(object), coef = autonomics::coefs(object, fit = fit))

abstractvar(object, ...)

## S3 method for class 'data.table'
abstractvar(
  object,
  fit = fits(object),
  coef = autonomics::coefs(object, fit = fit),
  ...
)

## S3 method for class 'SummarizedExperiment'
abstractvar(
  object,
  fit = fits(object),
  coef = autonomics::coefs(object, fit = fit),
  ...
)

modelvec(object, ...)

## S3 method for class 'data.table'
modelvec(
  object,
  quantity,
  fit = fits(object)[1],
  coef = autonomics::coefs(object, fit = fit)[1],
  fvar = "feature_id",
  ...
)

## S3 method for class 'SummarizedExperiment'
modelvec(
  object,
  quantity,
  fit = fits(object)[1],
```

```
  coef = autonomics::coefs(object, fit = fit)[1],
  fvar = "feature_id",
  ...
)

effectvec(
  object,
  fit = fits(object)[1],
  coef = autonomics::coefs(object)[1],
  fvar = "feature_id"
)

tvec(
  object,
  fit = fits(object)[1],
  coef = autonomics::coefs(object, fit = fit)[1],
  fvar = "feature_id"
)

pvec(
  object,
  fit = fits(object)[1],
  coef = autonomics::coefs(object, fit = fit)[1],
  fvar = "feature_id"
)

fdrvec(
  object,
  fit = fits(object)[1],
  coef = autonomics::coefs(object, fit = fit)[1],
  fvar = "feature_id"
)

abstractvec(object, ...)

## S3 method for class 'data.table'
abstractvec(
  object,
  fit = fits(object)[1],
  coef = autonomics::coefs(object, fit = fit)[1],
  fvar = "feature_id",
  ...
)

## S3 method for class 'SummarizedExperiment'
abstractvec(
  object,
  fit = fits(object)[1],
```

```
  coef = autonomics::coefs(object, fit = fit)[1],
  fvar = "feature_id",
  ...
)

modeldt(object, ...)

## S3 method for class 'data.table'
modeldt(
  object,
  quantity,
  fit = fits(object),
  coef = autonomics::coefs(object, fit = fit),
  ...
)

## S3 method for class 'SummarizedExperiment'
modeldt(
  object,
  quantity,
  fit = fits(object),
  coef = autonomics::coefs(object, fit = fit),
  ...
)

## S3 method for class '`NULL`'
modeldt(object, ...)

effectdt(
  object,
  fit = fits(object),
  coef = autonomics::coefs(object, fit = fit)
)

tdt(object, fit = fits(object), coef = autonomics::coefs(object, fit = fit))

pdt(object, fit = fits(object), coef = autonomics::coefs(object, fit = fit))

modelmat(
  object,
  quantity,
  fit = fits(object),
  coef = autonomics::coefs(object, fit = fit)
)

modelmat(
  object,
  quantity,
```

```
  fit = fits(object),
  coef = autonomics::coefs(object, fit = fit)
)

effectmat(
  object,
  fit = fits(object),
  coef = autonomics::coefs(object, fit = fit)
)

effectsizemat(
  object,
  fit = fits(object),
  coef = autonomics::coefs(object, fit = fit)
)

tmat(object, fit = fits(object), coef = autonomics::coefs(object, fit = fit))

pmat(object, fit = fits(object), coef = autonomics::coefs(object, fit = fit))

fdrmat(object, fit = fits(object), coef = autonomics::coefs(object, fit = fit))

modelfeatures(object, ...)

## S3 method for class 'data.table'
modelfeatures(
  object,
  fit = fits(object)[1],
  coef = autonomics::coefs(object, fit = fit)[1],
  fvar = "feature_id",
  significancevar = "p",
  significance = 0.05,
  effectdirection = "<>",
  effectsize = 0,
  ...
)

## S3 method for class 'SummarizedExperiment'
modelfeatures(object, ...)

upfeatures(
  object,
  fit = fits(object)[1],
  coef = autonomics::coefs(object, fit = fit)[1],
  fvar = "feature_id",
  significancevar = "p",
  significance = 0.05,
  effectsize = 0
```

```
)

downfeatures(
  object,
  fit = fits(object)[1],
  coef = autonomics::coefs(object, fit = fit)[1],
  fvar = "feature_id",
  significancevar = "p",
  significance = 0.05,
  effectsize = 0
)
```

Arguments

object	data.table or SummarizedExperiment
...	S3 dispatch
quantity	'p', 'effect', 'fdr', 't', or 'se'
fit	string (vector)
coef	string (vector)
fvar	'feature_id' or other fvar for values (pvec) or names (upfeatures)
significancevar	'p' or 'fdr'
significance	p or fdr cutoff (fractional number)
effectdirection	'<>', '<' or '>'
effectsize	effectsize cutoff (positive number)

Value

string (tvar), matrix (tmat), numeric vector (tvec), character vector (tfeatures)

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file)
object %<>% linmod_limma()
object %<>% linmod_lm()

effectvar(object)
effectvec(object)[1:3]
 effectdt(object)[1:3, ]
effectmat(object)[1:3, ]

     tvar(object)
     tvec(object)[1:3]
      tdt(object)[1:3, ]
     tmat(object)[1:3, ]
```

```
           pvar(object)
           pvec(object)[1:3]
            pdt(object)[1:3, ]
           pmat(object)[1:3, ]

modelfeatures(object)
 downfeatures(object)
   upfeatures(object)
```

MSIGCOLLECTIONSHUMAN *Human/Mouse Msigdb Collections*

Description

Human/Mouse Msigdb Collections

Usage

```
MSIGCOLLECTIONSHUMAN

MSIGCOLLECTIONSMOUSE
```

Format

An object of class `character` of length 25.

An object of class `character` of length 13.

MSIGDIR *local msigdb dir*

Description

local msigdb dir

Usage

```
MSIGDIR
```

Format

An object of class `character` of length 1.

nfactors *stri_split and extract*

Description

stri_split and extract

Usage

```
nfactors(x, sep = guess_sep(x))

split_extract_fixed(x, sep, i)

split_extract_regex(x, sep, i)

split_extract(x, i, sep = guess_sep(x))
```

Arguments

x	character vector
sep	string
i	integer

Value

character vector

Examples

```
# Read
    file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
    object <- read_metabolon(file)
    x <- object$sample_id[1:5]
    nfactors(x)
# Split
    split_extract_fixed(x, '.', 1:2)
    split_extract_fixed(x, '.', seq_len(nfactors(x)-1))
    split_extract_fixed(x, '.', nfactors(x))
    split_extract_fixed(fdt(object)$PUBCHEM, ';', 1) # with NA values
```

object1 *Example objects for binding*

Description

Example objects for binding

Usage

```
object1()

object2()
```

Value

SummarizedExperiment

Examples

```
object1()
object2()
```

OPENTARGETSDIR *opentargets dir*

Description

opentargets dir

Usage

```
OPENTARGETSDIR
```

Format

An object of class `character` of length 1.

order_on_p *Order on p*

Description

Order on p

Usage

```
order_on_p(
  object,
  fit = autonomics::fits(object),
  coefs = autonomics::coefs(object, fit = fit),
  combiner = "|",
  decreasing = FALSE,
  verbose = TRUE
)

order_on_t(
  object,
  fit = autonomics::fits(object),
  coefs = autonomics::coefs(object, fit = fit),
  combiner = "|",
  decreasing = FALSE,
  verbose = TRUE
)

order_on_effect(
  object,
  fit = autonomics::fits(object),
  coefs = autonomics::coefs(object, fit = fit),
  combiner = "|",
  verbose = TRUE
)
```

Arguments

object	SummarizedExperiment
fit	string vector: subset of ‘fits(object)‘
coefs	string vector: subset of ‘coefs(object)‘
combiner	’|’ or ’&’
decreasing	TRUE or FALSE
verbose	TRUE or FALSE

Value

SummarizedExperiment

Examples

```
# Linmod
    file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
    object <- read_metabolon(file)
    order_on_p(object)
    object %<>% linmod_limma()
    order_on_p(object)
# Survival
    object <- survobj()
    object %<>% fit_survival()
    order_on_p(object)
```

`overall_parameters` *Distribution parameters*

Description

Mean, sd, weight of overall/mixture distribution

Usage

```
overall_parameters(x)

mclust_parameters(x, k = NULL)

mixtools_parameters(x, k = 2)
```

Arguments

x	numeric vector
k	number of components

Value

data.table (mean, sd, weight)

Examples

```
set.seed(1)
x <- c(rnorm(20, 3), rnorm(20,7), rnorm(20, 11))
overall_parameters(x)
mclust_parameters(x)
mixtools_parameters(x)
```

pca *PCA, SMA, LDA, PLS, SPLS, OPLS*

Description

Perform a dimension reduction. Store sample scores, feature loadings, and dimension variances.

Usage

```
pca(
  object,
  by = "sample_id",
  assay = assayNames(object)[1],
  ndim = 2,
  minvar = 0,
  center_samples = TRUE,
  verbose = TRUE,
  plot = FALSE,
  ...
)

pls(
  object,
  by = "subgroup",
  assay = assayNames(object)[1],
  ndim = 2,
  minvar = 0,
  verbose = FALSE,
  plot = FALSE,
  ...
)

sma(
  object,
  by = "sample_id",
  assay = assayNames(object)[1],
  ndim = 2,
  minvar = 0,
  verbose = TRUE,
  plot = FALSE,
  ...
)

lda(
  object,
  assay = assayNames(object)[1],
  by = "subgroup",
```

```
  ndim = 2,
  minvar = 0,
  verbose = TRUE,
  plot = FALSE,
  ...
)

spls(
  object,
  assay = assayNames(object)[1],
  by = "subgroup",
  ndim = 2,
  minvar = 0,
  plot = FALSE,
  ...
)

opls(
  object,
  by = "subgroup",
  assay = assayNames(object)[1],
  ndim = 2,
  minvar = 0,
  verbose = FALSE,
  plot = FALSE,
  ...
)
```

Arguments

object	SummarizedExperiment
by	svar or NULL
assay	string
ndim	number
minvar	number
center_samples	TRUE/FALSE: center samples prior to pca ?
verbose	TRUE/FALSE: message ?
plot	TRUE/FALSE: plot ?
...	passed to biplot

Value

SummarizedExperiment

Author(s)

Aditya Bhagwat, Laure Cougnaud (LDA)

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
 object <- read_metabolon(file)
 pca(object, plot = TRUE)    # Principal Component Analysis
 pls(object, plot = TRUE)    # Partial Least Squares
 lda(object, plot = TRUE)    # Linear Discriminant Analysis
 sma(object, plot = TRUE)    # Spectral Map Analysis
spls(object, plot = TRUE)    # Sparse PLS
# opls(object, plot = TRUE)  # OPLS # outcommented because it produces a file named FALSE
```

`pg_to_canonical` *proteingroup to isoforms*

Description

proteingroup to isoforms

Usage

```
pg_to_canonical(x, unique = TRUE)

pg_to_isoforms(x, unique = TRUE)
```

Arguments

`x`	proteingroups string vector
`unique`	whether to remove duplicates

Value

string vector

Examples

```
 (x <- c('Q96JP5;Q96JP5-2', 'Q96JP5', 'Q96JP5-2;P86791'))
 pg_to_isoforms(x)
 pg_to_canonical(x)
 pg_to_isoforms( x, unique = FALSE)
 pg_to_canonical(x, unique = FALSE)
# .pg_to_isoforms(x[1])   # unexported dot functions
# .pg_to_canonical(x[1])  # operate on scalars
```

plot_coef_densities *Plot contrast densities*

Description

Plot contrast densities

Usage

```
plot_coef_densities(
  object,
  fit = fits(object)[1],
  coefs = autonomics::coefs(object, fit = fit),
  label = "feature_id"
)
```

Arguments

object	SummarizedExperiment
fit	'limma', 'lm', 'lme', 'lmer', or 'wilcoxon'
coefs	character vector
label	svar

Value

ggplot

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file)
object %<>% linmod_limma(~subgroup, block = 'Subject')
plot_coef_densities(object)
```

plot_contrastogram *Plot contrastogram*

Description

Plot contrastogram

Usage

```
plot_contrastogram(
  object,
  subgroupvar,
  formula = as.formula(paste0("~ 0 +", subgroupvar)),
  colors = make_colors(slevels(object, subgroupvar), guess_sep(object)),
  curve = 0.1
)
```

Arguments

object	SummarizedExperiment
subgroupvar	subgroup svar
formula	formula
colors	named color vector (names = subgroups)
curve	arrow curvature

Value

list returned by plotmat

Examples

```
if (installed('diagram')){
   file <- download_data('halama18.metabolon.xlsx')
   object <- read_metabolon(file)
   plot_contrastogram(object, subgroupvar = 'subgroup')
}
```

---

plot_contrast_venn *Plot contrast venn*

Description

Plot contrast venn

Usage

```
plot_contrast_venn(issig, colors = NULL)
```

Arguments

issig	matrix(nrow, ncontrast): -1 (down), +1 (up)
colors	NULL or colorvector

Value

nothing returned

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file)
object %<>% linmod_wilcoxon(~ subgroup, block = 'Subject')
object %<>% linmod_limma(   ~ subgroup, block = 'Subject')
isfdr <- is_sig(object, contrast = 't3-t0', quantity = 'p', fit = fits(object))
plot_contrast_venn(isfdr)
```

---

plot_data *Plot data*

Description

Plot data

Usage

```
plot_data(
  data,
  geom = geom_point,
  color = NULL,
  fill = NULL,
  linetype = NULL,
  ...,
  palette = NULL,
  fixed = list(),
  theme = list()
)
```

Arguments

data	data.frame'
geom	geom_point, etc.
color	variable mapped to color (symbol)
fill	variable mapped to fill (symbol)
linetype	variable mapped to linetype (symbol)
...	mapped aesthetics
palette	color palette (named character vector)
fixed	fixed aesthetics (list)
theme	list with ggplot theme specifications

Value

ggplot object

Author(s)

Aditya Bhagwat, Johannes Graumann

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file)
object %<>% pca()
data <- sdt(object)
plot_data(data, x = `t~sample_id~pca1`, y = `t~sample_id~pca2`)
plot_data(data, x = `t~sample_id~pca1`, y = `t~sample_id~pca2`, color = subgroup)
plot_data(data, x = `t~sample_id~pca1`, y = `t~sample_id~pca2`, color = NULL)
fixed <- list(shape = 15, size = 3)
plot_data(data, x = `t~sample_id~pca1`, y = `t~sample_id~pca2`, fixed = fixed)
```

---

plot_densities *Plot sample/feature distributions*

Description

Plot sample/feature distributions

Usage

```
plot_densities(
  object,
  assay = assayNames(object)[1],
  group,
  fill,
  color = NULL,
  linetype = NULL,
  facet = NULL,
  nrow = NULL,
  ncol = NULL,
  dir = "h",
  scales = "free_y",
  labeller = label_value,
  palette = NULL,
  fixed = list(alpha = 0.8, na.rm = TRUE)
)

plot_sample_densities(
  object,
  assay = assayNames(object)[1],
```

```
  group = "sample_id",
  fill = if ("subgroup" %in% svars(object)) "subgroup" else "sample_id",
  color = NULL,
  linetype = NULL,
  n = 100,
  facet = NULL,
  nrow = NULL,
  ncol = NULL,
  dir = "h",
  scales = "free_y",
  labeller = label_value,
  palette = NULL,
  fixed = list(alpha = 0.8, na.rm = TRUE)
)

plot_feature_densities(
  object,
  assay = assayNames(object)[1],
  fill = "feature_id",
  group = fill,
  color = NULL,
  linetype = NULL,
  n = 9,
  facet = NULL,
  nrow = NULL,
  ncol = NULL,
  dir = "h",
  scales = "free",
  labeller = label_value,
  palette = NULL,
  fixed = list(alpha = 0.8, na.rm = TRUE)
)
```

Arguments

object	SummarizedExperiment
assay	string
group	svar (string)
fill	svar (string)
color	svar (string)
linetype	svar (string)
facet	svar (character vector)
nrow	number of facet rows
ncol	number of facet cols
dir	'h' (horizontal) or 'v' (vertical)
scales	'free', 'fixed', 'free_y'

labeller	e.g. label_value
palette	named character vector
fixed	fixed aesthetics
n	number

Value

ggplot object

See Also

plot_sample_violins, plot_sample_boxplots

Examples

```
# Data
    file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
    object <- read_metabolon(file)
    object %<>% extract(, order(.$subgroup))

# Sample distributions
    plot_sample_densities(object)
    plot_sample_violins(  object, facet = 'Time')
    plot_sample_boxplots(object)
    plot_exprs(object)
    plot_exprs(object, dim = 'samples', x = 'subgroup', facet = 'Time')

# Feature distributions
    plot_feature_densities(object)
    plot_feature_violins(  object)
    plot_feature_boxplots( object)
```

---

plot_densities_transforms

Visually evaluate transformation effects

Description

Visually evaluate transformation effects

Usage

```
plot_densities_transforms(
  object,
  assay = assayNames(object)[1],
  subgroupvar = "subgroup",
  transforms = c("center", "invnorm", "quantnorm", "vsn", "zscore"),
  ...,
```

```
  fixed = list(na.rm = TRUE, show.legend = FALSE, verbose = FALSE),
  verbose = TRUE
)

plot_violins_transforms(
  object,
  assay = assayNames(object)[1],
  subgroupvar = "subgroup",
  transforms = c("center", "invnorm", "quantnorm", "vsn", "zscore"),
  ...,
  fixed = list(na.rm = TRUE, trim = FALSE, draw_quantiles = c(0.25, 0.5, 0.75),
    show.legend = FALSE),
  verbose = TRUE
)

biplot_transforms(
  object,
  assay = assayNames(object)[1],
  subgroupvar = "subgroup",
  transforms = TRANSFORMSTRICT,
  method = DIMREDENGINES[1],
  dims = 1:2,
  color = subgroupvar,
  shape = NULL,
  size = NULL,
  alpha = NULL,
  group = NULL,
  label = NULL,
  ncol = NULL,
  nrow = NULL,
  ...,
  fixed = list(shape = 15, size = 3),
  verbose = FALSE
)

biplot_transforms_assays(
  object,
  assays = assayNames(object)[1],
  subgroupvar = "subgroup",
  transforms = TRANSFORMSTRICT,
  method = DIMREDENGINES[1],
  dims = 1:2,
  color = subgroupvar,
  shape = NULL,
  size = NULL,
  alpha = NULL,
  group = NULL,
  label = NULL,
```

```
  ...,
  verbose = FALSE,
  fixed = list(shape = 15, size = 3)
)
```

Arguments

object	SummarizedExperiment
assay	string : assay name to operate on
subgroupvar	svar
transforms	character vector : transformations explored
...	: further plotting parameters
fixed	list : fixed aesthetics
verbose	TRUE/FALSE : message?
method	string : dimension reduction technique
dims	numbers : biplot dimensions
color	svar
shape	svar
size	svar
alpha	svar
group	svar
label	svar
ncol	integer : columns for facet wraping
nrow	integer : rows for facet wraping
assays	character vector : assay names to operate on

Value

ggplot2 object

Author(s)

Johannes Graumann

Examples

```
file <- system.file('extdata/fukuda20.proteingroups.txt', package = 'autonomics')
object <- read_maxquant_proteingroups(file)

# `vsn` implemented, but example data set to small
transformations <- c(
  'center_mean', 'center_median', 'invnorm', 'quantnorm', 'zscore')

# object %>% plot_densities_transforms(transforms = transformations) # Requires package ggridges
object %>% plot_violins_transforms(transforms = transformations)
```

```
object %>% biplot_transforms(
  method  = 'pca', transforms = transformations, nrow = 2)
object %>% biplot_transforms(
  method  = 'pls', transforms = transformations, nrow = 2)

object[['replicate']] <- gsub('^.*\\.(.+)$', '\\1', object[['sample_id']])
object %>%
  biplot_transforms(
  transforms = transformations, label = 'replicate')
```

---

plot_design *Plot model*

Description

Plot model

Usage

```
plot_design(object, coding = "code_control")
```

Arguments

object	´SummarizedExperiment
coding	string: codingfunname

- contr.treatment: intercept = y0, coefi = yi - y0
- contr.treatment.explicit: intercept = y0, coefi = yi - y0
- code_control: intercept = ymean, coefi = yi - y0
- contr.diff: intercept = y0, coefi = yi - y(i-1)
- code_diff: intercept = ymean, coefi = yi - y(i-1)
- code_diff_forward: intercept = ymean, coefi = yi - y(i+)
- code_deviation: intercept = ymean, coefi = yi - ymean (drop last)
- code_deviation_first: intercept = ymean, coefi = yi - ymean (drop first)
- code_helmert: intercept = ymean, coefi = yi - mean(y0:(yi-1))
- code_helmert_forward: intercept = ymean, coefi = yi - mean(y(i+1):yp)

Value

ggplot

Examples

```
file <- system.file('extdata/billing19.proteingroups.txt', package = 'autonomics')
subgroups <- paste0(c('E00', 'E01', 'E02', 'E05', 'E15', 'E30', 'M00'), '_STD')
object <- read_maxquant_proteingroups(file, subgroups = subgroups)
object$subgroup %<>% substr(1,3)
plot_design(object)
```

plot_exprs *Plot exprs for coef*

Description

Plot exprs for coef

Usage

```
plot_exprs(
  object,
  dim = "both",
  assay = assayNames(object)[1],
  features = NULL,
  fit = fits(object)[1],
  coefs = autonomics::coefs(object, fit = fit),
  block = NULL,
  x = default_x(object, dim),
  geom = default_geom(object, x = x, block = block),
  color = x,
  fill = x,
  shape = NULL,
  size = NULL,
  alpha = NULL,
  linetype = NULL,
  highlight = NULL,
  combiner = "|",
  p = 1,
  fdr = 1,
  facet = if (dim == "both") "feature_id" else NULL,
  file = NULL,
  width = 7,
  height = 7,
  n = if (is.null(file)) 4 else 12,
  ncol = if (is.null(file)) NULL else 3,
  nrow = if (is.null(file)) NULL else 4,
  scales = "free_y",
  labeller = "label_value",
  pointsize = if (is.null(block)) 0 else 0.5,
  jitter = if (is.null(block)) 0.1 else 0,
  fillpalette = make_var_palette(object, fill),
  colorpalette = make_var_palette(object, color),
  hlevels = NULL,
  title = switch(dim, both = x, features = "Feature Boxplots", samples =
    "Sample Boxplots"),
  subtitle = if (!is.null(fit)) coefs else "",
  xlab = x,
```

```
  ylab = "value",
  theme = ggplot2::theme(plot.title = element_text(hjust = 0.5)),
  guides = NULL,
  verbose = TRUE
)

plot_sample_boxplots(
  object,
  fill = if ("subgroup" %in% svars(object)) "subgroup" else "sample_id",
  n = min(ncol(object), 16),
  ...
)

plot_feature_boxplots(object, ...)
```

Arguments

object	SummarizedExperiment
dim	'samples' (per-sample distribution across features), 'features' (per-feature distribution across samples) or 'both' (subgroup distribution faceted per feature)
assay	string: value in assayNames(object)
features	features to plot no matter what (character vector)
fit	'limma', 'lm', 'lme', 'lmer', 'wilcoxon'
coefs	subset of coefs(object) to consider in selecting top
block	group svar
x	x svar
geom	'boxplot' or 'point'
color	color svar: points, lines
fill	fill svar: boxplots
shape	shape svar
size	size svar
alpha	alpha svar
linetype	linetype svar
highlight	highlight svar
combiner	'&' or '|'
p	fraction: p cutoff
fdr	fraction: fdr cutoff
facet	string: fvar mapped to facet
file	NULL or filepath
width	inches
height	inches

n	number of samples (dim = 'samples') or features (dim = 'features' or 'both') to plot
ncol	number of cols in faceted plot (if dim = 'both')
nrow	number of rows in faceted plot (if dim = 'both)
scales	'free_y', 'free'x', 'fixed'
labeller	string or function
pointsize	number
jitter	jitter width (number)
fillpalette	named character vector: fill palette
colorpalette	named character vector: color palette
hlevels	xlevels for which to plot hlines
title	string
subtitle	string
xlab	string
ylab	string
theme	ggplot2::theme(...) or NULL
guides	NULL or c(fill = 'none', color = 'none')
verbose	TRUE or FALSE
...	used to maintain depreceated functions

Value

ggplot object

See Also

plot_sample_densities, plot_sample_violins

Examples

```
# Without limma
    file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
    object <- read_metabolon(file)
    plot_exprs(object, block = 'Subject', title = 'Subgroup Boxplots')
    plot_exprs(object, dim = 'samples')
    plot_exprs(object, dim = 'features', block = 'sample_id')
# With limma
    object %<>% linmod_limma(block = 'Subject')
    plot_exprs(object, block = 'Subject')
    plot_exprs(object, block = 'Subject', coefs = c('t1-t0', 't2-t0', 't3-t0'))
    plot_exprs_per_coef(object, x = 'Time', block = 'Subject')
# Points
    plot_exprs(object, geom = 'point', block = 'Subject')
# Add highlights
    controlfeatures <- c('biotin','phosphate')
```

```
    fdt(object) %<>% cbind(control = .$feature_name %in% controlfeatures)
    plot_exprs(object, dim = 'samples', highlight = 'control')
# Multiple pages
    plot_exprs(object, block = 'Subject', n = 4, nrow = 1, ncol = 2)
```

`plot_exprs_per_coef` *Plot exprs per coef*

Description

Plot exprs per coef

Usage

```
plot_exprs_per_coef(
  object,
  fit = fits(object)[1],
  coefs = autonomics::coefs(object, fit = fit),
  x = default_x(object),
  block = NULL,
  geom = default_geom(object, x, block = block),
  orderbyp = FALSE,
  title = x,
  subtitle = default_subtitle(fit, x, coefs),
  n = 1,
  nrow = 1,
  ncol = NULL,
 theme = ggplot2::theme(legend.position = "bottom", legend.title = element_blank(),
  plot.title = element_text(hjust = 0.5), plot.subtitle = element_text(hjust = 0.5)),
  ...
)
```

Arguments

`object`	SummarizedExperiment
`fit`	'limma', 'lm', 'lme', 'lmer', 'wilcoxon'
`coefs`	subset of coefs(object) to consider in selecting top
`x`	x svar
`block`	group svar
`geom`	'boxplot' or 'point'
`orderbyp`	TRUE or FALSE
`title`	string
`subtitle`	string
`n`	number

nrow	number of rows in faceted plot
ncol	number of cols in faceted plot
theme	ggplot2::theme(...) or NULL
...	passed to plot_exprs

Value

ggplot object

See Also

plot_sample_densities, plot_sample_violins

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file)
object %<>% linmod_limma()
object %<>% pls(by = 'subgroup')
object %<>% pls(by = 'Diabetes')
object %<>% pls(by = 'Subject')
plot_exprs_per_coef(object)
plot_exprs_per_coef(object, orderbyp = TRUE)
plot_exprs_per_coef(object, fit = 'pls1', block = 'Subject')
```

---

plot_fit_summary *Plot fit summary*

Description

Plot fit summary

Usage

```
plot_fit_summary(sumdt, nrow = NULL, ncol = NULL, order = FALSE)
```

Arguments

sumdt	data.table
nrow	number
ncol	number
order	TRUE or FALSE

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file)
object %<>% linmod_lm()
object %<>% linmod_limma(block = 'Subject')
sumdt <- summarize_fit(object, coefs = c('t1-t0', 't2-t0', 't3-t0'))
plot_fit_summary(sumdt)
```

---

plot_heatmap *Plot heatmap*

Description

Plot heatmap

Usage

```
plot_heatmap(
  object,
  fit = fits(object)[1],
  coef = autonomics::coefs(object, fit = fit)[1],
  effectsize = 0,
  p = 1,
  fdr = 0.05,
  n = 100,
  assay = assayNames(object)[1],
  cluster_features = FALSE,
  cluster_samples = FALSE,
  flabel = intersect(c("gene", "feature_id"), fvars(object))[1],
  group = "subgroup",
  verbose = TRUE,
  title = NULL
)
```

Arguments

object	SummarizedExperiment
fit	'limma', 'lm', 'lme(r)', 'wilcoxon'
coef	string: one of coefs(object)
effectsize	number: effectsize filter
p	number: p filter
fdr	number: fdr filter
n	number: n filter
assay	string: one of assayNames(object)

cluster_features	TRUE or FALSE
cluster_samples	TRUE or FALSE
flabel	string: feature label
group	sample groupvar
verbose	TRUE or FALSE
title	string

Examples

```
file <- system.file('extdata/fukuda20.proteingroups.txt', package = 'autonomics')
object <- read_maxquant_proteingroups(file, fit = 'limma')
plot_heatmap(object)
```

---

plot_matrix *Plot binary matrix*

Description

Plot binary matrix

Usage

```
plot_matrix(mat)
```

Arguments

mat	matrix

Value

no return (base R plot)

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file)
mat <- sdt(object)[, .(Subject, subgroup)]
mat$present <- 1
mat %<>% data.table::dcast(Subject ~ subgroup, value.var  = 'present', fill = 0)
mat %<>% dt2mat()
plot_matrix(mat)
```

`plot_sample_nas` *Plot (summarized) detections*

Description

`plot_detections` plots the detection structure at feature/sample resolution. It shows systematic/random NAs (white), full detection (bright color) and imputations (light color).

Usage

```
plot_sample_nas(...)

plot_subgroup_nas(...)

plot_detections(
  object,
  by = "subgroup",
  fill = by,
  palette = make_svar_palette(object, fill),
  axis.text.y = element_blank()
)

plot_summarized_detections(
  object,
  by = "subgroup",
  fill = by,
  palette = NULL,
  na_imputes = TRUE
)
```

Arguments

`...`	used to maintain deprecated functions
`object`	SummarizedExperiment
`by`	svar (string)
`fill`	svar (string)
`palette`	color vector (names = levels, values = colors)
`axis.text.y`	passed to ggplot2::theme
`na_imputes`	TRUE or FALSE

Details

`plot_summarized_detections` plots the detection structure at featuregroup/samplegroup resolution. It shows full detection and random NAs (bright color) and imputations (light color).

Value

ggplot object

Examples

```
file <- system.file('extdata/fukuda20.proteingroups.txt', package = 'autonomics')
object <- read_maxquant_proteingroups(file)
plot_detections(object)
plot_detections(impute(object))
plot_summarized_detections(object)
plot_summarized_detections(impute(object))

subgroups <- sprintf('%s_STD', c('E00','E01','E02','E05','E15','E30','M00'))
file <- system.file('extdata/billing19.proteingroups.txt', package = 'autonomics')
object <- read_maxquant_proteingroups(file, subgroups = subgroups)
plot_summarized_detections(object)
plot_summarized_detections(object, 'subgroup')
plot_detections(object)
plot_detections(object, 'subgroup')
```

---

plot_subgroup_points *Plot features*

Description

Plot features

Usage

```
plot_subgroup_points(
  object,
  subgroup = "subgroup",
  block = NULL,
  x = subgroup,
  color = subgroup,
  group = block,
  facet = "feature_id",
  nrow = NULL,
  scales = "free_y",
  ...,
  palette = NULL,
  fixed = list(na.rm = TRUE),
  theme = list(axis.text.x = element_text(angle = 90, vjust = 0.5, hjust = 1))
)
```

Arguments

object	SummarizedExperiment
subgroup	subgroup svar
block	block svar
x	svar mapped to x
color	svar mapped to color
group	svar mapped to group
facet	svar mapped to facets
nrow	number of rows
scales	'free_y' etc.
...	mapped aesthetics
palette	color palette (named character vector)
fixed	fixed aesthetics
theme	ggplot theme specifications

Value

ggplot object

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file, fit = 'limma')
idx <- order(fdata(object)$`p~t1-t0~limma`)[1:9]
object %<>% extract(idx, )
plot_sample_boxplots(  object)
plot_feature_boxplots( object)
plot_sample_boxplots(object, x = 'Time')
plot_subgroup_points(  object, subgroup = 'Time')
plot_subgroup_points(  object, subgroup = 'Time', block = 'Subject')
```

---

plot_summary *Plot summary*

Description

Plot summary

Usage

```
plot_summary(
  object,
  fit = "limma",
  formula = default_formula(object),
  block = NULL,
  label = "feature_id",
  palette = make_svar_palette(object, svar = svar)
)
```

Arguments

object	SummarizedExperiment
fit	linmod engine : 'limma', 'lm', 'lme', 'lmer' or 'wilcoxon'
formula	model formula
block	NULL or svar
label	fvar
palette	NULL or colorvector

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file)
object %<>% pca()
object %<>% pls(by = 'subgroup')
object %<>% linmod_limma()
plot_summary(object, block = 'Subject')
```

---

plot_venn *Plot venn*

Description

Plot venn

Usage

```
plot_venn(x)
```

Arguments

x	list

Examples

```
x <- list(roundfruit = c('apple', 'orange'), redfruit = c('apple', 'strawberry'))
plot_venn(x)
```

plot_venn_heatmap *Plot venn heatmap*

Description

Plot venn heatmap

Usage

```
plot_venn_heatmap(x)
```

Arguments

x	list

Examples

```
x <- list(roundfruit = c('apple', 'orange'), redfruit = c('apple', 'strawberry'))
plot_venn_heatmap(x)
```

plot_violins *Plot sample/feature violins*

Description

Plot sample/feature violins

Usage

```
plot_violins(
  object,
  assay = assayNames(object)[1],
  x,
  fill,
  color = NULL,
  group = NULL,
  facet = NULL,
  nrow = NULL,
  ncol = NULL,
  dir = "h",
  scales = "free",
  labeller = label_value,
  highlight = NULL,
  palette = NULL,
  fixed = list(na.rm = TRUE)
)
```

```
plot_feature_violins(
  object,
  assay = assayNames(object)[1],
  x = "feature_id",
  fill = "feature_id",
  color = NULL,
  n = 9,
  facet = NULL,
  nrow = NULL,
  ncol = NULL,
  dir = "h",
  scales = "free",
  labeller = label_value,
  highlight = NULL,
  fixed = list(na.rm = TRUE)
)

plot_sample_violins(
  object,
  assay = assayNames(object)[1],
  x = "sample_id",
  fill = if ("subgroup" %in% svars(object)) "subgroup" else "sample_id",
  color = NULL,
  n = 100,
  facet = NULL,
  nrow = NULL,
  ncol = NULL,
  dir = "h",
  scales = "free",
  labeller = label_value,
  highlight = NULL,
  fixed = list(na.rm = TRUE)
)

plot_subgroup_violins(
  object,
  assay = assayNames(object)[1],
  subgroup,
  x = "subgroup",
  fill = "subgroup",
  color = NULL,
  highlight = NULL,
  facet = "feature_id",
  fixed = list(na.rm = TRUE)
)
```

Arguments

object	SummarizedExperiment
assay	string
x	svar (string)
fill	svar (string)
color	svar (string)
group	svar (string)
facet	svar (character vector)
nrow	NULL or number
ncol	NULL or number
dir	'h' or 'v' : are facets filled horizontally or vertically ?
scales	'free', 'free_x', 'free_y', or 'fixed'
labeller	label_both or label_value
highlight	fvar expressing which feature should be highlighted (string)
palette	named color vector (character vector)
fixed	fixed aesthetics
n	number
subgroup	subgroup svar

Value

ggplot object

See Also

plot_exprs, plot_densities

Examples

```
# data
    file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
    object <- read_metabolon(file)
    object %<>% extract(, order(.$subgroup))
    control_features <- c('biotin','phosphate')
    fdata(object) %<>% cbind(control = .$feature_name %in% control_features)
# plot
    plot_violins(object[1:12, ], x = 'feature_id', fill = 'feature_id')
    plot_feature_violins(object[1:12, ])
    plot_sample_violins(object[, 1:12],  highlight = 'control')
    plot_subgroup_violins(object[1:4, ], subgroup = 'subgroup')
```

plot_volcano *Plot volcano*

Description

Plot volcano

Usage

```
plot_volcano(
  object,
  fit = fits(object)[1],
  coefs = autonomics::coefs(object, fit = fit)[1],
  facet = if (is_scalar(fit)) "coef" else c("fit", "coef"),
  scales = "fixed",
  shape = if ("imputed" %in% fvars(object)) "imputed" else NULL,
  size = NULL,
  alpha = NULL,
  label = if ("gene" %in% fvars(object)) "gene" else "feature_id",
  colors = c(down = "#ff5050", unchanged = "grey", up = "#009933"),
  max.overlaps = 10,
  features = NULL,
  nrow = length(fit),
  p = 0.05,
  fdr = 0.05,
  n = Inf,
  xndown = NULL,
  xnup = NULL,
  title = NULL,
  file = NULL,
  width = 7,
  height = 7,
  verbose = TRUE
)
```

Arguments

object	SummarizedExperiment
fit	'limma', 'lme', 'lm', 'wilcoxon'
coefs	character vector
facet	character vector
scales	'free', 'fixed', etc.
shape	fvar (string)
size	fvar (string)
alpha	fvar (string)

label	fvar (string)
colors	character vector
max.overlaps	number: passed to ggrepel
features	feature ids (character vector): features to encircle
nrow	number: no of rows in plot
p	number: p cutoff for labeling
fdr	number: fdr cutoff for labeling
n	number: n cutoff for labeling
xndown	x position of ndown labels
xnup	x position of nup labels
title	string or NULL
file	filename
width	number
height	number
verbose	TRUE or FALSE

Value

ggplot object

Examples

```
# Regular Usage
    file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
    object <- read_metabolon(file)
    object %<>% linmod_limma()
    object %<>% linmod_lm()
   plot_volcano(object, coefs = 't3-t0', fit = 'limma')                # single contrast
  plot_volcano(object, coefs = c('t2-t0', 't3-t0'), fit = 'limma')      # multip contrasts
  plot_volcano(object, coefs = c('t2-t0', 't3-t0'), fit = c('limma', 'lm')) # multip contrs & methods

# When nothing passes FDR
    fdt(object) %<>% add_adjusted_pvalues('fdr', fit = 'limma',coefs = 't3-t0')
    object %<>% extract( fdrvec(object, fit = 'limma', coef = 't3-t0') > 0.05, )
    plot_volcano(object, coefs = 't3-t0', fit = 'limma')

# Additional mappings
    file <- system.file('extdata/fukuda20.proteingroups.txt', package = 'autonomics')
    object <- read_maxquant_proteingroups(file, impute = TRUE)
    object %<>% linmod_limma()
    plot_volcano(object)
    plot_volcano(object, label = 'gene')
    plot_volcano(object, label = 'gene', size = 'log2maxlfq')
    plot_volcano(object, label = 'gene', size = 'log2maxlfq', alpha = 'pepcounts')
    plot_volcano(object, label = 'gene', features = c('Q503D2_DANRE'))
   plot_volcano(object, label = 'gene', features = list(c('Q503D2_DANRE', 'Q6DGK4_DANRE'),
                                                        c('Q6DGK4_DANRE', 'F1Q7L0_DANRE')))
```

plot_x_density *Plot xy densities*

Description

Plot xy densities

Usage

```
plot_x_density(
  x,
  y = NULL,
  xbreaks = mclust_breaks(x),
  components = TRUE,
  title = NULL,
  color = "#F8766D",
  xlab = NULL,
  ylab = "Density",
  transcolor = "00000000",
  panel.border = element_rect(color = color),
  plot.margin = unit(c(5.5, 5.5, 5.5, 5.5), "points"),
  scale_x_position = "bottom",
  axis.ticks.x = element_line(color = color),
  axis.ticks.y = element_line(color = color),
  axis.text.x = element_text(color = color),
  axis.text.y = element_text(color = color),
  axis.title.y = element_text(color = color)
)

plot_y_density(
  y,
  x = NULL,
  ybreaks = mclust_breaks(y),
  title = NULL,
  color = "#F8766D",
  xlab = NULL,
  ylab = NULL,
  transcolor = "00000000"
)

plot_xy_scatter(
  x,
  y,
  xbreaks = mclust_breaks(x),
  ybreaks = mclust_breaks(y),
  color = c("#F8766D", "#00BFC4"),
  contour = FALSE,
```

```
  smooth = FALSE,
  xlab = NULL,
  ylab = NULL
)

plot_xy_density(
  x,
  y,
  xbreaks = mclust_breaks(x),
  ybreaks = mclust_breaks(y),
  xlab = get_name_in_parent(x),
  ylab = get_name_in_parent(y),
  color = c("#F8766D", "#00BFC4"),
  contour = FALSE,
  smooth = FALSE
)
```

Arguments

x	numeric vector
y	numeric vector
xbreaks	numeric vector
components	TRUE or FALSE: whether to plot distributions of mixture components
title	NULL or string
color	vector or string
xlab	NULL or string
ylab	NULL or string
transcolor	string
panel.border	element_rect(color = color) etc.
plot.margin	unit(c(5.5,5.5,5.5,5.5), 'points') etc.
scale_x_position	'bottom' etc.
axis.ticks.x	element_line(color = color) etc.
axis.ticks.y	element_line(color = color) etc.
axis.text.x	element_text(color = color) etc.
axis.text.y	element_text(color = color) etc.
axis.title.y	element_text(color = color) etc.
ybreaks	numeric vector
contour	TRUE or FALSE: plot density contours ?
smooth	TRUE or FALSE: plot smooth line ?

Value

ggplot

Examples

```
# Bimodal
    set.seed(1)
    x <- c(rnorm(10, 3), rnorm(10,7))
    y <- c(rnorm(10, 3), rnorm(10,7))
    plot_xy_density(x,y)
    plot_xy_density(x,y, contour = TRUE)
    plot_xy_density(x,y,  smooth = TRUE)
    plot_xy_scatter(x,y)
    plot_x_density(x)
    plot_y_density(y)
# Unimodal
    set.seed(1)
    x <- c(rnorm(20, 3))
    y <- c(rnorm(20, 3))
    plot_xy_density(x,y)
    plot_xy_scatter(x,y)
    plot_x_density(x)
    plot_y_density(y)
```

PRECURSOR_QUANTITY *diann precursor quantity*

Description

diann precursor quantity

Usage

```
PRECURSOR_QUANTITY
```

Format

An object of class `character` of length 1.

---

preprocess_rnaseq_counts *Preprocess RNAseq counts*

Description

Preprocess RNAseq counts

Usage

```
preprocess_rnaseq_counts(
  object,
  formula = ~subgroup,
  block = NULL,
  min_count = 10,
  pseudo = 0.5,
  tpm = FALSE,
  cpm = TRUE,
  voom = TRUE,
  log2 = TRUE,
  verbose = TRUE,
  plot = TRUE
)
```

Arguments

object	SummarizedExperiment
formula	designmat formula
block	blocK svar
min_count	min count required in some samples
pseudo	added pseudocount to avoid log(x)=-Inf
tpm	TRUE or FALSE : tpm normalize?
cpm	TRUE or FALSE : cpm normalize? (counts per million (scaled) reads)
voom	TRUE or FALSE : voom weight?
log2	TRUE or FALSE : log2 transform?
verbose	TRUE or FALSE : msg?
plot	TRUE or FALSE : plot?

Value

SummarizedExperiment

Examples

```
file <- system.file('extdata/billing19.rnacounts.txt', package = 'autonomics')
object <- .read_rnaseq_counts(file)
object$subgroup
object %<>% preprocess_rnaseq_counts()
```

pull_columns *Pull columns in a dataframe to the front*

Description

Pull columns in a dataframe to the front

Usage

```
pull_columns(df, first_cols, verbose = TRUE)
```

Arguments

df	data.frame
first_cols	character vector: columns to be pulled to the front
verbose	TRUE (default) or FALSE

Value

dataframe with re-ordered columns

Examples

```
df <- data.frame(
   symbol = c('A1BG', 'A2M'),
   id     = c('1',    '2'),
   name   = c('alpha-1-B glycoprotein', 'alpha-2-macroglobulin'),
   type   = c('proteincoding', 'proteincoding'))
first_cols <- c('id', 'symbol', 'location', 'uniprot')
pull_columns(df, first_cols)
```

pvalues_estimable *Are coefs/pvalues estimable*

Description

Are coefs/pvalues estimable

Usage

```
pvalues_estimable(formula, data)

coefs_estimable(formula, data)
```

Arguments

formula	formula
data	data.table

Examples

```
# Onevar design
# -------------
    # Design not full rank, coefficients/pvalues not estimable
         (dt <- data.table( time = factor(c('t0', 't1', 't2', 't3'  ) ),
                            value =        c(  0,    1,    2,   NA   ) ))
           coefs_estimable(~time, data = dt)
          pvalues_estimable(~time, data = dt)
           summary(lm(value~time, data = dt))

    # Design full rank, coefficients estimable.
    # No residual dof, pvalues not estimable.
         (dt <- data.table( time = factor(c('t0', 't1', 't2', 't3'  ) ),
                            value =        c(  0,    1,    2,    3   ) ))
           coefs_estimable(~time, data = dt)
          pvalues_estimable(~time, data = dt)
           summary(lm(value~time, data = dt))

    # Design full rank, coefficients estimable
    # Residual dof, pvalues estimable
         (dt <- data.table( time = factor(c('t0', 't1', 't2', 't3', 't3' ) ),
                            value =        c(  0,    1,    2,    3,    3.1) ))
           coefs_estimable(~time, data = dt)
          pvalues_estimable(~time, data = dt)
          summary(lm(value~time, data = dt))

# Twovar design
# -------------
    # Design not full rank, coefficients/pvalues not estimable.
      (dt <- data.table( time = factor(c( 't0', 't1', 't2', 't2','t3', 't3', 't0', 't1', 't2', 't3' ) ),
                 diabetes = factor(c(  'C', 'C', 'C', 'C', 'C',  'C',  'D', 'D', 'D', 'D' ) ),
                    value =     c(   0,   1,   2,   2.1, 3,   3.1,  NA,  NA,  NA,  NA ) ))
           coefs_estimable(~time+diabetes, data = dt)
          pvalues_estimable(~time+diabetes, data = dt)
          # summary(lm(value~time+diabetes, data = dt))

    # Design full rank, coefficients estimable
    # No residual dof, pvalues not estimable
      (dt <- data.table( time = factor(c( 't0', 't1', 't2', 't3', 't0', 't1', 't2', 't3' ) ),
                  diabetes = factor(c(  'C', 'C',  'C',  'C',   'D',  'D',  'D',  'D'  ) ),
                       value =       c(   0,   1,   2,   3,     0.5,  NA,   NA,   NA  ) ))
           coefs_estimable(~time+diabetes, data = dt)
          pvalues_estimable(~time+diabetes, data = dt)
           summary(lm(value~time+diabetes, data = dt))

    # Design full rank, coefficients estimable
    # Residual dof, pvalues estimable
```

```
(dt <- data.table( time = factor(c( 't0', 't1', 't2', 't3',  't0', 't1', 't2', 't3' ) ),
             diabetes = factor(c(  'C', 'C',  'C',  'C',   'D',  'D',  'D',  'D'  ) ),
                 value =       c(   0,    1,    2,   3,    0.5,  1.6,  NA,   NA  ) ))
  coefs_estimable(~time+diabetes, data = dt)
pvalues_estimable(~time+diabetes, data = dt)
  summary(lm(value~time+diabetes, data = dt))
```

`read_affymetrix` *Read affymetrix microarray*

Description

Read affymetrix microarray

Usage

```
read_affymetrix(celfiles)
```

Arguments

`celfiles`	string vector: CEL file paths

Value

RangedSummarizedExperiment

Examples

```
# Downloading example dataset fails 600s limit - example outcommented.
# url <- paste0('http://www.bioconductor.org/help/publications/2003/Chiaretti/chiaretti2/T33.tgz')
# localdir  <- file.path(tools::R_user_dir('autonomics', 'cache'), 'T33')
# dir.create(localdir, showWarnings = FALSE)
# localfile <- file.path(localdir, basename(url))
# if (!file.exists(localfile)){  download.file(url, destfile = localfile)
#                                untar(localfile, exdir = path.expand(localdir))  }
# localfile %<>% substr(1, nchar(.)-4)
# if (!installed("BiocManager"))  install.packages('BiocManager')
# if (!installed("hgu95av2.db"))  BiocManager::install('hgu95av2.db')
# read_affymetrix(celfiles = list.files(localfile, full.names = TRUE))
```

`read_compounddiscoverer` *Read compound discoverer output*

Description

Read compound discoverer output

Usage

```
read_compounddiscoverer(
  dir = getwd(),
 files = list.files(path = dir, pattern = "(RP|HILIC).*\\.csv$", full.names = TRUE),
  colname_regex = "^(.*)\\d{8,8}_+(.*)_+((HILIC|RP)(NEG|POS))\\.raw.*$",
 colname_format = function(x) stringi::stri_replace_first_regex(x, colname_regex,
    "$1$2", opts_regex = stringi::stri_opts_regex(case_insensitive = TRUE)),
 mod_extract = function(x) stringi::stri_subset_regex(x, colname_regex, opts_regex =
    stringi::stri_opts_regex(case_insensitive = TRUE)) %>%
    stringi::stri_replace_first_regex(colname_regex, "$3", opts_regex =
    stringi::stri_opts_regex(case_insensitive = TRUE)),
  quantity = NULL,
  nonames = FALSE,
  exclude_sname_pattern = "(blank|QC|RS)",
  subgroups = NULL,
  logbase = 2,
  impute = FALSE,
  plot = FALSE,
  label = "feature_id",
  pca = plot,
  pls = plot,
  fit = if (plot) "limma" else NULL,
  formula = ~subgroup,
  block = NULL,
  coefs = NULL,
  contrasts = NULL,
  palette = NULL,
  verbose = TRUE
)
```

Arguments

`dir`	compound discoverer output directory
`files`	compound discoverer output files
`colname_regex`	regular expression to parse sample names from column names
`colname_format`	function to reformat column names
`mod_extract`	function to extract MS modi from sample names

quantity	'area', 'normalizedarea' or NULL
nonames	TRUE or FALSE: retain compunds without Names?
exclude_sname_pattern	regular expression of sample names to exclude
subgroups	NULL or string vector : subgroups to retain
logbase	base for logarithmization of the data
impute	TRUE or FALSE: impute group-specific NA values?
plot	TRUE or FALSE: plot ?
label	fvar
pca	TRUE or FALSE: run pca ?
pls	TRUE or FALSE: run pls ?
fit	model engine: 'limma', 'lm', 'lme(r)', 'wilcoxon' or NULL
formula	model formula
block	model blockvar: string or NULL
coefs	model coefficients of interest: character vector or NULL
contrasts	coefficient contrasts of interest: character vector or NULL
palette	color palette : named character vector
verbose	TRUE or FALSE : message ?

Value

SummarizedExperiment

`read_diann_pgmatrix` *Read diann phosphosites*

Description

Read diann phosphosites

Usage

```
read_diann_pgmatrix(dir)

read_diann_phosphosites(dir)

read_diann_phosphodiffs(dir)
```

Arguments

dir	directory with 'report_pgmatrix' and 'report.phosphosites_90.tsv'

Value

SummarizedExperiment

read_fragpipe *Read fragpipe*

Description

Read fragpipe

Usage

```
read_fragpipe(
  dir = getwd(),
  file = if (is_file(dir)) dir else file.path(dir, "combined_protein.tsv"),
  contaminants = FALSE,
  verbose = TRUE
)
```

Arguments

dir	directory with 'combined_protein.tsv'
file	'combined_protein.tsv' (full path)
contaminants	whether to include contaminants
verbose	whether to msg

Value

SummarizedExperiment

Examples

```
file <- download_data('multiorganism.combined_protein.tsv')
object <- read_fragpipe(file = file)
object
fdt(object)
sdt(object)
```

read_maxquant_phosphosites *Read maxquant phosphosites*

Description

Read maxquant phosphosites

Usage

```
read_maxquant_phosphosites(
  dir = getwd(),
  fosfile = if (is_file(dir)) dir else file.path(dir, "phospho (STY)Sites.txt"),
  profile = file.path(dirname(fosfile), "proteinGroups.txt"),
  fastafile = NULL,
  restapi = FALSE,
  quantity = NULL,
  subgroups = NULL,
  invert = character(0),
  rm_contaminants = TRUE,
  rm_reverse = TRUE,
  rm_missing_in_all_samples = TRUE,
  localization = 0.75,
  impute = FALSE,
  plot = FALSE,
  label = "feature_id",
  pca = plot,
  pls = plot,
  fit = if (plot) "limma" else NULL,
  formula = as.formula("~ subgroup"),
  block = NULL,
  coefs = NULL,
  contrasts = NULL,
  palette = NULL,
  verbose = TRUE
)

read_phosphosites(...)
```

Arguments

dir	proteingroups directory
fosfile	phosphosites file
profile	proteingroups file
fastafile	uniprot fastafile
restapi	TRUE or FALSE : annotate non-fastadt uniprots using uniprot restapi
quantity	'normalizedratio', 'ratio', 'correctedreporterintensity', 'reporterintensity', 'maxlfq', 'labeledintensity', 'intensity' or NULL
subgroups	NULL or string vector : subgroups to retain
invert	string vector: subgroups which require inversion
rm_contaminants	TRUE or FALSE: rm contaminants ?
rm_reverse	TRUE or FALSE: rm reverse proteins ?
rm_missing_in_all_samples	TRUE or FALSE

localization	number: min localization probability (for phosphosites)
impute	TRUE or FALSE: impute group-specific NA values?
plot	TRUE or FALSE
label	fvar
pca	TRUE or FALSE: run pca ?
pls	TRUE or FALSE: run pls ?
fit	model engine: 'limma', 'lm', 'lme(r)', 'wilcoxon' or NULL
formula	model formula
block	model blockvar: string or NULL
coefs	model coefficients of interest: string vector or NULL
contrasts	model coefficient contrasts of interest: string vector or NULL
palette	color palette: named string vector
verbose	TRUE or FALSE: message ?
...	maintain deprecated functions

Value

SummarizedExperiment

Examples

```
  profile <- system.file('extdata/billing19.proteingroups.txt', package = 'autonomics')
  fosfile <- system.file('extdata/billing19.phosphosites.txt',  package = 'autonomics')
fastafile <- system.file('extdata/uniprot_hsa_20140515.fasta',  package = 'autonomics')
subgroups <- sprintf('%s_STD', c('E00', 'E01', 'E02', 'E05', 'E15', 'E30', 'M00'))
pro <- read_maxquant_proteingroups(file = profile, subgroups = subgroups)
fos <- read_maxquant_phosphosites(fosfile = fosfile, profile = profile, subgroups = subgroups)
fos <- read_maxquant_phosphosites(fosfile = fosfile, profile = profile, fastafile = fastafile, subgroups = subgroup
```

---

read_maxquant_proteingroups

Read maxquant proteingroups

Description

Read maxquant proteingroups

Usage

```
read_maxquant_proteingroups(
  dir = getwd(),
  file = if (is_file(dir)) dir else file.path(dir, "proteinGroups.txt"),
  fastafile = NULL,
  restapi = FALSE,
  quantity = NULL,
  subgroups = NULL,
  invert = character(0),
  rm_contaminants = TRUE,
  rm_reverse = TRUE,
  rm_missing_in_all_samples = TRUE,
  impute = FALSE,
  plot = FALSE,
  label = "feature_id",
  pca = plot,
  pls = plot,
  fit = if (plot) "limma" else NULL,
  formula = as.formula("~ subgroup"),
  block = NULL,
  coefs = NULL,
  contrasts = NULL,
  palette = NULL,
  verbose = TRUE
)

read_proteingroups(...)
```

Arguments

dir	proteingroups directory
file	proteingroups file
fastafile	uniprot fastafile
restapi	TRUE or FALSE : use uniprot restapi to annotate uniprots not in fastadt ?
quantity	'normalizedratio', 'ratio', 'correctedreporterintensity', 'reporterintensity', 'maxlfq', 'labeledintensity', 'intensity' or NULL
subgroups	NULL or string vector : subgroups to retain
invert	string vector : subgroups which require inversion
rm_contaminants	TRUE or FALSE : rm contaminants ?
rm_reverse	TRUE or FALSE : rm reverse proteins ?
rm_missing_in_all_samples	TRUE or FALSE
impute	TRUE or FALSE: impute group-specific NA values?
plot	TRUE or FALSE: plot ?

label	fvar
pca	TRUE or FALSE: run pca ?
pls	TRUE or FALSE: run pls ?
fit	model engine: 'limma', 'lm', 'lme(r)', 'wilcoxon' or NULL
formula	model formula
block	model blockvar: string or NULL
coefs	model coefficients of interest: character vector or NULL
contrasts	coefficient contrasts of interest: character vector or NULL
palette	color palette : named character vector
verbose	TRUE or FALSE : message ?
...	maintain deprecated functions

Value

SummarizedExperiment

Examples

```
# fukuda20 - LFQ
    file <- system.file('extdata/fukuda20.proteingroups.txt', package = 'autonomics')
    pro <- read_maxquant_proteingroups(file = file)

# billing19 - Normalized Ratios
       file <- system.file('extdata/billing19.proteingroups.txt', package = 'autonomics')
   fastafile <- system.file('extdata/uniprot_hsa_20140515.fasta', package = 'autonomics')
    subgroups <- sprintf('%s_STD', c('E00', 'E01', 'E02', 'E05', 'E15', 'E30', 'M00'))
    pro <- read_maxquant_proteingroups(file = file, subgroups = subgroups)
   pro <- read_maxquant_proteingroups(file = file, fastafile = fastafile, subgroups = subgroups)
```

---

read_msigdt *Read msigdb datatable*

Description

Read msigdb datatable

Usage

```
read_msigdt(
  file = defaultmsigfile(),
 collections = if (is.null(file)) NULL else switch(basename(file) %>% substr(nchar(.)
  - 4, nchar(.) - 3), Hs = c("C2:CP:REACTOME", "C5:GO:BP", "C5:GO:MF", "C5:GO:CC"), Mm
    = c("M2:CP:REACTOME", "M5:GO:BP", "M5:GO:MF", "M5:GO:CC"))
)
```

Arguments

file	msigdb file: one of the files in dir(MSIGDB).
collections	subset of names(MSIGCOLLECTIONS)

Examples

```
read_msigdt()
```

---

read_olink *Read olink file*

Description

Read olink file

Usage

```
read_olink(file, sample_excel = NULL, sample_tsv = NULL, by.y = "SampleID")
```

Arguments

file	olinkfile
sample_excel	sample excel
sample_tsv	sample tsv
by.y	sample tsv mergeby column

Value

SummarizedExperiment

Examples

```
# Example data
    npxdt   <- data.table::data.table(OlinkAnalyze::npx_data1)[, c(1:11, 17)]
    sampledt <- data.table::data.table(OlinkAnalyze::npx_data1)[, c(1, 12:15)]
    sampledt %<>% extract(!grepl('CONTROL', SampleID))
    sampledt %<>% unique()
# Write to file
    file <- paste0(tempfile(), '.olink.csv')
    samplefile <- paste0(tempfile(), '.samples.xlsx')
    data.table::fwrite(npxdt, file)
    writexl::write_xlsx(sampledt, samplefile)
# Read
    object <- read_olink(file, sample_excel = samplefile)
    biplot(pca(object), color = 'Time', group = 'Subject', shape = 'Treatment')
```

read_salmon *Read salmon*

Description

Read salmon

Usage

```
read_salmon(dir, sfile = NULL, by = NULL, ensdb = NULL)
```

Arguments

dir	salmon results rootdir
sfile	samplefile
by	samplefile column to merge by
ensdb	EnsDb object

Value

SummarizedExperiment

Examples

```
# dir <- '../bh/salmon_quants'
# sfile <- '../bh/samplesheet.csv'
# by <- 'salmonDir'
# ah <- AnnotationHub::AnnotationHub()
# ensdb <- ah[['AH98078']]
# read_salmon(dir, sfile = sfile, by = 'salmonDir', ensdb = ensdb)
```

read_uniprotdt *Read fasta hdrs*

Description

Read fasta hdrs

Usage

```
read_uniprotdt(fastafile, fastafields = FASTAFIELDS, verbose = TRUE)

parse_maxquant_hdrs(fastahdrs)

read_contaminantdt(force = FALSE, verbose = TRUE)
```

Arguments

fastafile	string (or charactervector)
fastafields	charactervector : which fastahdr fields to extract ?
verbose	bool
fastahdrs	character vector
force	whether to overwrite existing file

Value

data.table(uniprot, protein, gene, uniprot, reviewed, existence)

Note

existence values are always those of the canonical isoform (no isoform-level resolution for this field)

Examples

```
# uniprot hdrs
    fastafile <- system.file('extdata/uniprot_hsa_20140515.fasta', package = 'autonomics')
     read_uniprotdt(fastafile)

# maxquant hdrs
    file <- system.file('extdata/fukuda20.proteingroups.txt', package = 'autonomics')
    dt <- .read_maxquant_proteingroups(file)
    parse_maxquant_hdrs(dt$`Fasta headers`)

   profile <- system.file('extdata/billing19.proteingroups.txt', package = 'autonomics')
   fosfile <- system.file('extdata/billing19.phosphosites.txt',  package = 'autonomics' )
    prodt <- .read_maxquant_proteingroups(profile)
    fosdt <- .read_maxquant_phosphosites(fosfile, profile)
    parse_maxquant_hdrs(prodt$`Fasta headers`)
    parse_maxquant_hdrs(fosdt$`Fasta headers`)

# contaminant hdrs
    read_contaminantdt()
```

---

reexports *Objects exported from other packages*

Description

These objects are imported from other packages. Follow the links below to see their documentation.

data.table data.table

magrittr %<>%, %>%, extract

reset_fit *Reset fit*

Description

Reset fit

Usage

```
reset_fit(object, fit = fits(object), verbose = TRUE)
```

Arguments

object	SummarizedExperiment
fit	character vector
verbose	TRUE or FALSE

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file)
object %>% fdt()
object %>% linmod_limma() %>% fdt()
object %>% linmod_limma() %>% reset_fit() %>% fdt()
object %>% linmod_limma() %>% linmod_lm() %>% reset_fit('limma') %>% fdt()
object %>% linmod_limma() %>% linmod_lm() %>% reset_fit() %>% fdt()
```

rm_diann_contaminants *Rm contaminants*

Description

Rm contaminants from DIA-NN SumExp

Usage

```
rm_diann_contaminants(object, verbose = TRUE)
```

Arguments

object	SummarizedExperiment
verbose	TRUE or FALSE

Value

SummarizedExperiment

Examples

```
file <- download_data('dilution.report.tsv')
object <- read_diann_proteingroups(file)
object %<>% rm_diann_contaminants()
```

`rm_missing_in_all_samples` *Rm features missing in some samples*

Description

Rm features missing in some samples

Usage

```
rm_missing_in_all_samples(object, verbose = TRUE)

rm_missing_in_some_samples(object, verbose = TRUE)
```

Arguments

`object`	SummarizedExperiment
`verbose`	TRUE (default) or FALSE

Value

updated object

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file)
rm_missing_in_all_samples( object)
rm_missing_in_some_samples(object)
```

`rm_unmatched_samples` *rm unmatched/singleton samples*

Description

rm unmatched/singleton samples

Usage

```
rm_unmatched_samples(
  object,
  subgroupvar = "subgroup",
  subgroupctr = slevels(object, subgroupvar)[1],
  block,
  verbose = TRUE
)

rm_singleton_samples(object, subgroupvar = "subgroup", verbose = TRUE)
```

Arguments

object	SummarizedExperiment
subgroupvar	subgroup variable (string)
subgroupctr	control subgroup (string)
block	block variable (string)
verbose	TRUE/FALSE

Value

SummarizedExperiment

Examples

```
file <- system.file('extdata/atkin.somascan.adat', package = 'autonomics')
object <- read_somascan(file)
object %<>% filter_samples(subgroup %in% c('t1', 't2'), verbose = TRUE)
rm_singleton_samples(object, subgroupvar = 'Subject')
rm_unmatched_samples(object, subgroupvar = 'subgroup', block = 'Subject')
```

---

sbind *Sample/Feature/Assay bind*

Description

Sample/Feature/Assay bind

Usage

```
sbind(obj1, obj2)

fbind(obj1, obj2)

abind(obj1, obj2)
```

Arguments

obj1	SummarizedExperiment: nrow1 x ncol1
obj2	SummarizedExperiment: nrow2 x ncol2

Value

SummarizedExperiment: nrow1+nrow2 x ncol1+ncol2

Examples

```
# Data
    obj1 <- object1()
    obj2 <- object2()
    biplot( pca(obj1), color = 'age')
    biplot( pca(obj2), color = 'age')

# Sample bind
    obj <- sbind(obj1, obj2)
    biplot( pca(obj), color = 'age', shape = 'set')
    sdt(obj)  # SET added
    fdt(obj)  # common fvars with differing content pasted together

# Feature bind
    obj <- fbind(obj1, obj2)
    biplot( pca(obj), color = 'age', nx = 2)
    fdt(obj)  # SET added
    sdt(obj)  # common svars with differing content pasted together

# Assay bind
    obj <- abind(obj1, obj2)
    plot( SummarizedExperiment::assays(abind(obj1, obj2))$SET1.exprs,
          SummarizedExperiment::assays(abind(obj1, obj2))$SET2.exprs)
    fdt(obj)  # common fvars with differing content pasted together
    sdt(obj)  # common svars with differing content pasted together
```

---

scaledlibsizes *Get tmm-scaled libsizes*

Description

Get tmm-scaled libsizes

Usage

```
scaledlibsizes(counts)
```

Arguments

counts	counts matri

Value

scaled libsize vector

Examples

```
file <- system.file('extdata/billing19.rnacounts.txt', package = 'autonomics')
object <- read_rnaseq_counts(file)
scaledlibsizes(counts(object))
```

`scoremat` *Extract scores/loadings*

Description

Extract scores/loadings

Usage

```
scoremat(object, method = "pca", by = biplot_by(object, method), dim = 1:2)

scores(object, method = "pca", by = biplot_by(object, method), dim = 1)

loadingmat(object, method = "pca", by = biplot_by(object, method), dim = 1:2)

loadings(object, method = "pca", by = biplot_by(object, method), dim = 1)
```

Arguments

`object`	SummarizedExperiment
`method`	'pca', 'pls', etc.
`by`	svar (string)
`dim`	numeric vector

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file)
object %<>% pca()
    scores(object)[1:2]
  loadings(object)[1:2]
  scoremat(object)[1:2, ]
loadingmat(object)[1:2, ]
```

slevels *Get slevels*

Description

Get svar levels

Usage

```
slevels(object, svar)

subgroup_levels(object)
```

Arguments

object	SummarizedExperiment, eSet, or eList
svar	sample var (character)

Value

svar values (character)

Examples

```
file <- system.file('extdata/billing19.proteingroups.txt', package = 'autonomics')
object <- read_maxquant_proteingroups(file)
slevels(object, 'subgroup')
subgroup_levels(object)
```

snames *Get/Set snames*

Description

Get/Set sample names

Usage

```
snames(object)

## S4 method for signature 'SummarizedExperiment'
snames(object)

snames(object) <- value

## S4 replacement method for signature 'SummarizedExperiment,character'
snames(object) <- value
```

Arguments

object	SummarizedExperiment
value	string vector with sample names

Value

sample names vector (get) or updated eSet (set)

Examples

```
file <- system.file('extdata/billing19.proteingroups.txt', package = 'autonomics')
object <- read_maxquant_proteingroups(file)
head(snames(object))
head(snames(object) %<>% paste0('SAMPLE_', .))
```

---

split_samples *Split samples*

Description

Split samples by svar

Usage

```
split_samples(object, by = "subgroup")

cbind_imputed(objlist)

split_features(object, by)
```

Arguments

object	SummarizedExperiment
by	svar to split by (string)
objlist	SummarizedExperiment list

Value

SummarizedExperiment list

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file)
objlist <- split_features(object, by = 'PLATFORM')
objlist <- split_samples(object, 'Diabetes')
objlist %<>% Map(impute, .)
object <- cbind_imputed(objlist)
```

stepauc *Compute step auc*

Description

Compute step auc

Usage

```
stepauc(x, y, color = "group1", plot = FALSE)
```

Arguments

x	numeric vector
y	numeric vector
color	string
plot	TRUE or FALSE

Value

number

Examples

```
x <- c(  0, 4,   8, 27)
y <- c(100, 67, 33,  0)
stepauc(x, y, plot = TRUE)
```

stri_any_regex *Does any string have a regex*

Description

Does any string have a regex

Usage

```
stri_any_regex(str, pattern)
```

Arguments

str	string vector
pattern	string

Value

TRUE or FALSE

Examples

```
str <- c('s1 Spectral Count', 's1 Unique Spectral Count')
patterns <- c('Spectral Count', '(?<!Unique) Spectral Count', 'Intensity')
stringi::stri_detect_regex(str, pattern = patterns[1])
stringi::stri_detect_regex(str, pattern = patterns[2])
stringi::stri_detect_regex(str, pattern = patterns[3])
stri_any_regex(   str, pattern = patterns)
```

---

stri_detect_fixed_in_collapsed

Detect fixed patterns in collapsed strings

Description

Detect fixed patterns in collapsed strings

Usage

```
stri_detect_fixed_in_collapsed(x, patterns, sep)
```

Arguments

x	vector with collapsed strings
patterns	vector with fixed patterns (strings)
sep	collapse separator (string) or NULL (if uncollapsed)

Value

boolean vector

Examples

```
file <- system.file('extdata/fukuda20.proteingroups.txt', package = 'autonomics')
object <- read_maxquant_proteingroups(file)
x <- fdt(object)$uniprot
patterns <- c('A0A0R4IKT8', 'Q7T3G6')
table(stri_detect_fixed_in_collapsed(x = x, patterns = patterns, sep = ';'))
```

subgroup_array *Get subgroup matrix*

Description

Arrange (subgroup)levels in matrix

Usage

```
subgroup_array(object, subgroupvar)

subgroup_matrix(object, subgroupvar)
```

Arguments

object	SummarizedExperiment
subgroupvar	subgroup svar

Value

matrix

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file)
object$subgroup <- paste0(object$Diabetes, '.', object$subgroup)
subgroup_matrix(object, 'subgroup')
```

subtract_baseline *Subtract baseline*

Description

Subtract baseline level within block

Usage

```
subtract_baseline(
  object,
  subgroupvar,
  subgroupctr = slevels(object, subgroupvar)[1],
  block = NULL,
  assaynames = setdiff(assayNames(object), c("weights", "pepcounts")),
  verbose = TRUE
)
```

```
subtract_pairs(
  object,
  subgroupvar = "subgroup",
  subgroupctr = slevels(object, subgroupvar)[1],
  block,
  assaynames = assayNames(object)[1],
  verbose = TRUE
)

subtract_differences(object, block, subgroupvar, verbose = TRUE)
```

Arguments

object	SummarizedExperiment
subgroupvar	subgroup svar
subgroupctr	control subgroup
block	block svar (within which subtraction is performed)
assaynames	which assays to subtract for
verbose	TRUE/FALSE

Details

subtract_baseline subtracts baseline levels within block, using the medoid baseline sample if multiple exist.

subtract_pairs also subtracts baseline level within block. It cannot handle multiple baseline samples, but has instead been optimized for many blocks

subtract_differences subtracts differences between subsequent levels, again within block

Value

SummarizedExperiment

Examples

```
# read
    file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
    object0 <- read_metabolon(file)
    pca(object0, plot = TRUE, color = 'Time')

# subtract_baseline: takes medoid of baseline samples if multiple
    object <- subtract_baseline(object0, block = 'Subject', subgroupvar = 'Time')
    pca(object, plot = TRUE, color = 'Time')

# subtract_pairs: optimized for many blocks
    object <- subtract_pairs(object0, block = 'Subject', subgroupvar = 'Time')
```

```
    pca(object, plot = TRUE, color = 'Time')

# subtract_differences
    object <- subtract_differences(object0, block = 'Subject', subgroupvar = 'Time')
    values(object) %<>% na_to_zero()
    pca(object, plot = TRUE, color = 'Time')
```

`sumexplist_to_longdt` *SummarizedExperiment list to long data.table*

Description

SummarizedExperiment list to long data.table

Usage

```
sumexplist_to_longdt(
  sumexplist,
  svars = intersect("subgroup", autonomics::svars(sumexplist[[1]])),
  fvars = intersect("gene", autonomics::fvars(sumexplist[[1]])),
  setvarname = "set"
)
```

Arguments

`sumexplist`	list of SummarizedExperiments
`svars`	character vector
`fvars`	character vector
`setvarname`	string

Value

data.table

Examples

```
subgroups <- paste0(c('E00', 'E01', 'E02', 'E05', 'E15', 'E30', 'M00'), '_STD')
rnafile <- system.file('extdata/billing19.rnacounts.txt',     package = 'autonomics')
profile <- system.file('extdata/billing19.proteingroups.txt', package = 'autonomics')
fosfile <- system.file('extdata/billing19.phosphosites.txt',  package = 'autonomics')
rna <- read_rnaseq_counts(rnafile)
pro <- read_maxquant_proteingroups(file = profile, subgroups = subgroups)
fos <- read_maxquant_phosphosites(fosfile = fosfile, profile = profile, subgroups = subgroups)
pro$subgroup %<>% stringi::stri_replace_first_fixed('_STD', '')
fos$subgroup %<>% stringi::stri_replace_first_fixed('_STD', '')

sumexplist <- list(rna = rna, pro = pro, fos = fos)
dt <- sumexplist_to_longdt(sumexplist, setvarname = 'platform')
dt %<>% extract(gene %in% c('TNMD', 'TSPAN6'))
```

sumexp_to_tsv *Write sumexp to tsv*

Description

Write sumexp to tsv

Usage

```
sumexp_to_tsv(object, assay = assayNames(object)[1], file)
```

Arguments

object	SummarizedExperiment
assay	string
file	filename

Examples

```
file <- system.file('extdata/fukuda20.proteingroups.txt', package = 'autonomics')
object <- read_maxquant_proteingroups(file, fit = 'limma')
tsv <- file.path(tempdir(), 'fukuda20.proteingroups.tsv')
sumexp_to_tsv(object, file = tsv)
```

sumexp_to_widedt *SummarizedExperiment to data.table*

Description

SummarizedExperiment to data.table

Usage

```
sumexp_to_widedt(
  object,
  fvars = autonomics::fvars(object),
  assay = assayNames(object)[1]
)

sumexp_to_longdt(
  object,
  fvars = intersect("feature_name", autonomics::fvars(object)),
  svars = intersect("subgroup", autonomics::svars(object)),
  assay = assayNames(object) %>% intersect(c(.[1], "is_imputed")),
  value.name = "value"
)

sumexp_to_groupdt(object, subgroup = subgroup)
```

Arguments

object	sumexp
fvars	additional fvars to include in table
assay	matrix in assays(object) to be used
svars	additional svars to include in table
value.name	string: passed to melt.data.table
subgroup	subgroup (sym)

Details

- sumexp_to_widedt: feature x sample
- sumexp_to_groupdt: feature.subgroup x replicate
- sumexp_to_longdt: feature.sample

Value

data.table

Examples

```
# Atkin Hypoglycemia
   file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
   object <- read_metabolon(file)
   sumexp_to_widedt(object)
   sumexp_to_longdt(object)
   sumexp_to_groupdt(object)

# Fukuda
   file <- system.file('extdata/fukuda20.proteingroups.txt', package = 'autonomics')
   object <- read_maxquant_proteingroups(file)
   values(object)
   fdt(object)
   object %<>% impute()
   table(fdt(object)$imputed)
   sumexp_to_longdt(object)
   sumexp_to_widedt(object)
   sumexp_to_longdt(object)
```

---

summarize_fit *Summarize fit*

Description

Summarize fit

Usage

```
summarize_fit(object, ...)

## S3 method for class 'data.table'
summarize_fit(
  object,
  fit = fits(object),
  coefs = autonomics::coefs(object, fit = fit),
  ...
)

## S3 method for class 'SummarizedExperiment'
summarize_fit(
  object,
  fit = fits(object),
  coefs = autonomics::coefs(object, fit = fit),
  ...
)
```

Arguments

object	SummarizedExperiment or data.table
...	S3 dispatch
fit	'limma', 'lme', 'lm', 'lme', 'wilcoxon' or NULL
coefs	string vector

Value

data.table(contrast, nup, ndown)

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file)
object %<>% linmod_limma()
object %<>% linmod_lm()
summarize_fit(object, coefs = c('t1-t0', 't2-t0', 't3-t0'))
```

---

survobj *Survival analysis example*

Description

Survival analysis example

Usage

```
survobj(verbose = TRUE)
```

Arguments

verbose	TRUE or FALSE

Value

SummarizedExperiment

Examples

```
survobj()
```

---

svalues *Get/Set svalues*

Description

Get/Set svar values

Usage

```
svalues(object, svar)

subgroup_values(object)

sampleid_values(object)

svalues(object, svar) <- value

## S4 replacement method for signature 'SummarizedExperiment,character'
svalues(object, svar) <- value
```

Arguments

object	SummarizedExperiment
svar	sample var (character)
value	value vector

Value

character vector (get) or SummarizedExperiment (set)

Examples

```
file <- system.file('extdata/billing19.proteingroups.txt', package = 'autonomics')
object <- read_maxquant_proteingroups(file)
svalues(object, 'subgroup')
subgroup_values(object)
```

---

svars *Get/Set svars*

Description

Get/Set sample variables

Usage

```
svars(object)

## S4 method for signature 'SummarizedExperiment'
svars(object)

## S4 method for signature 'MultiAssayExperiment'
svars(object)

svars(object) <- value

## S4 replacement method for signature 'SummarizedExperiment,character'
svars(object) <- value

## S4 replacement method for signature 'MultiAssayExperiment,character'
svars(object) <- value
```

Arguments

object	SummarizedExperiment
value	string fector with variable names

Value

sample variable names (get) or updated SummarizedExperiment

Examples

```
file <- system.file('extdata/billing19.proteingroups.txt', package = 'autonomics')
object <- read_maxquant_proteingroups(file)
svars(object)[1]
(svars(object)[1] %<>% paste0('1'))
```

systematic_nas *Is systematic/random/full NA*

Description

Is systematic/random/full NA

Usage

```
systematic_nas(object, by = "subgroup", frac = 0.5)

random_nas(object, by = "subgroup")

no_nas(object)
```

Arguments

object	SummarizedExperiment
by	svar (string)
frac	fraction

Examples

```
file <- system.file('extdata/fukuda20.proteingroups.txt', package = 'autonomics')
object <- read_maxquant_proteingroups(file)
table(systematic_nas(object))   # missing in some subgroups, present in others
table(random_nas(object))       # missing in some samples, independent of subgroup
table(no_nas(object))           # missing in no samples
```

tag_features *Tag features*

Description

Tag features

Usage

```
tag_features(
  object,
  keyvar,
  sep,
  features,
  tagvar = get_name_in_parent(features),
  verbose = TRUE
)
```

Arguments

object	SummarizedExperiment
keyvar	string : intersection fvar
sep	string : keyvar collapse separator
features	character vector : intersection set
tagvar	string :
verbose	TRUE or FALSE

Value

SummarizedExperiment

Examples

```
file <- system.file('extdata/atkin.somascan.adat', package = 'autonomics')
object <- read_somascan(file)
features <- AnnotationDbi::keys(org.Hs.eg.db::org.Hs.eg.db, keytype = 'SYMBOL')
object %<>% tag_features(keyvar = 'EntrezGeneSymbol', sep = ' ', features)
table(fdt(object)$features)
```

---

tag_hdlproteins *Tag hdlproteins*

Description

Tag hdlproteins

Usage

```
tag_hdlproteins(object, verbose = TRUE)
```

Arguments

object	SummarizedExperiment
verbose	TRUE or FALSE

Value

SummarizedExperiment

Examples

```
file <- system.file('extdata/billing19.proteingroups.txt', package = 'autonomics')
object <- read_maxquant_proteingroups(file)
object %<>% tag_hdlproteins()
fdt(object)
```

TAXON_TO_ORGNAME *Annotation Maps*

Description

Annotation Maps

Usage

```
TAXON_TO_ORGNAME

ABBREV_TO_ORGNAME

REVIEWED_TO_NUMBER

EXISTENCE_TO_NUMBER
```

Format

An object of class `character` of length 7.

An object of class `character` of length 4.

An object of class `character` of length 2.

An object of class `numeric` of length 4.

Examples

```
    TAXON_TO_ORGNAME['9606']
   ABBREV_TO_ORGNAME['HSA']
 REVIEWED_TO_NUMBER['reviewed']
EXISTENCE_TO_NUMBER['Evidence at protein level']
```

TESTS *Statistical models supported in autonomics*

Description

Statistical models supported in autonomics

Usage

```
TESTS
```

Format

An object of class `character` of length 5.

Examples

```
TESTS
```

`tpm` *Get/Set tpm*

Description

Get / Set tpm matrix

Usage

```
tpm(object)

## S4 method for signature 'SummarizedExperiment'
tpm(object)

tpm(object) <- value

## S4 replacement method for signature 'SummarizedExperiment,matrix'
tpm(object) <- value

## S4 replacement method for signature 'SummarizedExperiment,numeric'
tpm(object) <- value
```

Arguments

`object`	SummarizedExperiment
`value`	tpm matrix (features x samples)

Value

tpm matrix (get) or updated object (set)

Examples

```
file <- system.file('extdata/billing19.rnacounts.txt', package = 'autonomics')
object <- read_rnaseq_counts(file, plot=FALSE)
tpm(object) <- values(object)
tpm(object)[1:3, 1:3]
```

TRANSFORMENGINES *Data Transformation Methods*

Description

Data Transformation Methods

Usage

```
TRANSFORMENGINES

TRANSFORMSTRICT
```

Format

An object of class `character` of length 7.

An object of class `character` of length 5.

Details

- `TRANSFORMENGINES`: `c('center', 'center_mean', 'center_median', 'invnorm', 'quantnorm', 'vsn', 'zscore')`
- `TRANSFORMSTRICT`: `c('center', 'invnorm', 'quantnorm', 'vsn', 'zscore')`

twofactor_sumexp *twofactor sumexp*

Description

twofactor sumexp

Usage

```
twofactor_sumexp()
```

Value

SummarizedExperiment

uncollapse *Uncollapse/Recollapse*

Description

Uncollapse data.table cols

Usage

```
uncollapse(dt, ..., sep = ";")

recollapse(dt, by, sep = ";")
```

Arguments

dt	data.table
...	cols
sep	string
by	string

Examples

```
# Example data
   (dt <- data.table::data.table(
              uniprot  = 'Q9BQL6;Q96AC1;Q96AC1-3',
              protein  = 'FERM1_HUMAN;FERM2_HUMAN',
              gene     = 'FERMT1;FERMT2',
              family   = 'FERM'))
# Uncollapse
    uncollapse(dt, protein, gene, sep = ';')
    recollapse( uncollapse(dt, protein, gene, sep = ';'), by = 'uniprot')

# Unchanged when no sep
    uncollapse(dt, family, sep = ';')
    uncollapse(dt, family, sep = 'NOSEP')
```

values *Get/Set expr values*

Description

Get/Set value matrix

Usage

```
values(object)

## S4 method for signature 'SummarizedExperiment'
values(object)

values(object) <- value

## S4 replacement method for signature 'SummarizedExperiment,matrix'
values(object) <- value

## S4 replacement method for signature 'SummarizedExperiment,numeric'
values(object) <- value
```

Arguments

object	SummarizedExperiment
value	ratio matrix (features x samples)

Value

value matrix (get) or updated object (set)

Examples

```
file <- system.file('extdata/billing19.proteingroups.txt', package = 'autonomics')
object <- read_maxquant_proteingroups(file)
values(object)[1:3, 1:3]
values(object) <- 0
values(object)[1:3, 1:3]
```

---

varlevels_dont_clash *Are varlevels unique*

Description

Are varlevels unique

Usage

```
varlevels_dont_clash(object, ...)

## S3 method for class 'data.table'
varlevels_dont_clash(object, vars = names(object), ...)

## S3 method for class 'SummarizedExperiment'
varlevels_dont_clash(object, vars = svars(object), ...)
```

Arguments

object	SummarizedExperiment or data.table
...	required for s3 dispatch
vars	character vector

Value

TRUE or FALSE

Examples

```
require(data.table)
object1 <- data.table(expand.grid(genome = c('WT', 'MUT'), treat = c('control', 'drug')))
object2 <- data.table(expand.grid(mutant = c('YES', 'NO'), treated = c('YES', 'NO')))
varlevels_dont_clash(object1)
varlevels_dont_clash(object2)
```

---

venn_detects *Venn detects*

Description

Venn diagram full/consistent/random detects

Usage

```
venn_detects(object, by = "subgroup")
```

Arguments

object	SummarizedExperiment
by	svar (string)

Value

NULL

Examples

```
file <- system.file('extdata/fukuda20.proteingroups.txt', package = 'autonomics')
object <- read_maxquant_proteingroups(file)
venn_detects(object, 'subgroup')
```

`weights` *Get/Set weights*

Description

Get/Set weight matrix

Usage

```
weights(object, ...)

## S4 method for signature 'SummarizedExperiment'
weights(object)

weights(object) <- value

## S4 replacement method for signature 'SummarizedExperiment,matrix'
weights(object) <- value

## S4 replacement method for signature 'SummarizedExperiment,numeric'
weights(object) <- value

## S4 replacement method for signature 'SummarizedExperiment,NULL'
weights(object) <- value
```

Arguments

`object`	SummarizedExperiment
`...`	addtional params
`value`	ratio matrix (features x samples)

Value

weight matrix (get) or updated object (set)

Examples

```
file <- system.file('extdata/billing19.rnacounts.txt', package = 'autonomics')
object <- read_rnaseq_counts(file)
weights(object)[1:3, 1:2]
weights(object) <- 1
weights(object)[1:3, 1:2]
```

write_xl *Write xl*

Description

Write xl

Usage

```
write_xl(
  object,
  file,
  fitcoefs = autonomics::fitcoefs(object),
  assays = assayNames(object)[0],
  verbose = TRUE
)

write_ods(
  object,
  file,
  fitcoefs = autonomics::fitcoefs(object),
  assays = assayNames(object)[0],
  verbose = TRUE
)
```

Arguments

object	SummarizedExperiment
file	file
fitcoefs	character vector
assays	assayNames subset
verbose	TRUE or FALSE

Value

filepath

Examples

```
# linmod
    file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
    object <- read_metabolon(file)
    object %<>% linmod_limma(~Diabetes/Time)
    xlfile  <- file.path(tempdir(), 'linmod.atkin.metabolon.xlsx')
    odsfile <- file.path(tempdir(), 'linmod.atkin.metabolon.ods' )
   write_xl( object, xlfile)                                          # linmod xlsx: fdt + stats
   write_xl( object, xlfile,  assays = SummarizedExperiment::assayNames(object)[1] )    #         fdt + stats + a
```

```
  write_xl( object, xlfile,  assays = SummarizedExperiment::assayNames(object)[1:2])    #         fdt + stats + a
  write_ods(object, odsfile)                                                  #     ods:  fdt + stats
  write_ods(object, odsfile, assays = SummarizedExperiment::assayNames(object)[1] )    #         fdt + stats + a
  write_ods(object, odsfile, assays = SummarizedExperiment::assayNames(object)[1:2])    #         fdt + stats +

# awblinmod
   object <- read_metabolon(file)
   object %<>% awblinmod_limma(c('Diabetes', 'Time'), block = 'Subject')
   xlfile  <- file.path(tempdir(), 'awblinmod.atkin.metabolon.xlsx')
   odsfile <- file.path(tempdir(), 'awblinmod.atkin.metabolon.ods')
  write_xl( object, xlfile)                                                 # awblinmod xlsx: fdt + stats
  write_xl( object, xlfile,  assay = SummarizedExperiment::assayNames(object)[1] )     #           fdt + stats +
  write_xl( object, xlfile,  assay = SummarizedExperiment::assayNames(object)[1:2])     #           fdt + stats +
  write_ods(object, odsfile)                                                  #       ods:  fdt + stats
  write_ods(object, odsfile, assay = SummarizedExperiment::assayNames(object)[1] )     #           fdt + stats +
  write_ods(object, odsfile, assay = SummarizedExperiment::assayNames(object)[1:2])     #           fdt + stats
```

X *Model based prediction*

Description

Model based prediction

Usage

```
X(
  object,
  formula = default_formula(object),
  drop = varlevels_dont_clash(object, all.vars(formula)),
  coding = "code_control"
)

beta(object, fit = fits(object)[1])
```

Arguments

object	SummarizedExperiment or data.frame
formula	formula
drop	TRUE or FALSE
coding	string: codingfunname
fit	'limma', 'lm', 'lme', 'wilcoxon'

Value

beta matrix (nlevel x nfeature)

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file)
object %<>% linmod_limma(block = 'Subject', coefs = model_coefs(object)) # intercept required!
beta(object)                    #    betas : nlevel x nfeature
   X(object)                    #   design : nlevel x nlevel
   X(object) %*% beta(object)   # response : nlevel x nfeature
```

`zero_to_na` *Change nondetect representation*

Description

Change nondetect representation

Usage

```
zero_to_na(x, verbose = FALSE)

nan_to_na(x, verbose = FALSE)

na_to_zero(x, verbose = FALSE)

inf_to_na(x, verbose = FALSE)

minusinf_to_na(x, verbose = FALSE)

na_to_string(x)
```

Arguments

x	matrix
verbose	logical(1)

Value

Updated matrix

Examples

```
matrix(c(0, 7), nrow=1)
matrix(c(0, 7), nrow=1)    %>% zero_to_na(verbose=TRUE)

matrix(c(NA, 7), nrow=1)
matrix(c(NA, 7), nrow=1)   %>% na_to_zero(verbose=TRUE)

matrix(c(NaN, 7), nrow=1)
matrix(c(NaN, 7), nrow=1)  %>% nan_to_na(verbose=TRUE)
```

```
matrix(c(Inf, 7), nrow=1)
matrix(c(Inf, 7), nrow=1)  %>% inf_to_na(verbose=TRUE)

matrix(c(-Inf, 7), nrow=1)
matrix(c(-Inf, 7), nrow=1) %>% minusinf_to_na(verbose=TRUE)
```

Index