

Package ‘autonomics’

November 5, 2024

Type Package

Title Unified statistical Modeling of Omics Data

Version 1.14.0

Description This package unifies access to Statistical 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).

It provides a fast enrichment analysis implementation.

And an intuitive contrastogram visualisation to summarize contrast effects in complex designs.

License GPL-3

Encoding UTF-8

LazyData true

VignetteBuilder knitr

biocViews Software, DataImport, Preprocessing, DimensionReduction,
PrincipalComponent, Regression, DifferentialExpression,
GeneSetEnrichment, Transcriptomics, Transcription,
GeneExpression, RNASeq, Microarray, Proteomics, Metabolomics,
MassSpectrometry,

BugReports <https://github.com/bhagwataditya/autonomics>

URL <https://github.com/bhagwataditya/autonomics>

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ggplot2, ggrepel, graphics, grDevices, grid, gridExtra, limma,
magrittr, matrixStats, methods, MultiAssayExperiment, parallel,
RColorBrewer, rlang, R.utils, readxl, S4Vectors, scales, stats,
stringi, SummarizedExperiment, tidyr, tidyselect, tools, utils,
vsn

Suggests affy, AnnotationDbi, AnnotationHub, apcluster, Biobase,
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hgu95av2.db, ICSNP, jsonlite, knitr, lme4, lmerTest, MASS, patchwork, mixOmics, mpm, nlme, OlinkAnalyze, org.Hs.eg.db, org.Mm.eg.db, pcaMethods, pheatmap, progeny, propagate, RCurl, RSQLite, remotes, rmarkdown, ropis, Rsubread, readODS, rtracklayer, statmod, survival, survminer, testthat, UniProt.ws, writexl, XML

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Contents

.extract_p_features	6
.merge	8
.read_compounddiscoverer	9
.read_diann_precursors	9
.read_maxquant_proteingroups	11
.read_metabolon	12
.read_rectangles	14
.read_rnaseq_bams	16
.read_somascan	19
abstract_fit	21
add_adjusted_pvalues	21
add_assay_means	22
add_facetvars	23
add_opentargets_by_uniprot	24
add_psp	24
add_smiles	25
altenrich	26
analysis	27
analyze	27
annotate_maxquant	29
annotate_uniprot_rest	30
assert_is_valid_sumexp	31
AUTONOMICS_DATASETS	31

bin	32
biplot	33
biplot_corrections	34
biplot_covariates	35
block2lme	36
center	37
code	38
coefs	40
collapsed_entrezg_to_symbol	41
COMPOUNDDISCOVERER_PATTERNS	41
CONTAMINANTSURL	42
contrast_subgroup_cols	42
counts	43
counts2cpm	43
counts2tpm	44
count_in	45
cpm	46
create_design	47
DATADIR	48
default_coefs	49
default_geom	50
default_sfile	51
default_subgroupvar	51
demultiplex	52
dequantify	53
dequantify_compounddiscoverer	53
download_contaminants	54
download_gtf	55
download_mcclain21	55
download_tcga_example	56
dt2mat	56
enrichment	57
ens2org	58
entrezg_to_symbol	59
explore_transformations	59
extract_rectangle	60
feluster	62
fdata	63
fdr2p	64
filter_exprs_replicated_in_some_subgroup	65
filter_features	66
filter_medoid	66
filter_samples	67
fit	68
fitcoefs	71
fits	71
FITSEP	72
fitvars	72
fit_lmx	73
fit_survival	75
fix_xlgenes	77
flevels	78

fnames	78
formula2str	79
ftype	79
fvalues	80
fvars	81
genome_to_orgdb	81
group_by_level	82
guess_compounddiscoverer_quantity	83
guess_fitsep	83
guess_maxquant_quantity	84
guess_sep	85
has_multiple_levels	86
hdlproteins	87
impute	88
invert_subgroups	89
is_collapsed_subset	90
is_correlation_matrix	90
is_diann_report	91
is_fastadt	92
is_file	93
is_fraction	93
is_imputed	94
is_positive_number	95
is_scalar_subset	95
is_sig	96
is_valid_formula	97
keep_connected_blocks	98
keep_connected_features	98
keep_replicated_features	99
label2index	99
LINMOD_ENGINES	100
list2mat	100
list_files	101
log2counts	101
log2cpm	102
log2diffs	103
log2proteins	103
log2sites	104
log2tpm	105
log2transform	106
logical2factor	107
make_alpha_palette	108
make_colors	108
make_volcano_dt	109
map_fvalues	110
matrix2sumexp	110
MAXQUANT_PATTERNS	111
mdsplot	111
merge_compounddiscoverer	112
merge_sample_excel	113
merge_sample_file	113
merge_sdata	114

message_df	116
modelvar	116
MSIGCOLLECTIONSHUMAN	122
MSIGDIR	122
nfactors	123
OPENTARGETSDIR	123
order_on_p	124
pca	125
percentiles	127
pg_to_canonical	127
plot_contrastogram	128
plot_contrast_venn	129
plot_data	129
plot_densities	130
plot_design	132
plot_detections	133
plot_exprs	134
plot_exprs_per_coef	137
plot_fit_summary	138
plot_heatmap	139
plot_matrix	140
plot_subgroup_points	141
plot_summary	142
plot_venn	143
plot_venn_heatmap	143
plot_violins	144
plot_volcano	146
PRECURSOR_QUANTITY	147
preprocess_rnaseq_counts	148
pull_columns	149
read_affymetrix	149
read_compounddiscoverer	150
read_contaminants	151
read_fragpipe	152
read_maxquant_phosphosites	153
read_maxquant_proteingroups	154
read_msigdt	156
read_olink	157
read_salmon	157
read_uniprot dt	158
reexports	159
reset_fit	159
rm_diann_contaminants	160
rm_missing_in_all_samples	161
rm_unmatched_samples	161
scaledlibsizes	162
scoremat	163
slevels	163
snames	164
split_samples	165
stri_any_regex	165
stri_detect_fixed_in_collapsed	166

subgroup_array	167
subtract_baseline	167
sumexplist_to_longdt	169
sumexp_to_tsv	170
sumexp_to_widedt	170
summarize_fit	171
svalues	172
svars	173
systematic_nas	174
tag_features	175
tag_hdlproteins	175
TAXON_TO_ORGNAME	176
TESTS	177
tpm	177
twofactor_sumexp	178
uncollapse	178
values	179
varlevels_dont_clash	179
venn_detects	180
weights	181
write_xl	182
X	182
zero_to_na	183

Index**185**

.extract_p_features	<i>Extract coefficient features</i>
---------------------	-------------------------------------

Description

Extract coefficient features

Usage

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

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

```
.extract_effectsize_features(  
  object,  
  coefs,  
  effectsize = 1,  
  fit = fits(object),  
  combiner = "|",  
  verbose = TRUE  
)  
  
.extract_sign_features(  
  object,  
  coefs,  
  sign,  
  fit = fits(object)[1],  
  combiner = "|",  
  verbose = TRUE  
)  
  
.extract_n_features(  
  object,  
  coefs,  
  combiner = "|",  
  n,  
  fit = fits(object)[1],  
  verbose = TRUE  
)  
  
extract_coef_features(  
  object,  
  fit = fits(object)[1],  
  coefs = default_coefs(object, fit = fit),  
  combiner = "|",  
  p = 1,  
  fdr = 1,  
  effectsize = 0,  
  sign = c(-1, +1),  
  n = 4,  
  verbose = TRUE  
)
```

Arguments

<code>object</code>	SummarizedXExperiment
<code>coefs</code>	subset of <code>coefs(object)</code>
<code>p</code>	p threshold
<code>fit</code>	subset of <code>fits(object)</code>
<code>combiner</code>	' ' or '&': how to combine multiple fits/coefs
<code>verbose</code>	TRUE or FALSE
<code>fdr</code>	fdr threshold
<code>effectsiz</code>	effectsiz threshold

sign	effect sign
n	number of top features (Inf means all)

Value

SummarizedExperiment

Examples

```
# Read and Fit
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file)
object %<>% fit_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_sign_features(   coefs = 't1-t0', sign = -1)
object %<>% .extract_n_features(      coefs = 't1-t0', n = 1)
object <- object0
object %<>% extract_coef_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_sign_features(   coefs = c('t1-t0', 't2-t0'), sign = -1)
object %<>% .extract_n_features(      coefs = c('t1-t0', 't2-t0'), n = 1)
object <- object0
object %<>% extract_coef_features(
  coefs = c('t1-t0', 't2-t0'), p = 0.05, fdr = 0.01, effectsize = 1, sign = -1, n = 1)
```

`.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	compound 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_diann_precursors

Read diann

Description

Read diann

Usage

```

.read_diann_precursors(file, Lib.PG.Q = 0.01, verbose = TRUE)

.read_diann_proteingroups(file, Lib.PG.Q = 0.01)

read_diann_proteingroups(
  file,
  Lib.PG.Q = 0.01,
  simplify_snames = TRUE,
  contaminants = character(0),
  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	'report.tsv' file
Lib.PG.Q	Lib.PG.Q cutoff
verbose	TRUE or FALSE
simplify_snames	TRUE or FALSE: simplify (drop common parts in) samplenames ?
contaminants	character vector: contaminant uniprot
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

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

<code>file</code>	proteingroups / phosphosites file
<code>quantity</code>	string
<code>verbose</code>	TRUE / FALSE
<code>profile</code>	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,
  subgroupvar = "Group",
  verbose = TRUE
)
```

```
read_metabolon(
  file,
  sheet = "OrigScale",
  fidvar = "BIOCHEMICAL",
  sidvar = "(CLIENT_IDENTIFIER|Client ID)",
  sfile = NULL,
  by.x = "sample_id",
  by.y = NULL,
  subgroupvar = "Group",
  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 = ~subgroup,
  block = NULL,
  coefs = NULL,
  contrasts = NULL,
  palette = NULL,
  verbose = TRUE
)
```

Arguments

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

Value

SummarizedExperiment

Examples

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

<code>.read_rectangles</code>	<i>Read omics data from rectangular file</i>
-------------------------------	--

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

<code>file</code>	string: name of text (txt, csv, tsv, adat) or excel (xls, xlsx) file
<code>sheet</code>	integer/string: only relevant for excel files
<code>fid_rows</code>	numeric vector: featureid rows
<code>fid_cols</code>	numeric vector: featureid cols
<code>sid_rows</code>	numeric vector: sampleid rows
<code>sid_cols</code>	numeric vector: sampleid cols
<code>expr_rows</code>	numeric vector: expr rows
<code>expr_cols</code>	numeric vector: expr cols
<code>fvar_rows</code>	numeric vector: fvar rows
<code>fvar_cols</code>	numeric vector: fvar cols
<code>svar_rows</code>	numeric vector: svar rows
<code>svar_cols</code>	numeric vector: svar cols
<code>fdata_rows</code>	numeric vector: fdata rows
<code>fdata_cols</code>	numeric vector: fdata cols
<code>sdata_rows</code>	numeric vector: sdata rows
<code>sdata_cols</code>	numeric vector: sdata cols
<code>transpose</code>	TRUE or FALSE (default)
<code>verbose</code>	TRUE (default) or FALSE
<code>sfile</code>	sample file
<code>sfileby</code>	sample file mergeby column
<code>subgroupvar</code>	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 = ~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 = ~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 / libsiz / genelength) ?
cpm	TRUE or FALSE: add cpm to assays (counts / effectivelibsiz) ?
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 (requireNamespace('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)

```

<i>.read_somascan</i>	<i>Read somascan adatfile</i>
-----------------------	-------------------------------

Description

Read somascan adatfile

Usage

```

.read_somascan(
  file,
  fidvar = "Target",
  sidvar = "SampleId",
  sfile = NULL,
  by.x = NULL,
  by.y = NULL,
  subgroupvar = "SampleGroup",
  verbose = TRUE
)

read_somascan(
  file,
  fidvar = "Target",
  sidvar = "SampleId",
  sfile = NULL,
  by.x = NULL,
  by.y = NULL,
  subgroupvar = "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 = ~subgroup,
    block = NULL,
    coefs = NULL,
    contrasts = NULL,
    palette = NULL,
    verbose = TRUE
  )

```

Arguments

<code>file</code>	somascan (adat) file
<code>fidvar</code>	featureid var
<code>sidvar</code>	sampleid var
<code>sfile</code>	sample file
<code>by.x</code>	'file' mergeby column
<code>by.y</code>	'sfile' mergeby column
<code>subgroupvar</code>	subgroup var: string
<code>verbose</code>	TRUE or FALSE: message?
<code>fname_var</code>	featurename var: string
<code>sample_type</code>	subset of c('Sample', 'QC', 'Buffer', 'Calibrator')
<code>feature_type</code>	subset of c('Protein', 'Hybridization Control Elution', 'Rat Protein')
<code>sample_quality</code>	subset of c('PASS', 'FLAG', 'FAIL')
<code>feature_quality</code>	subset of c('PASS', 'FLAG', 'FAIL')
<code>rm_na_svars</code>	TRUE or FALSE: rm NA svars?
<code>rm_single_value_svars</code>	TRUE or FALSE: rm single value svars?
<code>plot</code>	TRUE or FALSE: plot ?
<code>label</code>	fvar
<code>pca</code>	TRUE or FALSE: run pca?
<code>pls</code>	TRUE or FALSE: run pls?
<code>fit</code>	model engine: 'limma', 'lm', 'lme(r)', 'wilcoxon' or NULL
<code>formula</code>	model formula
<code>block</code>	model blockvar
<code>coefs</code>	model coefficients of interest: character vector or NULL
<code>contrasts</code>	coefficient contrasts of interest: character vector or NULL
<code>palette</code>	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	<i>Abstract model fit</i>
--------------	---------------------------

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	<i>Add adjusted pvalues</i>
----------------------	-----------------------------

Description

Add adjusted pvalues

Usage

```
add_adjusted_pvalues(
  featuredt,
  method,
  fit = fits(featuredt),
  coefs = default_coefs(featuredt, fit = fit),
  verbose = TRUE
)
```

Arguments

featuredt	fdt(object)
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 %<>% fit_limma(coef = 'Adult-X30dpt')
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	<i>Add assay means</i>
-----------------	------------------------

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 = default_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')
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 = default_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_msigt
genevar	gene fvar
genesep	string or NULL
coef	string in <code>coefs(object)</code>
fit	'limma', 'lm', 'lme', 'lmer', 'wilcoxon'
significancevar	'p' or 'fdr'
significance	significance cutoff
effectsized	effectsized 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 enrichment 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 retained for testing purposes.

This alternative enrichment implementation

See Also

[`enrichment()`]

analysis	<i>Get/set analysis</i>
----------	-------------------------

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	<i>Analyze</i>
---------	----------------

Description

Analyze

Usage

```
analyze(
  object,
  pca = TRUE,
  pls = TRUE,
  fit = "limma",
  formula = default_formula(object),
  drop = varlevels_dont_clash(object, all.vars(formula)),
```

```

codingfun = contr.treatment.explicit,
contrasts = NULL,
coefs = colnames(create_design(object, formula = formula, drop = drop)),
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 ?
codingfun	factor coding function <ul style="list-style-type: none"> • contr.treatment: intercept = y_0, coefi = $y_i - y_0$ • contr.treatment.explicit: intercept = y_0, coefi = $y_i - y_0$ • code_control: intercept = y_{mean}, coefi = $y_i - y_0$ • contr.diff: intercept = y_0, coefi = $y_i - y_{(i-1)}$ • code_diff: intercept = y_{mean}, coefi = $y_i - y_{(i-1)}$ • code_diff_forward: intercept = y_{mean}, coefi = $y_i - y_{(i+)}$ • code_deviation: intercept = y_{mean}, coefi = $y_i - y_{\text{mean}}$ (drop last) • code_deviation_first: intercept = y_{mean}, coefi = $y_i - y_{\text{mean}}$ (drop first) • code_helmert: intercept = y_{mean}, coefi = $y_i - \text{mean}(y_0:(y_i-1))$ • code_helmert_forward: intercept = y_{mean}, coefi = $y_i - \text{mean}(y_{(i+1):y_p})$
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_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_uniprot
 contaminanthdrs data.table : output of read_uniprot
 maxquanthdrs data.table : output of read_uniprot
 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

```

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
```

bin*Bin continuous variable*

Description

Bin continuous variable

Usage

```
bin(object, ...)

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

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

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

## S3 method for class 'numeric'
bin(object, probs = c(0, 0.33, 0.66, 1), ...)

## S3 method for class 'SummarizedExperiment'
bin(object, fvar, probs = c(0, 0.33, 0.66, 1), ...)
```

Arguments

object	numeric or SummarizedExperiment
...	(S3 dispatch)
probs	numeric
fvar	string or NULL

Value

factor vector

Examples

```
# Numeric vector
object <- rnorm(10, 5, 1)
bin(object)

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


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 = "subgroup",
  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, guess_fitsep(fdt(object)), 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
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	<i>Biplot batch corrections</i>
--------------------	---------------------------------

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)
```

block2lme

Put block in lme-compatible format

Description

Put block in lme-compatible format

Usage

```
block2lme(block, ...)

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

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

## S3 method for class 'character'
block2lme(block, verbose = TRUE, ...)

formula2lmer(formula, block)

formula2lm(formula, block)

block_vars(formula)
```

Arguments

block	block: character vector or formula
...	required for s3 dispatch
verbose	TRUE or FALSE
formula	formula

Examples

```
# lme: ensure lme-compatible block specification
block2lme( block = list(subject = ~1, batch = ~1))
block2lme( block = ~1|subject)
block2lme( block = c('subject', 'batch'))

# lm: integrate block into formula as random effect
formula2lm( formula = ~ subgroup, block = c('subject', 'batch') )

# lmer: integrate block into formula as fixed effect
formula2lmer( formula = ~ subgroup, block = c('subject', 'batch') )
formula2lmer( formula = ~ subgroup + (1|subject) + (1|batch) )
```

center

*Center samples***Description**

Center samples

Usage

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

Arguments

object	SummarizedExperiment
selector	logical vector (length = nrow(object))
fun	aggregation function (string)
verbose	TRUE/FALSE

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, codingfun, verbose = TRUE, ...)

## S3 method for class 'data.table'
code(object, codingfun, 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
codingfun	factor coding function <ul style="list-style-type: none"> • <code>contr.treatment</code>: intercept = y_0, $\text{coef}_i = y_i - y_0$ • <code>contr.treatment.explicit</code>: intercept = y_0, $\text{coef}_i = y_i - y_0$ • <code>code_control</code>: intercept = y_{mean}, $\text{coef}_i = y_i - y_0$ • <code>contr.diff</code>: intercept = y_0, $\text{coef}_i = y_i - y_{(i-1)}$ • <code>code_diff</code>: intercept = y_{mean}, $\text{coef}_i = y_i - y_{(i-1)}$ • <code>code_diff_forward</code>: intercept = y_{mean}, $\text{coef}_i = y_i - y_{(i+)}$ • <code>code_deviation</code>: intercept = y_{mean}, $\text{coef}_i = y_i - y_{\text{mean}}$ (drop last) • <code>code_deviation_first</code>: intercept = y_{mean}, $\text{coef}_i = y_i - y_{\text{mean}}$ (drop first) • <code>code_helmert</code>: intercept = y_{mean}, $\text{coef}_i = y_i - \text{mean}(y_0:(y_i-1))$

- `code_helmert_forward`: intercept = ymean, coef = $y_i - \text{mean}(y_{(i+1):yp})$

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 %<>% fit_limma(codingfun = contr.treatment) # default
object %<>% fit_limma(codingfun = contr.treatment.explicit)
object %<>% fit_limma(codingfun = contr.diff)
object %<>% fit_limma(codingfun = code_control)
object %<>% fit_limma(codingfun = code_diff)
object %<>% fit_limma(codingfun = code_diff_forward)
object %<>% fit_limma(codingfun = code_deviation)
object %<>% fit_limma(codingfun = code_deviation_first)
object %<>% fit_limma(codingfun = code_helmert)
object %<>% fit_limma(codingfun = code_helmert_forward)

```

coefs

Get coefs

Description

Get coefs

Usage

```

coefs(object, ...)

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

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

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

```

Arguments

object	factor, data.table, SummarizedExperiment
...	required for s3 dispatch
fit	'limma', 'lm', 'lme', 'lmer', 'wilcoxon'
svars	NULL or charactervector (svar for which to return coefs)

Value

character vector

Examples

```

# Factor
x <- factor(c('A', 'B', 'C'))
coefs(x)
coefs(code(x, contr.treatment.explicit))
coefs(code(x, code_control))

# SummarizedExperiment
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file, fit = 'limma')
coefs(object)

```

`collapsed_entrezg_to_symbol`*Collapsed entrezg to genesymbol*

Description

Collapsed entrezg to genesymbol

Usage`collapsed_entrezg_to_symbol(x, sep, orgdb)`**Arguments**

<code>x</code>	charactervector
<code>sep</code>	string
<code>orgdb</code>	OrgDb

Value

character vector

Examples

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

CONTAMINANTSURL *Contaminants URL*

Description

Contaminants URL

Usage

CONTAMINANTSURL

Format

An object of class character of length 1.

Examples

CONTAMINANTSURL

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	<i>Get/Set counts</i>
--------	-----------------------

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	<i>Convert between counts and cpm/tpm</i>
------------	---

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	<i>counts to tpm</i>
------------	----------------------

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	<i>Count/Collapse in/outside intersection</i>
----------	---

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	<i>Create design matrix</i>
---------------	-----------------------------

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)),
  codingfun = contr.treatment.explicit,
  verbose = TRUE,
  ...
)

## S3 method for class 'data.table'
create_design(
  object,
  formula = default_formula(object),
  drop = varlevels_dont_clash(object, all.vars(formula)),
  codingfun = contr.treatment.explicit,
  verbose = TRUE,
  ...
)
```

Arguments

object	SummarizedExperiment or data.frame
...	required to s3ify
formula	formula with svars
drop	whether to drop predictor names
codingfun	factor coding function

- contr.treatment: intercept = y_0 , coefi = $y_i - y_0$
- contr.treatment.explicit: intercept = y_0 , coefi = $y_i - y_0$
- code_control: intercept = y_{mean} , coefi = $y_i - y_0$
- contr.diff: intercept = y_0 , coefi = $y_i - y_{(i-1)}$
- code_diff: intercept = y_{mean} , coefi = $y_i - y_{(i-1)}$

- `code_diff_forward`: intercept = ymean, coefi = $y_i - y_{i+}$
- `code_deviation`: intercept = ymean, coefi = $y_i - \text{ymean}$ (drop last)
- `code_deviation_first`: intercept = ymean, coefi = $y_i - \text{ymean}$ (drop first)
- `code_helmert`: intercept = ymean, coefi = $y_i - \text{mean}(y_0:(y_i-1))$
- `code_helmert_forward`: intercept = ymean, coefi = $y_i - \text{mean}(y_{i+1}:y_p)$

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, codingfun = contr.treatment.explicit))
unique(create_design(object, ~ Time, codingfun = contr.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
```

default_coefs

Get default coefs

Description

Get default coefs

Usage

```

default_coefs(object, ...)

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

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

```

Arguments

object	data.table or SummarizedExperiment
...	S3 dispatch
fit	'limma', 'lm', 'lme', 'lmer', 'wilcoxon'

Value

character

Examples

```

file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file)
object %<>% fit_limma()
default_coefs(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	<i>Default sfile</i>
---------------	----------------------

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)
```

default_subgroupvar	<i>Create default formula</i>
---------------------	-------------------------------

Description

Create default formula

Usage

```
default_subgroupvar(object)
```

```
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)
```

demultiplex	<i>Demultiplex snames</i>
-------------	---------------------------

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', 'correctedreporterinter
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
 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
```

download_contaminants *Downloads contaminants*

Description

Downloads contaminants

Usage

```
download_contaminants(url = CONTAMINANTSURL, overwrite = FALSE)
```

Arguments

url	contaminants file url (string)
overwrite	TRUE or FALSE: overwrite existung download?

Value

filename (string)

Examples

```
download_contaminants() # download first time
download_contaminants(overwrite = TRUE) # download each time
```

download_gtf	<i>Download GTF file</i>
--------------	--------------------------

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	<i>Download mcclain21 data</i>
--------------------	--------------------------------

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')
```

download_tcga_example *Download tcga example*

Description

Download tcga example

Usage

```
download_tcga_example()
```

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_msigt(collections = 'C5:G0: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()
var <- abstractvar(object)
varlevels <- c('flat', 'down', 'up')
enrichdt1 <- enrichment(object, pathwaydt, var = var) # 2:n factor
enrichdt2 <- enrichment(object, pathwaydt, var = var, 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 (requireNamespace('org.Hs.eg.db', quiet = TRUE)){
  orgdb <- org.Hs.eg.db::org.Hs.eg.db
  entrezg_to_symbol(x = c('7448', '3818', '727'), orgdb)
}
```

explore_transformations *Explore transformations*

Description

Explore transformations

Usage

```

explore_transformations(
  object,
  subgroupvar = "subgroup",
  transformations = c("quantnorm", "vsn", "zscore", "invnorm"),
  method = "pca",
  xdim = 1,
  ydim = 2,
  ...
)

```

Arguments

object	SummarizedExperiment
subgroupvar	string
transformations	vector
method	'pca', 'pls', 'sma', or 'lda'
xdim	number (default 1)
ydim	number (default 2)
...	passed to plot_data

Value

grid object

Examples

```

file <- system.file('extdata/billing19.proteingroups.txt', package = 'autonomics')
subgroups <- sprintf('%s_STD', c('E00', 'E01', 'E02', 'E05', 'E15', 'E30', 'M00'))
object <- read_maxquant_proteingroups(file, subgroups = subgroups)
explore_transformations(object, transformations = c('quantnorm', 'zscore', 'invnorm'))

```

extract_rectangle	<i>Extract rectangle from omics file, data.table, or matrix</i>
-------------------	---

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
```

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 %<>% fit_limma()
pcol <- pvar(fdt(object), fit = 'limma', coef = 't3-t0')
object %<>% extract(order(fdt(.)[[pcol]]), )
object %<>% extract(1:10, )
fdt(object) %<>% extract(, 1)
object %<>% fit_limma(coefs = 't3-t0')
# 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	<i>Filter features on condition</i>
-----------------	-------------------------------------

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	<i>Filter medoid sample</i>
---------------	-----------------------------

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	<i>Filter samples on condition</i>
----------------	------------------------------------

Description

Filter samples on condition

Usage

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

Arguments

object	SummarizedExperiment
condition	filter condition
verbose	TRUE/FALSE
record	TRUE/FALSE

Value

filtered SummarizedExperiment

Examples

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

fit

*Fit General Linear Model***Description**

Fit General Linear Model

Usage

```

fit(
  object,
  formula = default_formula(object),
  engine = "limma",
  drop = varlevels_dont_clash(object, all.vars(formula)),
  codingfun = contr.treatment.explicit,
  design = create_design(object, formula = formula, drop = drop, codingfun = codingfun,
    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,
  statvars = c("effect", "p", "se", "t")[1:2],
  fttest = if (is.null(coefs)) TRUE else FALSE,
  sep = FITSEP,
  suffix = paste0(sep, engine),
  verbose = TRUE,
  plot = FALSE
)

fit_limma(
  object,
  formula = default_formula(object),
  drop = varlevels_dont_clash(object, all.vars(formula)),
  codingfun = contr.treatment.explicit,
  design = create_design(object, formula = formula, drop = drop, codingfun = codingfun),
  contrasts = NULL,
  coefs = if (is.null(contrasts)) model_coefs(design = design) else NULL,
  block = NULL,
  weightvar = if ("weights" %in% assayNames(object)) "weights" else NULL,
  statvars = c("effect", "p", "t"),
  fttest = if (is.null(coefs)) TRUE else FALSE,
  sep = FITSEP,
  suffix = paste0(sep, "limma"),
  verbose = TRUE,
  plot = FALSE
)

.fit_limma(
  object,
  formula = default_formula(object),
  drop = varlevels_dont_clash(object, all.vars(formula)),

```

```

codingfun = contr.treatment.explicit,
design = create_design(object, formula = formula, drop = drop, codingfun = codingfun),
contrasts = NULL,
coefs = if (is.null(contrasts)) model_coefs(design = design) else NULL,
block = NULL,
weightvar = if ("weights" %in% assayNames(object)) "weights" else NULL,
statvars = c("effect", "p", "se", "t")[1:2],
ftest = if (is.null(coefs)) TRUE else FALSE,
sep = FITSEP,
suffix = paste0(sep, "limma"),
verbose = TRUE,
plot = FALSE
)

fit_wilcoxon(
  object,
  formula = default_formula(object),
  drop = NULL,
  codingfun = contr.treatment.explicit,
  design = NULL,
  contrasts = NULL,
  coefs = NULL,
  block = NULL,
  weightvar = NULL,
  statvars = c("effect", "p"),
  sep = FITSEP,
  suffix = paste0(sep, "wilcoxon"),
  verbose = TRUE,
  plot = FALSE
)

```

Arguments

object	SummarizedExperiment
formula	model formula
engine	'limma', 'lm', 'lme', 'lmer', or 'wilcoxon'
drop	TRUE or FALSE
codingfun	factor coding function <ul style="list-style-type: none"> • <code>contr.treatment</code>: intercept = y_0, $\text{coef}_i = y_i - y_0$ • <code>contr.treatment.explicit</code>: intercept = y_0, $\text{coef}_i = y_i - y_0$ • <code>code_control</code>: intercept = y_{mean}, $\text{coef}_i = y_i - y_0$ • <code>contr.diff</code>: intercept = y_0, $\text{coef}_i = y_i - y_{(i-1)}$ • <code>code_diff</code>: intercept = y_{mean}, $\text{coef}_i = y_i - y_{(i-1)}$ • <code>code_diff_forward</code>: intercept = y_{mean}, $\text{coef}_i = y_i - y_{(i+1)}$ • <code>code_deviation</code>: intercept = y_{mean}, $\text{coef}_i = y_i - y_{\text{mean}}$ (drop last) • <code>code_deviation_first</code>: intercept = y_{mean}, $\text{coef}_i = y_i - y_{\text{mean}}$ (drop first) • <code>code_helmert</code>: intercept = y_{mean}, $\text{coef}_i = y_i - \text{mean}(y_0:(y_i-1))$ • <code>code_helmert_forward</code>: intercept = y_{mean}, $\text{coef}_i = y_i - \text{mean}(y_{(i+1):y_p})$
design	design matrix

contrasts	NULL or character vector: coefficient contrasts to test
coefs	NULL or character vector: model coefs to test
block	block svar (or NULL)
weightvar	NULL or name of weight matrix in assays(object)
statvars	character vector: subset of c('effect', 'p', 'fdr', 't', 'se')
ftest	TRUE or FALSE
sep	string: pvar separator ("~" in "p~t2~limma")
suffix	string: pvar suffix ("limma" in "p~t2~limma")
verbose	whether to msg
plot	whether to plot

Value

Updated SummarizedExperiment

Examples

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

# Standard
fdt(object) %<>% extract(, 'feature_id')
object %<>% fit_lm( ~ subgroup) # statistics default
object %<>% fit_limma( ~ subgroup) # bioinformatics default
summarize_fit(object)

# Blocked
fdt(object) %<>% extract(, 'feature_id')
object %<>% fit_limma( ~ subgroup, block = 'Subject') # simple random effects
object %<>% fit_lme( ~ subgroup, block = 'Subject') # powerful random effects
object %<>% fit_lmer( ~ subgroup, block = 'Subject') # more powerful random effects
summarize_fit(object)

# Alternative coding: e.g. grand mean intercept
fdt(object) %<>% extract(, 'feature_id')
object %<>% fit_limma( ~ subgroup, block = 'Subject', codingfun = code_control)
object %<>% fit_lme( ~ subgroup, block = 'Subject', codingfun = code_control)
object %<>% fit_lmer( ~ subgroup, block = 'Subject', codingfun = code_control)
summarize_fit(object)

# Posthoc contrasts (only limma!)
fdt(object) %<>% extract(, 'feature_id')
object %<>% fit_limma( ~ subgroup, block = 'Subject', codingfun = code_control, coefs = 't1-t0')
object %<>% fit_limma( ~ 0 + subgroup, block = 'Subject', contrasts = 't1-t0')
# flexible, but only approximate
# stat.ethz.ch/pipermail/bioconductor/2014-February/057682.html

# Non-parametric: wilcoxon
fdt(object) %<>% extract(, 'feature_id')
object %<>% fit_wilcoxon( ~ subgroup) # unpaired
object %<>% fit_wilcoxon( ~ subgroup, block = 'Subject') # paired
```

```
# Custom separator
fdt(object) %<>% extract(, 'feature_id')
fdt( fit_lm(      object, sep = '.'))
fdt( fit_limma(  object, block = 'Subject', sep = '.' ) )
fdt( fit_lme(    object, block = 'Subject', sep = '.' ) )
fdt( fit_lmer(   object, block = 'Subject', sep = '.' ) )
fdt( fit_wilcoxon(object, block = 'Subject', sep = '.' ) )
fdt( fit_wilcoxon(object, sep = '.' ) )
```

fitcoefs

fitcoefs

Description

fitcoefs

Usage

```
fitcoefs(object)
```

Arguments

object SummarizedExperiment

Value

string vector

Examples

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

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, ...)
```

Arguments

object SummarizedExperiment or data.table
 ... S3 dispatch

Value

character vector

Examples

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

FITSEP	<i>Fit results separator</i>
--------	------------------------------

Description

Fit results separator

Usage

```
FITSEP

PPATTERN
```

Format

An object of class character of length 1.

An object of class character of length 1.

Examples

```
FITSEP
```

fitvars	<i>Get fit vars/dt</i>
---------	------------------------

Description

Get fit vars/dt

Usage

```
fitvars(object)

fitdt(object)
```


Arguments

object SummarizedExperiment

Value

string vector

Examples

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

fit_lmx

Fit lm, lme, or lmer

Description

Fit lm, lme, or lmer

Usage

```
fit_lmx(
  object,
  fit,
  formula = default_formula(object),
  drop = varlevels_dont_clash(object, all.vars(formula)),
  codingfun = contr.treatment.explicit,
  coefs = model_coefs(object, formula = formula, drop = drop, codingfun = codingfun),
  block = NULL,
  opt = "optim",
  weightvar = if ("weights" %in% assayNames(object)) "weights" else NULL,
  statvars = c("effect", "p", "se", "t")[1:2],
  ftest = if (is.null(coefs)) TRUE else FALSE,
  sep = FITSEP,
  suffix = paste0(sep, fit),
  verbose = TRUE,
  plot = FALSE
)
```

```
fit_lm(
  object,
  formula = default_formula(object),
  drop = varlevels_dont_clash(object, all.vars(formula)),
  codingfun = contr.treatment.explicit,
  design = NULL,
  block = NULL,
  weightvar = if ("weights" %in% assayNames(object)) "weights" else NULL,
```

```

statvars = c("effect", "p", "se", "t")[1:2],
sep = FITSEP,
suffix = paste0(sep, "lm"),
coefs = model_coefs(object, formula = formula, drop = drop, codingfun = codingfun),
contrasts = NULL,
ftest = if (is.null(coefs)) TRUE else FALSE,
verbose = TRUE,
plot = FALSE
)

fit_lme(
  object,
  formula = default_formula(object),
  drop = varlevels_dont_clash(object, all.vars(formula)),
  codingfun = contr.treatment.explicit,
  design = NULL,
  block = NULL,
  weightvar = if ("weights" %in% assayNames(object)) "weights" else NULL,
  opt = "optim",
  statvars = c("effect", "p", "se", "t")[1:2],
  sep = FITSEP,
  suffix = paste0(sep, "lme"),
  coefs = model_coefs(object, formula = formula, drop = drop, codingfun = codingfun),
  contrasts = NULL,
  ftest = if (is.null(coefs)) TRUE else FALSE,
  verbose = TRUE,
  plot = FALSE
)

fit_lmer(
  object,
  formula = default_formula(object),
  drop = varlevels_dont_clash(object, all.vars(formula)),
  codingfun = contr.treatment.explicit,
  design = NULL,
  block = NULL,
  weightvar = if ("weights" %in% assayNames(object)) "weights" else NULL,
  statvars = c("effect", "p", "se", "t")[1:2],
  sep = FITSEP,
  suffix = paste0(sep, "lmer"),
  coefs = model_coefs(object, formula = formula, drop = drop, codingfun = codingfun),
  contrasts = NULL,
  ftest = if (is.null(coefs)) TRUE else FALSE,
  verbose = TRUE,
  plot = FALSE
)

```

Arguments

object	SummarizedExperiment
fit	'lm', 'lme', or 'lmer'
formula	formula

drop	TRUE or FALSE
codingfun	coding function
coefs	NULL or stringvector
block	NULL or svar
opt	optimizer used in fit_lme: 'optim' (more robust) or 'nlminb'
weightvar	NULL or svar
statvars	character vector: subset of c('effect', 'p', 'fdr', 't')
ftest	TRUE or FALSE
sep	string
suffix	string: pvar suffix ("lm" in "p~t2~lm")
verbose	TRUE or FALSE
plot	TRUE or FALSE
design	NULL
contrasts	unused. only to allow generic get(fitfun)(contrasts)

Value

SummarizedExperiment

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file)
fit_lm(  object, formula = ~subgroup)
fit_limma( object, formula = ~subgroup)
fit_limma( object, formula = ~subgroup, block = 'Subject' )
fit_lme(  object, formula = ~subgroup, block = 'Subject' )
fit_lmer( object, formula = ~subgroup, block = 'Subject' )
# fit_lme( object, formula = ~subgroup, block = ~1|Subject) # needs fine-tuning
# fit_lmer( object, formula = ~subgroup + (1|Subject))      # needs fine-tuning
```

fit_survival

*Fit/Plot survival***Description**

Fit/Plot survival

Usage

```
fit_survival(
  object,
  assay = assayNames(object)[1],
  percentile = 25,
  sep = FITSEP,
  samples = if (ncol(object) < 50) TRUE else FALSE,
  verbose = TRUE
)
```

```
.plot_survival(
  object,
  assay = assayNames(object)[1],
  percentile = 25,
  title = paste0(assay, " ", percentile, "%"),
  subtitle = NULL,
  palette = c("#009999", "#ff5050")
)
```

```
plot_survival(
  object,
  assay = assayNames(object)[1],
  percentile = percentiles(object),
  title = paste0(assay, " ", percentile, "%"),
  subtitle = NULL,
  palette = c("#009999", "#ff5050"),
  n = 4,
  ncol = 4,
  nrow = length(percentile),
  file = NULL,
  width = 7 * ncol,
  height = 7 * nrow
)
```

Arguments

object	SummarizedExperiment
assay	string
percentile	percentage (not greater than 50)
sep	fvar string separator : e.g. '~' gives p~surv~LR50
samples	TRUE or FALSE : record which samples in which stratum ?
verbose	TRUE or FALSE
title	string
subtitle	string
palette	color vector
n	number
ncol	number
nrow	number
file	filepath
width	number
height	number

Value

ggsurvplot

Examples

```
file <- download_tcga_example()
if (!is.null(file) & requireNamespace('survminer')){
# Read
  object <- readRDS(file)
  object %<>% extract(, .$sample_type == 'T')
  object %<>% extract(c('UGT3A2', 'NSUN3', 'XRCC4', 'WNT10A'), )
# Fit
  fdt(object)
  fdt(fit_survival(object))
  fdt(fit_survival(object, percentile = 50))
  fdt(fit_survival(object, percentile = 50, sep = '.'))
# Plot
  object %<>% fit_survival()
  plot_survival(object)
  p1 <- .plot_survival(object[1, ])
  p2 <- .plot_survival(object[2, ])
}
```

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	<i>Get fvar levels</i>
---------	------------------------

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	<i>Get/Set fnames</i>
--------	-----------------------

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	<i>formula to string</i>
-------------	--------------------------

Description

formula to string

Usage

```
formula2str(formula)
```

Arguments

formula formula

Value

string

Examples

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

ftype	<i>Feature type</i>
-------	---------------------

Description

Feature type

Usage

```
fotype(
  object,
  formula = default_formula(object),
  drop = varlevels_dont_clash(object, all.vars(formula)),
  fit = fits(object)[1],
  codingfun = contr.treatment.explicit
)
```

Arguments

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

Value

SummarizedExperiment

Examples

```
file <- download_data('atkin.metabolon.xlsx')
object <- read_metabolon(file)
object %<>% fit_limma(block = 'Subject')
object %<>% ftype()
fdt(object)
```

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	<i>Get/Set fvars</i>
-------	----------------------

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	<i>Get corresponding orgdb</i>
-----------------	--------------------------------

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	<i>group by level</i>
----------------	-----------------------

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 %<>% fit_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	<i>Guess separator</i>
-----------	------------------------

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('%d', 1:3)
colnames(object) <- sprintf('%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 $N(\text{mean} - 2.5 \text{ sd}, 0.3 \text{ sd})$

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
```

invert_subgroups	<i>Invert subgroups</i>
------------------	-------------------------

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 inverted
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_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_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	<i>Is diann, fragpipe, proteingroups, phosphosites file?</i>
-----------------	--

Description

Is diann, fragpipe, proteingroups, phosphosites file?

Usage

```
is_diann_report(x, .xname = get_name_in_parent(x))
is_fragpipe_tsv(x, .xname = get_name_in_parent(x))
is_maxquant_proteingroups(x, .xname = get_name_in_parent(x))
is_maxquant_phosphosites(x, .xname = get_name_in_parent(x))
is_compounddiscoverer_output(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)
is_fragpipe_tsv(file)
is_maxquant_proteingroups(file)
is_maxquant_phosphosites(file)

file <- 3
is_diann_report(file)
is_fragpipe_tsv(file)
is_maxquant_proteingroups(file)
is_maxquant_phosphosites(file)

file <- 'blabla.tsv'
is_diann_report(file)
is_fragpipe_tsv(file)
is_maxquant_proteingroups(file)
is_maxquant_phosphosites(file)

file <- download_data('multiorganism.combined.protein.tsv')
is_diann_report(file)
is_fragpipe_tsv(file)
is_maxquant_proteingroups(file)
is_maxquant_phosphosites(file)

file <- download_data('dilution.report.tsv')
is_diann_report(file)
is_fragpipe_tsv(file)
is_maxquant_proteingroups(file)
is_maxquant_phosphosites(file)

file <- system.file('extdata/fukuda20.proteingroups.txt', package = 'autonomics')
is_diann_report(file)
is_fragpipe_tsv(file)
is_maxquant_proteingroups(file)
is_maxquant_phosphosites(file)

file <- system.file('extdata/billing19.phosphosites.txt', package = 'autonomics')
is_diann_report(file)
is_fragpipe_tsv(file)
is_maxquant_proteingroups(file)
is_maxquant_phosphosites(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	<i>Is a file?</i>
---------	-------------------

Description

Is a file (and not a dir)

Usage

```
is_file(file)
```

Arguments

file	filepath
------	----------

Details

This function distinguishes 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	<i>Is fraction</i>
-------------	--------------------

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_imputed	<i>Get/set is_imputed</i>
------------	---------------------------

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_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	<i>Is significant?</i>
--------	------------------------

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 %<>% fit_lm()
object %<>% fit_limma()
issig <- is_sig(object, fit = c('lm','limma'), contrast = 'Adult-X30dpt')
plot_contrast_venn(issig)
```

is_valid_formula	<i>Is valid formula</i>
------------------	-------------------------

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_connected_blocks *Keep fully connected blocks*

Description

Keep fully connected blocks

Usage

```
keep_connected_blocks(object, block, verbose = TRUE)
```

Arguments

object	SummarizedExperiment
block	svar
verbose	TRUE or FALSE

Examples

```

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

```

keep_connected_features

Keep features with n+ connected blocks

Description

Keep features with n+ connected blocks

Usage

```
keep_connected_features(object, block, n = 2, verbose = TRUE)
```

Arguments

object	SummarizedExperiment
block	svar
n	number
verbose	TRUE or FALSE

Examples

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

```
keep_replicated_features
      Keep replicated features
```

Description

Keep features replicated for each slevel

Usage

```
keep_replicated_features(object, formula = ~1, n = 3, verbose = TRUE)
```

Arguments

object	SummarizedExperiment
formula	formula
n	min replications required
verbose	TRUE or FALSE

Examples

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

```
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')
```

LINMOD_ENGINES	<i>Linear Modeling Engines</i>
----------------	--------------------------------

Description

Linear Modeling Engines

Usage

```
LINMOD_ENGINES
```

Format

An object of class character of length 5.

Examples

```
LINMOD_ENGINES
```

list2mat	<i>list to matrix</i>
----------	-----------------------

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	<i>list_files</i>
------------	-------------------

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	<i>Get/Set log2counts</i>
------------	---------------------------

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	<i>Get/Set log2diffs</i>
-----------	--------------------------

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

occupancy 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	<i>Get/Set log2proteins</i>
--------------	-----------------------------

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

occupancy 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

occupancy 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	<i>Get/Set log2tpm</i>
---------	------------------------

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.rnaseq_counts.txt', package = 'autonomics')
object <- read_rnaseq_counts(file)
log2tpm(object) <- values(object)
log2tpm(object)[1:3, 1:3]
```



```

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()
exp2(object)          %>% plot_sample_densities()
log2transform(exp2(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	<i>Create volcano datatable</i>
-----------------	---------------------------------

Description

Create volcano datatable

Usage

```
make_volcano_dt(
  object,
  fit = fits(object)[1],
  coefs = default_coefs(object, fit = fit)[1],
  shape = "imputed",
  size = NULL,
  alpha = NULL,
  label = "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	<i>Map fvalues</i>
-------------	--------------------

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	<i>Convert matrix into SummarizedExperiment</i>
---------------	---

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	<i>maxquant quantity patterns</i>
-------------------	-----------------------------------

Description

maxquant quantity patterns

Usage

MAXQUANT_PATTERNS

Format

An object of class character of length 7.

Examples

MAXQUANT_PATTERNS

mdsplot	<i>Feature correlations/distances</i>
---------	---------------------------------------

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	<i>Merge sample excel</i>
--------------------	---------------------------

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	<i>Merge sample / feature file</i>
-------------------	------------------------------------

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	<i>message dataframe</i>
------------	--------------------------

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	<i>Get model variable</i>
----------	---------------------------

Description

Get model variable

Usage

```
modelvar(object, ...)  
  
## S3 method for class 'data.table'  
modelvar(  
  object,  
  quantity,  
  fit = fits(object),  
  coef = default_coefs(object, fit = fit),  
  ...  
)  
  
## S3 method for class 'SummarizedExperiment'  
modelvar(  
  object,  
  quantity,  
  fit = fits(object),  
  coef = default_coefs(object, fit = fit),  
  ...  
)  
  
effectvar(object, fit = fits(object), coef = default_coefs(object, fit = fit))  
  
tvar(object, fit = fits(object), coef = default_coefs(object, fit = fit))  
  
pvar(object, fit = fits(object), coef = default_coefs(object, fit = fit))  
  
fdrvar(object, fit = fits(object), coef = default_coefs(object, fit = fit))  
  
abstractvar(object, ...)  
  
## S3 method for class 'data.table'  
abstractvar(  
  object,  
  fit = fits(object),  
  coef = default_coefs(object, fit = fit),  
  ...  
)  
  
## S3 method for class 'SummarizedExperiment'  
abstractvar(  
  object,  
  fit = fits(object),  
  coef = default_coefs(object, fit = fit),  
  ...  
)  
  
modelvec(object, ...)  
  
## S3 method for class 'data.table'  
modelvec(  
  object,
```

```
    quantity,
    fit = fits(object)[1],
    coef = default_coefs(object, fit = fit)[1],
    fvar = "feature_id",
    ...
)

## S3 method for class 'SummarizedExperiment'
modelvec(
  object,
  quantity,
  fit = fits(object)[1],
  coef = default_coefs(object, fit = fit)[1],
  fvar = "feature_id",
  ...
)

effectvec(
  object,
  fit = fits(object)[1],
  coef = default_coefs(object)[1],
  fvar = "feature_id"
)

tvec(
  object,
  fit = fits(object)[1],
  coef = default_coefs(object, fit = fit)[1],
  fvar = "feature_id"
)

pvec(
  object,
  fit = fits(object)[1],
  coef = default_coefs(object, fit = fit)[1],
  fvar = "feature_id"
)

fdrvec(
  object,
  fit = fits(object)[1],
  coef = default_coefs(object, fit = fit)[1],
  fvar = "feature_id"
)

abstractvec(object, ...)

## S3 method for class 'data.table'
abstractvec(
  object,
  fit = fits(object)[1],
  coef = default_coefs(object, fit = fit)[1],
```

```
    fvar = "feature_id",
    ...
  )

## S3 method for class 'SummarizedExperiment'
abstractvec(
  object,
  fit = fits(object)[1],
  coef = default_coefs(object, fit = fit)[1],
  fvar = "feature_id",
  ...
)

modeldt(object, ...)

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

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

effectdt(
  object,
  quantity,
  fit = fits(object),
  coef = default_coefs(object, fit = fit)
)

tdt(
  object,
  quantity,
  fit = fits(object),
  coef = default_coefs(object, fit = fit)
)

pdt(
  object,
  quantity,
  fit = fits(object),
  coef = default_coefs(object, fit = fit)
)
```

```

)

modelmat(
  object,
  quantity,
  fit = fits(object),
  coef = default_coefs(object, fit = fit)
)

modelmat(
  object,
  quantity,
  fit = fits(object),
  coef = default_coefs(object, fit = fit)
)

effectmat(object, fit = fits(object), coef = default_coefs(object, fit = fit))

effectsize(
  object,
  fit = fits(object),
  coef = default_coefs(object, fit = fit)
)

tmat(object, fit = fits(object), coef = default_coefs(object, fit = fit))

pmat(object, fit = fits(object), coef = default_coefs(object, fit = fit))

fdrmat(object, fit = fits(object), coef = default_coefs(object, fit = fit))

modelfeatures(object, ...)

## S3 method for class 'data.table'
modelfeatures(
  object,
  fit = fits(object)[1],
  coef = default_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 = default_coefs(object, fit = fit)[1],

```



```

    fvar = "feature_id",
    significancevar = "p",
    significance = 0.05,
    effectsize = 0
  )

downfeatures(
  object,
  fit = fits(object)[1],
  coef = default_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 %<>% fit_limma(statvars = c('effect', 't', 'p'))
object %<>% fit_lm(  statvars = c('effect', 't', 'p'))

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	<i>stri_split and extract</i>
----------	-------------------------------

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
```

OPENTARGETSDIR	<i>opentargets dir</i>
----------------	------------------------

Description

opentargets dir

Usage

```
OPENTARGETSDIR
```

Format

An object of class character of length 1.

order_on_p	<i>Order on p</i>
------------	-------------------

Description

Order on p

Usage

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

Value

SummarizedExperiment

Examples

```
# Read
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file)
order_on_p(object)
order_on_p(fit_limma(object), coefs = c('t1-t0', 't2-t0', 't3-t0'))
```

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,  
  sep = FITSEP,  
  minvar = 0,  
  center_samples = TRUE,  
  verbose = TRUE,  
  plot = FALSE,  
  ...  
)
```

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

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

```
lda(  
  object,  
  assay = assayNames(object)[1],  
  by = "subgroup",  
  ndim = 2,
```

```

    sep = FITSEP,
    minvar = 0,
    verbose = TRUE,
    plot = FALSE,
    ...
)

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

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

```

Arguments

object	SummarizedExperiment
by	svar or NULL
assay	string
ndim	number
sep	string
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
# oplс(object, plot = TRUE) # OPLS # outcommented because it produces a file named FALSE

```

percentiles	<i>survival percentiles</i>
-------------	-----------------------------

Description

survival percentiles

Usage

```
percentiles(object)
```

Arguments

object SummarizedExperiment

Value

numeric vector

pg_to_canonical	<i>proteingroup to isoforms</i>
-----------------	---------------------------------

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_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 (requireNamespace('diagram', quietly = TRUE)){
  file <- download_data('halama18.metabolon.xlsx')
  object <- read_metabolon(file)
  plot_contrastogram(object, subgroupvar = 'subgroup')
}
```

plot_contrast_venn	<i>Plot contrast venn</i>
--------------------	---------------------------

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 %<>% fit_wilcoxon(~ subgroup, block = 'Subject')
object %<>% fit_limma( ~ subgroup, block = 'Subject', codingfun = contr.treatment.explicit)
isfdr <- is_sig(object, contrast = 't3-t0', quantity = 'p', fit = fits(object))
plot_contrast_venn(isfdr)
```

plot_data	<i>Plot data</i>
-----------	------------------

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 = `effect~sample_id~pca1`, y = `effect~sample_id~pca2`)
plot_data(data, x = `effect~sample_id~pca1`, y = `effect~sample_id~pca2`, color = subgroup)
plot_data(data, x = `effect~sample_id~pca1`, y = `effect~sample_id~pca2`, color = NULL)
fixed <- list(shape = 15, size = 3)
plot_data(data, x = `effect~sample_id~pca1`, y = `effect~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_design

Plot model

Description

Plot model

Usage

```
plot_design(object, codingfun = contr.treatment.explicit)
```

Arguments

object	ˆSummarizedExperiment
codingfun	factor coding function <ul style="list-style-type: none"> • <code>contr.treatment</code>: <code>intercept = y0</code>, <code>coefi = yi - y0</code> • <code>contr.treatment.explicit</code>: <code>intercept = y0</code>, <code>coefi = yi - y0</code> • <code>code_control</code>: <code>intercept = ymean</code>, <code>coefi = yi - y0</code> • <code>contr.diff</code>: <code>intercept = y0</code>, <code>coefi = yi - y(i-1)</code> • <code>code_diff</code>: <code>intercept = ymean</code>, <code>coefi = yi - y(i-1)</code> • <code>code_diff_forward</code>: <code>intercept = ymean</code>, <code>coefi = yi - y(i+)</code> • <code>code_deviation</code>: <code>intercept = ymean</code>, <code>coefi = yi - ymean</code> (drop last) • <code>code_deviation_first</code>: <code>intercept = ymean</code>, <code>coefi = yi - ymean</code> (drop first) • <code>code_helmert</code>: <code>intercept = ymean</code>, <code>coefi = yi - mean(y0:(yi-1))</code> • <code>code_helmert_forward</code>: <code>intercept = ymean</code>, <code>coefi = yi - mean(y(i+1):yp)</code>

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_detections	<i>Plot missingness per sample / subgroup</i>
-----------------	---

Description

`plot_sample_nas` shows systematic and random missingness (white), and full detection (bright color) at sample resolution. Imputations are also shown (light color).

Usage

```
plot_detections(...)

plot_summarized_detections(...)

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

plot_subgroup_nas(
```

```

    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_subgroup_nas shows systematic missingness at subgroup resolution. Random missingness and full detection are shown together (bright color). Imputations are also shown (light color).

Value

ggplot object

Examples

```

file <- system.file('extdata/fukuda20.proteingroups.txt', package = 'autonomics')
object <- read_maxquant_proteingroups(file)
plot_sample_nas(object)
plot_sample_nas(impute(object))
plot_subgroup_nas(object)
plot_subgroup_nas(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_subgroup_nas(object)
plot_subgroup_nas(object, 'subgroup')
plot_sample_nas(object)
plot_sample_nas(object, 'subgroup')

```

plot_exprs

Plot exprs for coef

Description

Plot exprs for coef

Usage

```

plot_exprs(
  object,
  dim = "both",
  assay = assayNames(object)[1],
  fit = fits(object)[1],
  coefs = default_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,
  n = 4,
  ncol = NULL,
  nrow = NULL,
  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 = NULL,
  ylab = "value",
  theme = ggplot2::theme(plot.title = element_text(hjust = 0.5)),
  file = NULL,
  width = 7,
  height = 7,
  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)
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
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
file	NULL or filepath
width	inches
height	inches
verbose	TRUE or FALSE
...	used to maintain deprecated 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 %<>% fit_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 = default_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

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 %<>% fit_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 %<>% fit_lm()
object %<>% fit_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 = default_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
)
```

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

```

Examples

```

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

```

plot_matrix	<i>Plot binary matrix</i>
-------------	---------------------------

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)[, .(replicate, subgroup)]
mat$present <- 1
mat %<>% data.table::dcast(replicate ~ subgroup, value.var = 'present', fill = 0)
mat %<>% dt2mat()
plot_matrix(mat)

```

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 %<>% fit_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	<i>Plot sample/feature violins</i>
--------------	------------------------------------

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 = setdiff(autonomics::coefs(object, fit = fit), "Intercept")[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 = "feature_id",
  max.overlaps = 10,
  features = NULL,
  nrow = length(fit),
  p = 0.05,
  fdr = 0.05,
  xndown = NULL,
  xnup = NULL,
  title = NULL
)
```

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)
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
xndown	x position of ndown labels
xnup	x position of nup labels
title	string or NULL

Value

ggplot object

Examples

```
# Regular Usage
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file)
object %<>% fit_limma()
object %<>% fit_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
fdr(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 %<>% fit_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('hmsb'))
```

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 $\log(x)=-\text{Inf}$
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	<i>Pull columns in a dataframe to the front</i>
--------------	---

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('proteinencoding', 'proteinencoding'))
first_cols <- c('id', 'symbol', 'location', 'uniprot')
pull_columns(df, first_cols)
```

read_affymetrix	<i>Read affymetrix microarray</i>
-----------------	-----------------------------------

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 (!requireNamespace("BiocManager", quietly = TRUE)) install.packages('BiocManager')
# if (!requireNamespace("hgu95av2.db", quietly = TRUE)) 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"),
  mod_extract = function(x) stringi::stri_subset_regex(x, colname_regex) %>%
    stringi::stri_replace_first_regex(colname_regex, "$3"),
  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 compounds 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_contaminants *Read contaminants*

Description

Read contaminants

Usage

read_contaminants(file = download_contaminants())

Arguments

file contaminant file

Value

data.table

Examples

```
file <- download_contaminants()
dt <- read_contaminants(file)
```

read_fragpipe	<i>Read fragpipe</i>
---------------	----------------------

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"),
  fastafilename = NULL,
  restapi = FALSE,
  quantity = NULL,
  subgroups = NULL,
  invert = character(0),
  contaminants = FALSE,
  reverse = FALSE,
  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 = ~subgroup,
  block = NULL,
  coefs = NULL,
  contrasts = NULL,
  palette = NULL,
  verbose = TRUE
)

read_phosphosites(...)
```

Arguments

dir	proteingroups directory
fosfile	phosphosites file
profile	proteingroups file
fastafilename	uniprot fastafilename
restapi	TRUE or FALSE : annotate non-fastadt uniprot 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
contaminants	TRUE or FALSE: retain contaminants ?
reverse	TRUE or FALSE: include reverse hits
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 = subgroups)

```

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"),
  fastafilename = NULL,
  restapi = FALSE,
  quantity = NULL,
  subgroups = NULL,
  invert = character(0),
  contaminants = FALSE,
  reverse = FALSE,
  rm_missing_in_all_samples = TRUE,
  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
)

read_proteingroups(...)

```

Arguments

dir	proteingroups directory
file	proteingroups file
fastafilename	uniprot fastafilename
restapi	TRUE or FALSE : use uniprot restapi to annotate uniprot 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
contaminants	TRUE or FALSE : retain contaminants ?
reverse	TRUE or FALSE : include reverse hits ?
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_msigt	<i>Read msigdb datatable</i>
------------	------------------------------

Description

Read msigdb datatable

Usage

```
read_msigt(
  file = list_files(MSIGDIR, full.names = TRUE)[1],
  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_msigt()
```

read_olink	<i>Read olink file</i>
------------	------------------------

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	<i>Read salmon</i>
-------------	--------------------

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_uniprottdt	<i>Read fasta hdrs</i>
-----------------	------------------------

Description

Read fasta hdrs

Usage

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

parse_maxquant_hdrs(fastahdrs)

read_contaminanttdt(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_uniprot(dt(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_contaminant(dt())
```

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

Arguments

object	SummarizedExperiment
fit	character vector
coefs	character vector
verbose	TRUE or FALSE

Examples

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

rm_diann_contaminants *Rm contaminants*

Description

Rm contaminants from DIA-NN SumExp

Usage

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

Arguments

object	SummarizedExperiment
contaminants	uniprot (character vector)
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')
```

scaledlibsizes *Get tmm-scaled libsizes*

Description

Get tmm-scaled libsizes

Usage

```
scaledlibsizes(counts)
```

Arguments

counts	counts matrix
--------	---------------

Value

scaled libsize vector

Examples

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

scoremat	<i>Extract scores/loadings</i>
----------	--------------------------------

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	<i>Get slevels</i>
---------	--------------------

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	<i>Get/Set snames</i>
--------	-----------------------

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	<i>Split samples</i>
---------------	----------------------

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)
```

stri_any_regex	<i>Does any string have a regex</i>
----------------	-------------------------------------

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	<i>Get subgroup matrix</i>
----------------	----------------------------

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	<i>Subtract baseline</i>
-------------------	--------------------------

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	<i>Write sumexp to tsv</i>
---------------	----------------------------

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	<i>SummarizedExperiment to data.table</i>
------------------	---

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"))
)

sumexp_to_subrep_dt(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
subgroup	subgroup (sym)

Details

- sumexp_to_widedt: feature x sample
- sumexp_to_subrep_dt: 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_subrep_dt(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 %<>% fit_limma()
object %<>% fit_lm()
summarize_fit(object, coefs = c('t1-t0', 't2-t0', 't3-t0'))

```

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 factor 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	<i>Is systematic/random/full NA</i>
----------------	-------------------------------------

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	<i>Tag features</i>
--------------	---------------------

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	<i>Tag hdlproteins</i>
-----------------	------------------------

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	<i>Annotation Maps</i>
------------------	------------------------

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]
```

twofactor_sumexp	<i>twofactor sumexp</i>
------------------	-------------------------

Description

twofactor sumexp

Usage

```
twofactor_sumexp()
```

Value

SummarizedExperiment

uncollapse	<i>Uncollapse/Recollapse</i>
------------	------------------------------

Description

Uncollapse data.table cols

Usage

```
uncollapse(dt, ..., sep = ";")
```

```
recollapse(dt, by, sep = ";")
```

Arguments

dt	data.table
...	cols
sep	string
by	string

Examples

```
(dt <- data.table::data.table(
  uniprot = 'Q9BQL6;Q96AC1;Q96AC1-3',
  protein = 'FERM1_HUMAN;FERM2_HUMAN',
  gene = 'FERMT1;FERMT2'))
(dt %<>% uncollapse(protein, gene, sep = ';'))
(dt %>% recollapse(by = 'uniprot'))
```

values	<i>Get/Set expr values</i>
--------	----------------------------

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	<i>Are varlevels unique</i>
----------------------	-----------------------------

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	<i>Get/Set weights</i>
---------	------------------------

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
...	additional params
value	ratio matrix (features x samples)

Value

weight matrix (get) or updated object (set)

Examples

```
file <- system.file('extdata/billing19.rnaseq_counts.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	<i>Write xl/ods</i>
----------	---------------------

Description

Write xl/ods

Usage

```
write_xl(object, xlfile, fitcoefs = autonomics::fitcoefs(object))
```

```
write_ods(object, odsfile, fitcoefs = autonomics::fitcoefs(object))
```

Arguments

object	SummarizedExperiment
xlfile	file
fitcoefs	character vector
odsfile	file

Value

filepath

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file, fit = 'limma')
xlfile <- file.path(tempdir(), 'fukuda20.proteingroups.fdt.xlsx')
odsfile <- file.path(tempdir(), 'fukuda20.proteingroups.fdt.ods')
# write_xl(object, xlfile)
# write_ods(object, odsfile)
```

X	<i>Model based prediction</i>
---	-------------------------------

Description

Model based prediction

Usage

```
X(
  object,
  formula = default_formula(object),
  drop = varlevels_dont_clash(object, all.vars(formula)),
  codingfun = contr.treatment.explicit
)
```

```
beta(object, fit = fits(object)[1])
```

Arguments

object	SummarizedExperiment or data.frame
formula	formula
drop	TRUE or FALSE
codingfun	function
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 %<>% fit_limma(block = 'Subject')
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

* datasets

AUTONOMICS_DATASETS, 31
COMPOUNDDISCOVERER_PATTERNS, 41
CONTAMINANTSURL, 42
DATADIR, 48
FITSEP, 72
LINMOD_ENGINES, 100
MAXQUANT_PATTERNS, 111
MSIGCOLLECTIONSHUMAN, 122
MSIGDIR, 122
OPENTARGETSDIR, 123
PRECURSOR_QUANTITY, 147
TAXON_TO_ORGNAME, 176
TESTS, 177

* internal

reexports, 159
.extract_effectsize_features
 (.extract_p_features), 6
.extract_fdr_features
 (.extract_p_features), 6
.extract_n_features
 (.extract_p_features), 6
.extract_p_features, 6
.extract_sign_features
 (.extract_p_features), 6
.fit_limma (fit), 68
.merge, 8
.plot_survival (fit_survival), 75
.read_compounddiscoverer, 9
.read_diann_precursors, 9
.read_diann_proteingroups
 (.read_diann_precursors), 9
.read_maxquant_phosphosites
 (.read_maxquant_proteingroups),
 11
.read_maxquant_proteingroups, 11
.read_metabolon, 12
.read_rectangles, 14
.read_rnaseq_bams, 16
.read_rnaseq_counts
 (.read_rnaseq_bams), 16
.read_somascan, 19
%<>% (reexports), 159

%>% (reexports), 159

%<>%, 159

%>%, 159

ABBREV_TO_ORGNAME (TAXON_TO_ORGNAME),
176

abstract_fit, 21

abstractvar (modelvar), 116

abstractvec (modelvar), 116

add_adjusted_pvalues, 21

add_assay_means, 22

add_facetvars, 23

add_opentargets_by_uniprot, 24

add_psp, 24

add_smiles, 25

altenrich, 26

analysis, 27

analysis, SummarizedExperiment-method
(analysis), 27

analysis<- (analysis), 27

analysis<-, SummarizedExperiment, list-method
(analysis), 27

analyze, 27

annotate_maxquant, 29

annotate_uniprot_rest, 30

assert_compounddiscoverer_output
(is_diann_report), 91

assert_correlation_matrix
(is_correlation_matrix), 90

assert_diann_report (is_diann_report),
91

assert_fastadt (is_fastadt), 92

assert_fragpipe_tsv (is_diann_report),
91

assert_is_fraction (is_fraction), 93

assert_is_valid_sumexp, 31

assert_maxquant_phosphosites
(is_diann_report), 91

assert_maxquant_proteingroups
(is_diann_report), 91

assert_positive_number
(is_positive_number), 95

assert_scalar_subset
(is_scalar_subset), 95

- assert_valid_formula
(is_valid_formula), 97
- assert_weakly_positive_number
(is_positive_number), 95
- AUTONOMICS_DATASETS, 31
- beta (X), 182
- bin, 32
- biplot, 33
- biplot_corrections, 34
- biplot_covariates, 35
- block2lme, 36
- block_vars (block2lme), 36
- cbind_imputed (split_samples), 165
- center, 37
- code, 38
- code_control (code), 38
- code_deviation (code), 38
- code_deviation_first (code), 38
- code_diff (code), 38
- code_diff_forward (code), 38
- code_helmert (code), 38
- code_helmert_forward (code), 38
- coefs, 40
- collapse_in (count_in), 45
- collapsed_entrezg_to_symbol, 41
- COMPOUNDDISCOVERER_PATTERNS, 41
- CONTAMINANTSURL, 42
- contr.diff (code), 38
- contr.treatment.explicit (code), 38
- contrast_subgroup_cols, 42
- contrast_subgroup_rows
(contrast_subgroup_cols), 42
- count_in, 45
- count_out (count_in), 45
- counts, 43
- counts, SummarizedExperiment-method
(counts), 43
- counts2cpm, 43
- counts2tpm, 44
- counts<- (counts), 43
- counts<-, SummarizedExperiment, matrix-method
(counts), 43
- counts<-, SummarizedExperiment, NULL-method
(counts), 43
- counts<-, SummarizedExperiment, numeric-method
(counts), 43
- cpm, 46
- cpm, SummarizedExperiment-method (cpm),
46
- cpm2counts (counts2cpm), 43
- cpm<- (cpm), 46
- cpm<-, SummarizedExperiment, matrix-method
(cpm), 46
- cpm<-, SummarizedExperiment, numeric-method
(cpm), 46
- create_design, 47
- data.table, 159
- data.table (reexports), 159
- DATADIR, 48
- default_coefs, 49
- default_formula (default_subgroupvar),
51
- default_geom, 50
- default_sfile, 51
- default_subgroupvar, 51
- demultiplex, 52
- dequantify, 53
- dequantify_compounddiscoverer, 53
- downfeatures (modelvar), 116
- download_contaminants, 54
- download_data (DATADIR), 48
- download_gtf, 55
- download_mcclain21, 55
- download_tcga_example, 56
- dt2mat, 56
- effectdt (modelvar), 116
- effectmat (modelvar), 116
- effectsize (modelvar), 116
- effectvar (modelvar), 116
- effectvec (modelvar), 116
- enrichment, 57
- ens2org, 58
- entrezg_to_symbol, 59
- EXISTENCE_TO_NUMBER (TAXON_TO_ORGNAME),
176
- exp2 (log2transform), 106
- explore_transformations, 59
- extract, 159
- extract (reexports), 159
- extract_coef_features
(.extract_p_features), 6
- extract_rectangle, 60
- factor2logical (logical2factor), 107
- fcluster, 62
- fcor (mdsplot), 111
- fdata, 63
- fdata, SummarizedExperiment-method
(fdata), 63
- fdata<- (fdata), 63
- fdata<-, SummarizedExperiment, data.frame-method
(fdata), 63

- fdist (mdsplot), 111
- fdr2p, 64
- fdrmat (modelvar), 116
- fdrvar (modelvar), 116
- fdrvec (modelvar), 116
- fdt (fdata), 63
- fdt, SummarizedExperiment-method
 - (fdata), 63
- fdt<- (fdata), 63
- fdt<-, SummarizedExperiment, data.table-method
 - (fdata), 63
- filter_exprs_replicated_in_some_subgroup, 65
- filter_features, 66
- filter_medoid, 66
- filter_samples, 67
- fit, 68
- fit_limma (fit), 68
- fit_lm (fit_lmx), 73
- fit_lme (fit_lmx), 73
- fit_lmer (fit_lmx), 73
- fit_lmx, 73
- fit_survival, 75
- fit_wilcoxon (fit), 68
- fitcoefs, 71
- fitdt (fitvars), 72
- fits, 71
- FITSEP, 72
- fitvars, 72
- fix_xlgenes, 77
- flevels, 78
- fnames, 78
- fnames, SummarizedExperiment-method
 - (fnames), 78
- fnames<- (fnames), 78
- fnames<-, SummarizedExperiment, character-method
 - (fnames), 78
- formula2lm (block2lme), 36
- formula2lmer (block2lme), 36
- formula2str, 79
- fscale (log2transform), 106
- ftype, 79
- fvalues, 80
- fvars, 81
- fvars, SummarizedExperiment-method
 - (fvars), 81
- fvars<- (fvars), 81
- fvars<-, SummarizedExperiment, character-method
 - (fvars), 81
- genome_to_orgdb, 81
- group_by_level, 82
- guess_compounddiscoverer_quantity, 83
- guess_fitsep, 83
- guess_maxquant_quantity, 84
- guess_sep, 85
- has_multiple_levels, 86
- hdlproteins, 87
- impute, 88
- inf_to_na (zero_to_na), 183
- invert_subgroups, 89
- invnorm (log2transform), 106
- is_collapsed_subset, 90
- is_compounddiscoverer_output
 - (is_diann_report), 91
- is_correlation_matrix, 90
- is_diann_report, 91
- is_fastadt, 92
- is_file, 93
- is_fraction, 93
- is_fragpipe_tsv (is_diann_report), 91
- is_imputed, 94
- is_imputed, SummarizedExperiment-method
 - (is_imputed), 94
- is_imputed<- (is_imputed), 94
- is_imputed<-, SummarizedExperiment, matrix-method
 - (is_imputed), 94
- is_imputed<-, SummarizedExperiment, NULL-method
 - (is_imputed), 94
- is_maxquant_phosphosites
 - (is_diann_report), 91
- is_maxquant_proteingroups
 - (is_diann_report), 91
- is_positive_number, 95
- is_scalar_subset, 95
- is_sig, 96
- is_valid_formula, 97
- is_weakly_positive_number
 - (is_positive_number), 95
- keep_connected_blocks, 98
- keep_connected_features, 98
- keep_replicated_features, 99
- label2index, 99
- lda (pca), 125
- LINMOD_ENGINES, 100
- list2mat, 100
- list_files, 101
- loadingmat (scoremat), 163
- loadings (scoremat), 163
- log2counts, 101
- log2counts, SummarizedExperiment-method
 - (log2counts), 101

- log2counts<- (log2counts), 101
- log2counts<- , SummarizedExperiment, matrix-method (log2counts), 101
- log2counts<- , SummarizedExperiment, numeric-method (log2counts), 101
- log2cpm, 102
- log2cpm, SummarizedExperiment-method (log2cpm), 102
- log2cpm<- (log2cpm), 102
- log2cpm<- , SummarizedExperiment, matrix-method (log2cpm), 102
- log2cpm<- , SummarizedExperiment, numeric-method (log2cpm), 102
- log2diffs, 103
- log2diffs, SummarizedExperiment-method (log2diffs), 103
- log2diffs<- (log2diffs), 103
- log2diffs<- , SummarizedExperiment, matrix-method (log2diffs), 103
- log2diffs<- , SummarizedExperiment, numeric-method (log2diffs), 103
- log2proteins, 103
- log2proteins, SummarizedExperiment-method (log2proteins), 103
- log2proteins<- (log2proteins), 103
- log2proteins<- , SummarizedExperiment, matrix-method (log2proteins), 103
- log2proteins<- , SummarizedExperiment, numeric-method (log2proteins), 103
- log2sites, 104
- log2sites, SummarizedExperiment-method (log2sites), 104
- log2sites<- (log2sites), 104
- log2sites<- , SummarizedExperiment, matrix-method (log2sites), 104
- log2sites<- , SummarizedExperiment, numeric-method (log2sites), 104
- log2tpm, 105
- log2tpm, SummarizedExperiment-method (log2tpm), 105
- log2tpm<- (log2tpm), 105
- log2tpm<- , SummarizedExperiment, matrix-method (log2tpm), 105
- log2tpm<- , SummarizedExperiment, numeric-method (log2tpm), 105
- log2transform, 106
- logical2factor, 107
- make_alpha_palette, 108
- make_colors, 108
- make_volcano_dt, 109
- map_fvalues, 110
- mat2dt (dt2mat), 56
- matrix2sumexp, 110
- MAXQUANT_PATTERNS, 111
- mdsplot, 111
- hedge_compounddiscoverer, 112
- merge_fdata (merge_sdata), 114
- merge_fdt (merge_sdata), 114
- merge_ffile (merge_sample_file), 113
- merge_sample_excel, 113
- merge_sample_file, 113
- merge_sdata, 114
- merge_sdt (merge_sdata), 114
- message_df, 116
- minusinf_to_na (zero_to_na), 183
- modeldt (modelvar), 116
- modelfeatures (modelvar), 116
- modelmat (modelvar), 116
- modelvar, 116
- modelvec (modelvar), 116
- MSIGCOLLECTIONSHUMAN, 122
- MSIGCOLLECTIONSMOUSE (MSIGCOLLECTIONSHUMAN), 122
- MSIGDIR, 122
- na_to_string (zero_to_na), 183
- na_to_zero (zero_to_na), 183
- na_to_na (zero_to_na), 183
- nfactors, 123
- methods (systematic_nas), 174
- OPENTARGETSDIR, 123
- opls (pca), 125
- order_on_effect (order_on_p), 124
- order_on_p, 124
- parse_maxquant_hdrs (read_uniprot), 158
- pca, 125
- pdt (modelvar), 116
- percentiles, 127
- pg_to_canonical, 127
- pg_to_isoforms (pg_to_canonical), 127
- plot_contrast_venn, 129
- plot_contrastogram, 128
- plot_data, 129
- plot_densities, 130, 145
- plot_design, 132
- plot_detections, 133
- plot_exprs, 134, 145
- plot_exprs_per_coef, 137
- plot_feature_boxplots (plot_exprs), 134
- plot_feature_densities (plot_densities), 130
- plot_feature_violins (plot_violins), 144

- plot_fit_summary, 138
- plot_heatmap, 139
- plot_matrix, 140
- plot_sample_boxplots, 132
- plot_sample_boxplots (plot_exprs), 134
- plot_sample_densities, 137, 138
- plot_sample_densities (plot_densities), 130
- plot_sample_nas (plot_detections), 133
- plot_sample_violins, 132, 137, 138
- plot_sample_violins (plot_violins), 144
- plot_subgroup_nas (plot_detections), 133
- plot_subgroup_points, 141
- plot_subgroup_violins (plot_violins), 144
- plot_summarized_detections (plot_detections), 133
- plot_summary, 142
- plot_survival (fit_survival), 75
- plot_venn, 143
- plot_venn_heatmap, 143
- plot_violins, 144
- plot_volcano, 146
- plotmat, 128
- pls (pca), 125
- pmat (modelvar), 116
- PPATTERN (FITSEP), 72
- PRECURSOR_QUANTITY, 147
- preprocess_rnaseq_counts, 148
- pull_columns, 149
- pvar (modelvar), 116
- pvec (modelvar), 116

- quantnorm (log2transform), 106

- random_nas (systematic_nas), 174
- read_affymetrix, 149
- read_compounddiscoverer, 150
- read_contaminantdt (read_uniprottdt), 158
- read_contaminants, 151
- read_diann (.read_diann_precursors), 9
- read_diann_proteingroups (.read_diann_precursors), 9
- read_fragpipe, 152
- read_maxquant_phosphosites, 153
- read_maxquant_proteingroups, 154
- read_metabolon (.read_metabolon), 12
- read_msigdt, 26, 156
- read_olink, 157
- read_phosphosites (read_maxquant_phosphosites), 153
- read_proteingroups (read_maxquant_proteingroups), 154
- read_rectangles (.read_rectangles), 14
- read_rnaseq_bams (.read_rnaseq_bams), 16
- read_rnaseq_counts (.read_rnaseq_bams), 16
- read_salmon, 157
- read_somascan (.read_somascan), 19
- read_uniprottdt, 158
- recollapse (uncollapse), 178
- reexports, 159
- reset_fit, 159
- REVIEWED_TO_NUMBER (TAXON_TO_ORGNAME), 176
- rm_diann_contaminants, 160
- rm_missing_in_all_samples, 161
- rm_missing_in_some_samples (rm_missing_in_all_samples), 161
- rm_singleton_samples (rm_unmatched_samples), 161
- rm_unmatched_samples, 161

- sampleid_values (svalues), 172
- scaledlibsizes, 162
- scor (mdsplot), 111
- scoremat, 163
- scores (scoremat), 163
- sdata (fdata), 63
- sdata, SummarizedExperiment-method (fdata), 63
- sdata<- (fdata), 63
- sdata<-, SummarizedExperiment, data.frame-method (fdata), 63
- sdata<-, SummarizedExperiment, DataFrame-method (fdata), 63
- sdist (mdsplot), 111
- sdt (fdata), 63
- sdt, SummarizedExperiment-method (fdata), 63
- sdt<- (fdata), 63
- sdt<-, SummarizedExperiment, data.table-method (fdata), 63
- slevels, 163
- sma (pca), 125
- snames, 164
- snames, SummarizedExperiment-method (snames), 164
- snames<- (snames), 164
- snames<-, SummarizedExperiment, character-method (snames), 164
- split_extract (nfactors), 123

- split_extract_fixed (nfactors), 123
- split_extract_regex (nfactors), 123
- split_features (split_samples), 165
- split_samples, 165
- spls (pca), 125
- sscale (log2transform), 106
- stri_any_regex, 165
- stri_detect_fixed_in_collapsed, 166
- subgroup_array, 167
- subgroup_levels (slevels), 163
- subgroup_matrix (subgroup_array), 167
- subgroup_values (svalues), 172
- subtract_baseline, 167
- subtract_differences
 - (subtract_baseline), 167
- subtract_pairs (subtract_baseline), 167
- sumexp_to_longdt (sumexp_to_widedt), 170
- sumexp_to_subrep_dt (sumexp_to_widedt), 170
- sumexp_to_tsv, 170
- sumexp_to_widedt, 170
- sumexplist_to_longdt, 169
- summarize_fit, 171
- svalues, 172
- svalues<- (svalues), 172
- svalues<-, SummarizedExperiment, character-method
 - (svalues), 172
- svars, 173
- svars, MultiAssayExperiment-method
 - (svars), 173
- svars, SummarizedExperiment-method
 - (svars), 173
- svars<- (svars), 173
- svars<-, MultiAssayExperiment, character-method
 - (svars), 173
- svars<-, SummarizedExperiment, character-method
 - (svars), 173
- systematic_nas, 174

- tag_features, 175
- tag_hdlproteins, 175
- taxon2org (ens2org), 58
- TAXON_TO_ORGNAME, 176
- tdt (modelvar), 116
- TESTS, 177
- tmat (modelvar), 116
- tpm, 177
- tpm, SummarizedExperiment-method (tpm), 177
- tpm<- (tpm), 177
- tpm<-, SummarizedExperiment, matrix-method
 - (tpm), 177
- tpm<-, SummarizedExperiment, numeric-method
 - (tpm), 177
- tvar (modelvar), 116
- tvec (modelvar), 116
- twofactor_sumexp, 178

- uncollapse, 178
- upfeatures (modelvar), 116

- values, 179
- values, SummarizedExperiment-method
 - (values), 179
- values<- (values), 179
- values<-, SummarizedExperiment, matrix-method
 - (values), 179
- values<-, SummarizedExperiment, numeric-method
 - (values), 179
- varlevels_dont_clash, 179
- venn_detects, 180
- vsn (log2transform), 106

- weights, 181
- weights, SummarizedExperiment-method
 - (weights), 181
- weights<- (weights), 181
- weights<-, SummarizedExperiment, matrix-method
 - (weights), 181
- weights<-, SummarizedExperiment, NULL-method
 - (weights), 181
- weights<-, SummarizedExperiment, numeric-method
 - (weights), 181
- write_ods (write_xl), 182
- write_xl, 182

- zero_to_na, 183
- zscore (log2transform), 106