

Package ‘autonomics’

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Type Package

Title Unified statistical Modeling of Omics Data

Version 1.12.1

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, opl).

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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vsn

Suggests affy, AnnotationDbi, AnnotationHub, apcluster, BiocManager, BiocStyle, Biostrings, diagram, DBI, ensemblDb, fpc, GenomicDataCommons, GenomicRanges, GEOquery, hgu95av2.db, ICSNP, jsonlite, knitr, lme4, lmerTest, MASS, 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	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	22
add_assay_means	23
add_facetvars	24
add_opentargets_by_uniprot	24
add_psp	25
add_smiles	26
altenrich	27
analysis	28

analyze	29
annotate_maxquant	30
annotate_uniprot_rest	32
assert_is_valid_sumexp	32
AUTONOMICS_DATASETS	33
bin	33
biplot	34
biplot_corrections	36
biplot_covariates	37
block2lme	38
center	39
code	40
coefs	42
collapsed_entrezg_to_symbol	43
CONTAMINANTSURL	44
contrast_subgroup_cols	44
counts	45
counts2cpm	46
counts2tpm	46
count_in	47
cpm	48
create_design	49
DATADIR	51
default_geom	52
default_sfile	53
default_subgroupvar	53
demultiplex	54
dequantify	55
download_contaminants	56
download_gtf	56
download_mcclain21	57
download_tcga_example	58
dt2mat	58
enrichment	59
ens2org	60
entrezg_to_symbol	61
explore_transformations	61
extract_rectangle	62
fdata	64
fdr2p	66
filter_exprs_replicated_in_some_subgroup	66
filter_features	67
filter_medoid	68
filter_samples	69
fit	69
fitcoefs	72
fits	73
FITSEP	74

fitvars	74
fit_lmx	75
fit_survival	77
fix_xlgenes	79
flevels	80
fnames	80
formula2str	81
fvalues	82
fvars	82
genome_to_orgdb	83
group_by_level	84
guess_fitsep	85
guess_maxquant_quantity	85
guess_sep	86
has_multiple_levels	87
hdlproteins	89
impute	89
invert_subgroups	91
is_collapsed_subset	92
is_diann_report	92
is_fastadt	94
is_file	94
is_fraction	95
is_imputed	95
is_positive_number	96
is_scalar_subset	97
is_sig	98
is_valid_formula	99
keep_connected_blocks	100
keep_connected_features	100
keep_replicated_features	101
label2index	101
LINMOD_ENGINES	102
list2mat	102
list_files	103
log2counts	103
log2cpm	104
log2diffs	105
log2proteins	106
log2sites	106
log2tpm	107
log2transform	108
logical2factor	109
make_alpha_palette	110
make_colors	111
make_volcano_dt	111
map_fvalues	112
matrix2sumexp	113

MAXQUANT_PATTERNS	113
merge_sample_excel	114
merge_sample_file	115
merge_sdata	116
message_df	117
modelvar	118
MSIGCOLLECTIONSHUMAN	123
MSIGDIR	123
nfactors	124
OPENTARGETSDIR	125
order_on_p	125
pca	126
percentiles	128
pg_to_canonical	129
plot_contrastogram	129
plot_contrast_venn	130
plot_data	131
plot_densities	132
plot_design	134
plot_detections	135
plot_exprs	136
plot_exprs_per_coef	140
plot_fit_summary	141
plot_heatmap	142
plot_matrix	143
plot_subgroup_points	143
plot_summary	145
plot_venn	146
plot_venn_heatmap	146
plot_violins	147
plot_volcano	149
PRECURSOR_QUANTITY	151
preprocess_rnaseq_counts	151
pull_columns	152
read_affymetrix	153
read_contaminants	153
read_fragpipe	154
read_maxquant_phosphosites	155
read_maxquant_proteingroups	157
read_msigt	159
read_olink	159
read_salmon	160
read_uniprot	161
reexports	162
reset_fit	162
rm_diann_contaminants	163
rm_missing_in_all_samples	163
rm_unmatched_samples	164

scaledlibsizes	165
scoremat	165
slevels	166
snames	167
split_samples	167
stri_any_regex	168
stri_detect_fixed_in_collapsed	169
subgroup_array	170
subtract_baseline	170
sumexplist_to_longdt	172
sumexp_to_tsv	173
sumexp_to_widedt	173
summarize_fit	174
svalues	175
svars	176
systematic_nas	177
tag_features	178
tag_hdlproteins	179
TAXON_TO_ORGNAME	179
TESTS	180
tpm	180
uncollapse	181
values	182
varlevels_dont_clash	183
venn_detects	184
weights	184
write_xl	185
zero_to_na	186

Index**188**

.extract_p_features *Extract coefficient features*

Description

Extract coefficient features

Usage

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

```
.extract_fdr_features(  
  object,  
  coefs,  
  fdr = 0.05,  
  fit = fits(fdt(object)),  
  combiner = "|",  
  verbose = TRUE  
)  
  
.extract_effectsize_features(  
  object,  
  coefs,  
  effectsize = 1,  
  fit = fits(fdt(object)),  
  combiner = "|",  
  verbose = TRUE  
)  
  
.extract_sign_features(  
  object,  
  coefs,  
  sign,  
  fit = fits(fdt(object))[1],  
  combiner = "|",  
  verbose = TRUE  
)  
  
.extract_n_features(  
  object,  
  coefs,  
  combiner = "|",  
  n,  
  fit = fits(fdt(object))[1],  
  verbose = TRUE  
)  
  
extract_coef_features(  
  object,  
  fit = fits(fdt(object))[1],  
  coefs = default_coefs(fdt(object), fit = fit),  
  combiner = "|",  
  p = 1,  
  fdr = 1,  
  effectsize = 0,  
  sign = c(-1, +1),  
  n = 4,  
  verbose = TRUE
```

)

Arguments

object	SummarizedXExperiment
coefs	subset of coefs(object)
p	p threshold
fit	subset of fits(fdt(object))
combiner	' ' or '&': how to combine multiple fits/coefs
verbose	TRUE or FALSE
fdr	fdr threshold
effectsize	effectsize 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', p = 0.05)
object %<>% .extract_fdr_features(    coefs = 't1', fdr = 0.05)
object %<>% .extract_effectsize_features(coefs = 't1', effectsize = 1)
object %<>% .extract_sign_features(   coefs = 't1', sign = -1)
object %<>% .extract_n_features(     coefs = 't1', n = 1)
object <- object0
object %<>% extract_coef_features(coefs = 't1', p = 0.05, fdr = 0.05, effectsize = 1, sign = -1, n = 1)

# Multiple coefs
object <- object0
object %<>% .extract_p_features(      coefs = c('t1', 't2'), p = 0.05)
object %<>% .extract_fdr_features(    coefs = c('t1', 't2'), fdr = 0.01)
object %<>% .extract_effectsize_features(coefs = c('t1', 't2'), effectsize = 1)
object %<>% .extract_sign_features(   coefs = c('t1', 't2'), sign = -1)
object %<>% .extract_n_features(     coefs = c('t1', 't2'), n = 1)
object <- object0
object %<>% extract_coef_features(coefs = c('t1', 't2'), 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_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

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

Value

data.table

Examples

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

<code>.read_metabolon</code>	<i>Read metabolon xlsxfile</i>
------------------------------	--------------------------------

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')
```

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

Description

Read omics data from rectangular file

Usage

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

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

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

Arguments

<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

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

Value

SummarizedExperiment

Author(s)

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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.rnaseq_counts.txt', package = 'autonomics')
  object <- read_rnaseq_counts(file, fit = 'limma', coefs = 'E15')
  object <- read_rnaseq_counts(file, fit = 'limma', coefs = 'E15', voom = FALSE)
  object <- read_rnaseq_counts(file, fit = 'limma', coefs = 'E15', voom = FALSE, cpm = FALSE)
  object <- read_rnaseq_counts(file, fit = 'limma', coefs = 'E15', 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', tpm = TRUE, ensdb = ensdb)

## End(Not run)
```

.read_somascan	<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

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

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

Value

Summarizedexperiment

Examples

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

abstract_fit

Abstract model fit

Description

Abstract model fit

Usage

```
abstract_fit(
  object,
  sep = guess_fitsep(fdt(object)),
  fit = fits(fdt(object)),
  coef = coefs(fdt(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')
fdt(object)
fdt(abstract_fit(object))
```

add_adjusted_pvalues *Add adjusted pvalues*

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')
object %<>% extract(order(fdt(.)$`p~Adult~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(fdt(object))[1],  
  coefs = default_coefs(fdt(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	<i>Add psp</i>
---------	----------------

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	<i>Alternative Enrichment Analysis</i>
-----------	--

Description

Alternative Enrichment Analysis

Usage

```
altenrich(
  object,
  pathwaydt,
  genevar = "gene",
  genesep = "[ ,;]",
  coef = default_coefs(fdt(object))[1],
  fit = fits(fdt(object))[1],
  significancevar = "p",
  significance = 0.05,
  effectsize = 0,
  n = 3,
  genes = FALSE,
  verbose = TRUE
)
```

Arguments

object	SummarizedExperiment
pathwaydt	data.table, e.g. <code>read_msigt</code>
genevar	gene fvar
genesep	string or NULL
coef	string in <code>coefs(fdt(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

Get/set analysis

Description

Get/set analysis

Usage

```
analysis(object)
```

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

```
analysis(object) <- value
```

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

Arguments

object SummarizedExperiment

value list

Value

analysis details (get) or updated object (set)

Examples

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

analyze

*Analyze***Description**

Analyze

Usage

```
analyze(
  object,
  pca = TRUE,
  pls = TRUE,
  fit = "limma",
  formula = default_formula(object),
  drop = varlevels_dont_clash(object, all.vars(formula)),
  codingfun = contr.treatment,
  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"> • <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_helmert: intercept = ymean, coefi = yi - mean(y0:(yi-1))
- code_helmert_forward: intercept = ymean, coefi = yi - mean(y(i+1):yp)

contrasts	model coefficient contrasts of interest: string vector or NULL
coefs	model coefficients of interest: string vector or NULL
block	model blockvar
weightvar	NULL or name of weight matrix in assays(object)
plot	TRUE / FALSE
label	fvar
palette	NULL or colorvector
verbose	TRUE / FALSE: message?

Value

SummarizedExperiment

Examples

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

annotate_maxquant	<i>Annotate maxquant</i>
-------------------	--------------------------

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 dt
 contaminanthdrs data.table : output of read_uniprot dt
 maxquanthdrs data.table : output of read_uniprot dt
 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_uniprot dt(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 *Biplot batch corrections*

Description

Biplot batch corrections

Usage

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

Arguments

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

Value

grid object

See Also

biplot_covariates

Examples

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

biplot_covariates	<i>Biplot covariates</i>
-------------------	--------------------------

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: charactervector 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	<i>Center samples</i>
--------	-----------------------

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

- `contr.treatment`: intercept = y_0 , coefi = $y_i - y_0$
- `contr.treatment.explicit`: intercept = y_0 , coefi = $y_i - y_0$

	<ul style="list-style-type: none"> • <code>code_control</code>: intercept = ymean, coefi = yi - y0 • <code>contr.diff</code>: intercept = y0, coefi = yi - y(i-1) • <code>code_diff</code>: intercept = ymean, coefi = yi - y(i-1) • <code>code_diff_forward</code>: intercept = ymean, coefi = yi - y(i+) • <code>code_deviation</code>: intercept = ymean, coefi = yi - ymean (drop last) • <code>code_deviation_first</code>: intercept = ymean, coefi = yi - ymean (drop first) • <code>code_helmert</code>: intercept = ymean, coefi = yi - mean(y0:(yi-1)) • <code>code_helmert_forward</code>: intercept = ymean, coefi = yi - mean(y(i+1):yp)
<code>verbose</code>	TRUE or FALSE
<code>vars</code>	svars
<code>n</code>	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(featuredt, ...)
```

```
## S3 method for class 'factor'
```

```
coefs(featuredt, ...)
```

```
## S3 method for class 'data.table'
```

```
coefs(featuredt, fit = fits(featuredt), svars = NULL, ...)
```

Arguments

featuredt	data.table or factor
...	required for s3 dispatch
fit	string: 'limma', 'lm', 'lme', 'lmer'
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(fdt(object))
```

collapsed_entrezg_to_symbol
Collapsed entrezg to genesymbol

Description

Collapsed entrezg to genesymbol

Usage

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

Arguments

x	charactervector
sep	string
orgdb	OrgDb

Value

character vector

Examples

```
if (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)
}
```

CONTAMINANTSURL	<i>Contaminants URL</i>
-----------------	-------------------------

Description

Contaminants URL

Usage

CONTAMINANTSURL

Format

An object of class character of length 1.

Examples

CONTAMINANTSURL

contrast_subgroup_cols	<i>Row/Col contrasts</i>
------------------------	--------------------------

Description

Row/Col contrasts

Usage

contrast_subgroup_cols(object, subgroupvar)

contrast_subgroup_rows(object, subgroupvar)

Arguments

object	SummarizedExperiment
--------	----------------------

subgroupvar	subgroup svar
-------------	---------------

Value

matrix

Examples

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

counts

Get/Set counts

Description

Get / Set counts matrix

Usage

```
counts(object)

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

counts(object) <- value

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

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

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

Arguments

object	SummarizedExperiment
value	count matrix (features x samples)

Value

count matrix (get) or updated object (set)

Examples

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

counts2cpm	<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</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,
  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,
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 <ul style="list-style-type: none"> • <code>contr.treatment</code>: intercept = y_0, coefi = $y_i - y_0$ • <code>contr.treatment.explicit</code>: intercept = y_0, coefi = $y_i - y_0$ • <code>code_control</code>: intercept = y_{mean}, coefi = $y_i - y_0$ • <code>contr.diff</code>: intercept = y_0, coefi = $y_i - y_{(i-1)}$ • <code>code_diff</code>: intercept = y_{mean}, coefi = $y_i - y_{(i-1)}$ • <code>code_diff_forward</code>: intercept = y_{mean}, coefi = $y_i - y_{(i+)}$ • <code>code_deviation</code>: intercept = y_{mean}, coefi = $y_i - y_{\text{mean}}$ (drop last) • <code>code_deviation_first</code>: intercept = y_{mean}, coefi = $y_i - y_{\text{mean}}$ (drop first) • <code>code_helmert</code>: intercept = y_{mean}, coefi = $y_i - \text{mean}(y_0:(y_i-1))$ • <code>code_helmert_forward</code>: intercept = y_{mean}, 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_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

Demultiplex snames

Description

Demultiplex maxquant samplenames

Usage

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

Arguments

x character vector
 verbose TRUE or FALSE

Details

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

Value

character

Examples

```

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

```

dequantify

*Dequantify maxquant names***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', 'correctedreporterintensity'
verbose	TRUE or FALSE

Details

Ratio H/L WT(L).KD(H).R1 -> WT(L).KD(H).R1{H/L} LFQ intensity WT.R1 -> WT.R1{1}

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'))

```

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 *Download GTF file*

Description

Download GTF file with feature annotations

Usage

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

Arguments

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

Value

gtffile path

Examples

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

download_mcclain21	<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	<i>Enrichment analysis</i>
------------	----------------------------

Description

Are selected genes enriched in pathway?

Usage

```
enrichment(
  object,
  pathwaydt,
  fit = fits(fdt(object))[1],
  coef = coefs(fdt(object), fit = fit)[1],
  var = abstractvar(fdt(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:GO:BP')
  file <- system.file('extdata/atkin.somascan.adat', package = 'autonomics')
  object <- read_somascan(file, fit = 'limma', coefs = 't1')
  fvars(object) %<>% gsub('EntrezGeneSymbol', 'gene', .)
  object %<>% abstract_fit()
  var <- abstractvar(fdt(object))
  enrichdt1 <- enrichment(object, pathwaydt, var = var) # 2:n factor
  enrichdt2 <- enrichment(object, pathwaydt, var = var, levels = c('flat', 'down', 'up')) # 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", "vs", "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') %>% 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
```

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')
object %<>% extract(order(fdt(.)[[pcol]]), )
object %<>% extract(1:10, )
fdt(object) %<>% extract(, 1)
object %<>% fit_limma(coefs = 't3')
# 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.rnaseq.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	<i>Fit model and test for differential expression</i>
-----	---

Description

Fit model and test for differential expression

Usage

```
fit(
  object,
  formula = default_formula(object),
  engine = "limma",
  drop = varlevels_dont_clash(object, all.vars(formula)),
  codingfun = contr.treatment,
  design = create_design(object, formula = formula, drop = drop, codingfun = codingfun),
  contrasts = NULL,
```

```
  coefs = if (is.null(contrasts)) colnames(design) else 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, "limma"),
  verbose = TRUE,
  plot = FALSE
)

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

fit_wilcoxon(
  object,
  formula = default_formula(object),
  drop = NULL,
```

```

codingfun = contr.treatment.explicit,
contrasts = NULL,
coefs = NULL,
block = NULL,
weightvar = NULL,
statvars = c("effect", "p"),
sep = FITSEP,
verbose = TRUE,
plot = FALSE
)

```

Arguments

object	SummarizedExperiment
formula	modeling 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, coef = $y_i - y_0$ • <code>contr.treatment.explicit</code>: intercept = y_0, coef = $y_i - y_0$ • <code>code_control</code>: intercept = y_{mean}, coef = $y_i - y_0$ • <code>contr.diff</code>: intercept = y_0, coef = $y_i - y_{(i-1)}$ • <code>code_diff</code>: intercept = y_{mean}, coef = $y_i - y_{(i-1)}$ • <code>code_diff_forward</code>: intercept = y_{mean}, coef = $y_i - y_{(i+)}$ • <code>code_deviation</code>: intercept = y_{mean}, coef = $y_i - y_{\text{mean}}$ (drop last) • <code>code_deviation_first</code>: intercept = y_{mean}, coef = $y_i - y_{\text{mean}}$ (drop first) • <code>code_helmert</code>: intercept = y_{mean}, coef = $y_i - \text{mean}(y_0:(y_i-1))$ • <code>code_helmert_forward</code>: intercept = y_{mean}, coef = $y_i - \text{mean}(y_{(i+1):y_p})$
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 <code>assays(object)</code>
statvars	character vector: subset of <code>c('effect', 'p', 'fdr', 't', 'se')</code>
sep	string: pvar separator (" <code>~</code> " in " <code>p~t2~limma</code> ")
suffix	string: pvar suffix (" <code>limma</code> " in " <code>p~t2~limma</code> ")
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(fdt(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(fdt(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(fdt(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 = '.'))

```


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(featuredt)
```

Arguments

featuredt feature data.table

Value

character vector

Examples

```
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file, fit = 'limma')
fits(fdt(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,
  coefs = colnames(create_design(object, formula = formula, drop = drop, codingfun =
    codingfun, verbose = FALSE)),
  block = NULL,
  opt = "optim",
  weightvar = if ("weights" %in% assayNames(object)) "weights" else NULL,
  statvars = c("effect", "p", "se", "t")[1:2],
  sep = FITSEP,
  verbose = TRUE,
  plot = FALSE
)

fit_lm(
  object,
  formula = default_formula(object),
  drop = varlevels_dont_clash(object, all.vars(formula)),
  codingfun = contr.treatment,
  block = NULL,
  weightvar = if ("weights" %in% assayNames(object)) "weights" else NULL,
  statvars = c("effect", "p", "se", "t")[1:2],
  sep = FITSEP,
  coefs = colnames(create_design(object, formula = formula, drop = drop, codingfun =
    codingfun, verbose = FALSE)),
  contrasts = NULL,
  verbose = TRUE,

```

```

    plot = FALSE
  )

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

fit_lmer(
  object,
  formula = default_formula(object),
  drop = varlevels_dont_clash(object, all.vars(formula)),
  codingfun = contr.treatment,
  block = NULL,
  weightvar = if ("weights" %in% assayNames(object)) "weights" else NULL,
  statvars = c("effect", "p", "se", "t")[1:2],
  sep = FITSEP,
  coefs = colnames(create_design(object, formula = formula, drop = drop, codingfun =
    codingfun, verbose = FALSE)),
  contrasts = NULL,
  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')
sep	string
verbose	TRUE or FALSE
plot	TRUE or FALSE
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	<i>Fit/Plot survival</i>
--------------	--------------------------

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)
```

fvalues	<i>Get fvalues</i>
---------	--------------------

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 *Get corresponding orgdb*

Description

Get corresponding orgdb

Usage

```
genome_to_orgdb(genome)
```

Arguments

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

Value

OrgDb

Examples

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

group_by_level	<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_fitsep	<i>guess_fitsep</i>
--------------	---------------------

Description

guess_fitsep

Usage

```
guess_fitsep(featuredt)
```

Arguments

featuredt data.table

Value

string

Examples

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

guess_maxquant_quantity	<i>Guess maxquant quantity from snames</i>
-------------------------	--

Description

Guess maxquant quantity from snames

Usage

```
guess_maxquant_quantity(x)
```

Arguments

x character vector

Value

string: value from names(MAXQUANT_PATTERNS)

Examples

```

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

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

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

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

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

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

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

```

guess_sep

Guess separator

Description

Guess separator

Usage

```

guess_sep(x, ...)

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

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

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

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

```

Arguments

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

Value

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

Examples

```
# character vector
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	<i>hdl proteomewatch proteins</i>
-------------	-----------------------------------

Description

hdl proteomewatch proteins

Usage

```
hdlproteins()
```

Value

string vector: HDLProteomeWatch protein entries

Examples

```
hdlproteins()
```

impute	<i>Impute</i>
--------	---------------

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_diann_report *Is diann, fragpipe, proteingroups, phosphosites file?*

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))
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))
```

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	<i>Is fastadt</i>
------------	-------------------

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))

```

<code>is_positive_number</code>	<i>Is positive number</i>
---------------------------------	---------------------------

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	<i>Is scalar subset</i>
------------------	-------------------------

Description

Is scalar subset

Usage

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

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

Arguments

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

Examples

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

is_sig

Is significant?

Description

Is significant?

Usage

```
is_sig(
  object,
  fit = fits(fdt(object))[1],
  contrast = coefs(fdt(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')
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('%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	<i>Get/Set log2cpm</i>
---------	------------------------

Description

Get / Set log2cpm matrix

Usage

```
log2cpm(object)

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

log2cpm(object) <- value

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

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

Arguments

object SummarizedExperiment
 value log2cpm matrix (features x samples)

Value

log2cpm matrix (get) or updated object (set)

Examples

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

log2diffs

Get/Set log2diffs

Description

Get/Set log2diffs

Usage

```
log2diffs(object)

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

log2diffs(object) <- value

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

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

Arguments

object	SummarizedExperiment
value	occupancy matrix (features x samples)

Value

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	<i>Get/Set log2sites</i>
-----------	--------------------------

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

Get/Set log2tpm

Description

Get / Set log2tpm matrix

Usage

```

log2tpm(object)

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

log2tpm(object) <- value

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

```

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

Arguments

```
object      SummarizedExperiment
value      log2tpm matrix (features x samples)
```

Value

log2tpm matrix (get) or updated object (set)

Examples

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

log2transform	<i>Transform values</i>
---------------	-------------------------

Description

Transform values

Usage

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

exp2(object, verbose = FALSE)

zscore(object, verbose = FALSE)

quantnorm(object, verbose = FALSE)

invnorm(object, verbose = FALSE)

vsnorm(object, verbose = FALSE, delog = TRUE)
```

Arguments

object	SummarizedExperiment
assay	character vector : assays for which to perform transformation
pseudo	number : pseudo value to be added prior to transformation
verbose	TRUE or FALSE : whether to msg
deLog	TRUE or FALSE (vsN)

Value

Transformed sumexp

Examples

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

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

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

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

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

object          %>% plot_sample_densities()
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	<i>Make colors</i>
-------------	--------------------

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(fdt(object))[1],  
  coefs = default_coefs(fdt(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')
```

map_fvalues

Map fvalues

Description

Map fvalues

Usage

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

Arguments

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

Value

string vector

Examples

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

matrix2sumexp	<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
```

```
merge_sample_excel      Merge sample excel
```

Description

Merge sample excel

Usage

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

Arguments

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

Value

SummarizedExperiment

merge_sample_file	<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

message dataframe

Description

message dataframe using sprintf syntax. Use place holder ' '

Usage

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

Arguments

format_string sprintf style format string
 x data.frame

Value

nothing returned

Examples

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

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

 modelvar

Get model variable

Description

Get model variable

Usage

```
modelvar(
  featuredt,
  quantity,
  fit = fits(featuredt),
  coef = default_coefs(featuredt, fit = fit)
)
```

```
effectvar(
  featuredt,
  fit = fits(featuredt),
  coef = default_coefs(featuredt, fit = fit)
)
```

```
tvar(
  featuredt,
  fit = fits(featuredt),
  coef = default_coefs(featuredt, fit = fit)
)
```

```
pvar(
  featuredt,
  fit = fits(featuredt),
```

```
    coef = default_coefs(featuredt, fit = fit)
  )

fdrvar(
  featuredt,
  fit = fits(featuredt),
  coef = default_coefs(featuredt, fit = fit)
)

abstractvar(
  featuredt,
  fit = fits(featuredt),
  coef = default_coefs(featuredt, fit = fit)
)

modelvec(
  featuredt,
  quantity,
  fit = fits(featuredt)[1],
  coef = default_coefs(featuredt, fit = fit)[1],
  fvar = "feature_id"
)

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

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

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

fdrvec(
  featuredt,
  fit = fits(featuredt)[1],
  coef = default_coefs(featuredt, fit = fit)[1],
```

```
fvar = "feature_id"
)

modeldt(
  featuredt,
  quantity,
  fit = fits(featuredt),
  coef = default_coefs(featuredt, fit = fit)
)

effectdt(
  featuredt,
  fit = fits(featuredt),
  coef = default_coefs(featuredt, fit = fit)
)

tdt(
  featuredt,
  fit = fits(featuredt),
  coef = default_coefs(featuredt, fit = fit)
)

pdt(
  featuredt,
  fit = fits(featuredt),
  coef = default_coefs(featuredt, fit = fit)
)

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

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

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

tmat(
```



```
    featuredt,  
    fit = fits(featuredt),  
    coef = default_coefs(featuredt, fit = fit)  
  )  
  
  pmat(  
    featuredt,  
    fit = fits(featuredt),  
    coef = default_coefs(featuredt, fit = fit)  
  )  
  
  fdrmat(  
    featuredt,  
    fit = fits(featuredt),  
    coef = default_coefs(featuredt, fit = fit)  
  )  
  
  modelfeatures(  
    featuredt,  
    fit = fits(featuredt)[1],  
    coef = default_coefs(featuredt, fit = fit)[1],  
    fvar = "feature_id",  
    significancevar = "p",  
    significance = 0.05,  
    effectdirection = "<>",  
    effectsize = 0  
  )  
  
  upfeatures(  
    featuredt,  
    fit = fits(featuredt)[1],  
    coef = default_coefs(featuredt, fit = fit)[1],  
    fvar = "feature_id",  
    significancevar = "p",  
    significance = 0.05,  
    effectsize = 0  
  )  
  
  downfeatures(  
    featuredt,  
    fit = fits(featuredt)[1],  
    coef = default_coefs(featuredt, fit = fit)[1],  
    fvar = "feature_id",  
    significancevar = "p",  
    significance = 0.05,  
    effectsize = 0  
  )
```

Arguments

featuredt	data.table
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

```
# Read
file <- system.file('extdata/atkin.metabolon.xlsx', package = 'autonomics')
object <- read_metabolon(file)
object %<>% fit_limma()
object %<>% fit_lm()
featuredt <- fdt(object)
featuredt %<>% add_adjusted_pvalues('fdr')

# modelvar
modelvar(featuredt, 'p');                pvar(featuredt)
modelvar(featuredt, 'effect');          effectvar(featuredt)
modelvar(featuredt, 'fdr');             fdrvar(featuredt)

# modelvec
modelvec(featuredt, 'p'   )[1:3];        pvec(featuredt)[1:3]
modelvec(featuredt, 'effect')[1:3];     effectvec(featuredt)[1:3]
modelvec(featuredt, 'fdr' )[1:3];        fdrvec(featuredt)[1:3]

# modelmatrix
modelmat(featuredt, 'p'   )[1:3, 1:3];   pmat(featuredt)[1:3, 1:3]
modelmat(featuredt, 'effect')[1:3, 1:3]; effectmat(featuredt)[1:3, 1:3]
modelmat(featuredt, 'fdr' )[1:3, 1:3];   fdrmat(featuredt)[1:3, 1:3]

# modelfeatures
modelfeatures(featuredt      )[1:3]
modelfeatures(featuredt, effectdirection = '<')[1:3];  downfeatures(featuredt)[1:3]
modelfeatures(featuredt, effectdirection = '>')[1:3];  upfeatures(featuredt)[1:3]
```

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

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

Arguments

object	SummarizedExperiment
fit	string vector: subset of 'fits(fdt(object))'
coefs	string vector: subset of 'coefs(fdt(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', 't2', 't3'))
```

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
spl(object, plot = TRUE) # Sparse PLS
# opl(object, plot = TRUE) # OPLS # outcommented because it produces a file named FALSE
```

percentiles

*survival percentiles***Description**

survival percentiles

Usage

percentiles(object)

Arguments

object SummarizedExperiment

Value

numeric vector

pg_to_canonical *proteingroup to isoforms*

Description

proteingroup to isoforms

Usage

```
pg_to_canonical(x, unique = TRUE)
```

```
pg_to_isoforms(x, unique = TRUE)
```

Arguments

x proteingroups string vector
unique whether to remove duplicates

Value

string vector

Examples

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

plot_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 *Plot contrast venn*

Description

Plot contrast venn

Usage

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

Arguments

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

Value

nothing returned

Examples

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

`plot_data`*Plot data*

Description

Plot data

Usage

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

Arguments

<code>data</code>	<code>data.frame</code> '
<code>geom</code>	<code>geom_point</code> , etc.
<code>color</code>	variable mapped to color (symbol)
<code>fill</code>	variable mapped to fill (symbol)
<code>linetype</code>	variable mapped to linetype (symbol)
<code>...</code>	mapped aesthetics
<code>palette</code>	color palette (named character vector)
<code>fixed</code>	fixed aesthetics (list)
<code>theme</code>	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)
```

Arguments

object	SummarizedExperiment
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 = y_{mean} , 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 = $y_i - \text{mean}(y_{i+1}:y_p)$

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(fdt(object))[1],
  coefs = default_coefs(fdt(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(fdt(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 'l'
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', 't2', 't3'))
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(fdt(object))[1],
  coefs = default_coefs(fdt(object), fit = fit),
  x = default_x(object),
  geom = default_geom(object, x),
  block = NULL,
  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(fdt(object)) to consider in selecting top
x	x svar
geom	'boxplot' or 'point'
block	group svar
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	<i>Plot fit summary</i>
------------------	-------------------------

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(fdt(object), coefs = c('t1', 't2', 't3'))
plot_fit_summary(sumdt)
```

plot_heatmap	<i>Plot heatmap</i>
--------------	---------------------

Description

Plot heatmap

Usage

```
plot_heatmap(
  object,
  fit = fits(fdt(object))[1],
  coef = default_coefs(fdt(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(fdt(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	<i>Plot features</i>
----------------------	----------------------

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~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(fdt(object))[1],
  coefs = default_coefs(fdt(object), fit = fit)[1],
  facet = if (is_scalar(fit)) "coef" else c("fit", "coef"),
  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
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', fit = 'limma') # single contrast
plot_volcano(object, coefs = c('t2', 't3'), fit = 'limma') # multiple contrasts
plot_volcano(object, coefs = c('t2', 't3'), fit = c('limma', 'lm')) # multiple contrasts and methods

# When nothing passes FDR
fdr(object) %<>% add_adjusted_pvalues('fdr', fit = 'limma', coefs = 't3')
object %<>% extract( fdrvec(fdr(object), fit = 'limma', coef = 't3') > 0.05, )
plot_volcano(object, coefs = 't3', 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 *Pull columns in a dataframe to the front*

Description

Pull columns in a dataframe to the front

Usage

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

Arguments

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

Value

dataframe with re-ordered columns

Examples

```
df <- data.frame(
  symbol = c('A1BG', 'A2M'),
  id      = c('1', '2'),
  name    = c('alpha-1-B glycoprotein', 'alpha-2-macroglobulin'),
  type    = c('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_contaminants	<i>Read contaminants</i>
-------------------	--------------------------

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

Read_fragpipe

Description

Read fragpipe

Usage

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

Arguments

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

Value

SummarizedExperiment

Examples

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

```
read_maxquant_phosphosites
    Read maxquant phosphosites
```

Description

Read maxquant phosphosites

Usage

```
read_maxquant_phosphosites(
  dir = getwd(),
  fosfile = if (is_file(dir)) dir else file.path(dir, "phospho (STY)Sites.txt"),
  profile = file.path(dirname(fosfile), "proteinGroups.txt"),
  fastafile = NULL,
  restapi = FALSE,
  quantity = NULL,
  subgroups = NULL,
  invert = character(0),
  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
fastafile	uniprot fastafile
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

*Read salmon***Description**

Read salmon

Usage

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

Arguments

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

Value

SummarizedExperiment

Examples

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

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

Description

Read fasta hdrs

Usage

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

```
parse_maxquant_hdrs(fastahdrs)
```

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

Arguments

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

Value

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

Note

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

Examples

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

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

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

```
# contaminant hdrs
  read_contaminantdt()
```

reexports	<i>Objects exported from other packages</i>
-----------	---

Description

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

data.table [data.table](#)

magrittr [%<>%](#), [%>%](#), [extract](#)

reset_fit	<i>Reset fit</i>
-----------	------------------

Description

Reset fit

Usage

```
reset_fit(
  object,
  fit = fits(fdt(object)),
  coefs = autonomics::coefs(fdt(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	uniprots (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	<i>Get tmm-scaled libsizes</i>
----------------	--------------------------------

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

Get slevels

Description

Get svar levels

Usage

```
slevels(object, svar)

subgroup_levels(object)
```

Arguments

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

Value

svar values (character)

Examples

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

snames	<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(
  featuredt,
  fit = fits(featuredt),
  coefs = autonomics::coefs(featuredt, fit = fit)
)

```

Arguments

```

featuredt      fdt(object)
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(fdt(object), coefs = c('t1', 't2', 't3'))

```

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 autonomies

Description

Statistical models supported in autonomies

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]

```

uncollapse

Uncollapse/Recollapse

Description

Uncollapse data.table cols

Usage

```

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

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

```

Arguments

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

Examples

```
(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 *Are varlevels unique*

Description

Are varlevels unique

Usage

```
varlevels_dont_clash(object, ...)

## S3 method for class 'data.table'
varlevels_dont_clash(object, vars = names(object), ...)

## S3 method for class 'SummarizedExperiment'
varlevels_dont_clash(object, vars = svars(object), ...)
```

Arguments

object	SummarizedExperiment or data.table
...	required for s3 dispatch
vars	character vector

Value

TRUE or FALSE

Examples

```
require(data.table)
object1 <- data.table(expand.grid(genome = c('WT', 'MUT'), treat = c('control', 'drug')))
object2 <- data.table(expand.grid(mutant = c('YES', 'NO'), treated = c('YES', 'NO')))
varlevels_dont_clash(object1)
varlevels_dont_clash(object2)
```

venn_detects	<i>Venn detects</i>
--------------	---------------------

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.rnacounts.txt', package = 'autonomics')
object <- read_rnaseq_counts(file)
weights(object)[1:3, 1:2]
weights(object) <- 1
weights(object)[1:3, 1:2]
```

write_xl	<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)

```

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, 33
CONTAMINANTSURL, 44
DATADIR, 51
FITSEP, 74
LINMOD_ENGINES, 102
MAXQUANT_PATTERNS, 113
MSIGCOLLECTIONSHUMAN, 123
MSIGDIR, 123
OPENTARGETSDIR, 125
PRECURSOR_QUANTITY, 151
TAXON_TO_ORGNAME, 179
TESTS, 180

* internal

reexports, 162
.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), 69
.merge, 9
.plot_survival (fit_survival), 77
.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), 162
%>% (reexports), 162
%<>%, 162
%>%, 162

ABBREV_TO_ORGNAME (TAXON_TO_ORGNAME),
179

abstract_fit, 21
abstractvar (modelvar), 118
add_adjusted_pvalues, 22
add_assay_means, 23
add_facetvars, 24
add_opentargets_by_uniprot, 24
add_psp, 25
add_smiles, 26
altenrich, 27
analysis, 28
analysis, SummarizedExperiment-method
 (analysis), 28
analysis<- (analysis), 28
analysis<-, SummarizedExperiment, list-method
 (analysis), 28
analyze, 29
annotate_maxquant, 30
annotate_uniprot_rest, 32
assert_diann_report (is_diann_report),
92
assert_fastadt (is_fastadt), 94
assert_fragpipe_tsv (is_diann_report),
92
assert_is_fraction (is_fraction), 95
assert_is_valid_sumexp, 32
assert_maxquant_phosphosites
 (is_diann_report), 92
assert_maxquant_proteingroups
 (is_diann_report), 92
assert_positive_number
 (is_positive_number), 96

- assert_scalar_subset
(is_scalar_subset), 97
- assert_valid_formula
(is_valid_formula), 99
- assert_weakly_positive_number
(is_positive_number), 96
- AUTONOMICS_DATASETS, 33
- bin, 33
- biplot, 34
- biplot_corrections, 36
- biplot_covariates, 37
- block2lme, 38
- block_vars (block2lme), 38
- cbind_imputed (split_samples), 167
- center, 39
- code, 40
- code_control (code), 40
- code_deviation (code), 40
- code_deviation_first (code), 40
- code_diff (code), 40
- code_diff_forward (code), 40
- code_helmert (code), 40
- code_helmert_forward (code), 40
- coefs, 42
- collapse_in (count_in), 47
- collapsed_entrezg_to_symbol, 43
- CONTAMINANTSURL, 44
- contr.diff (code), 40
- contr.treatment.explicit (code), 40
- contrast_subgroup_cols, 44
- contrast_subgroup_rows
(contrast_subgroup_cols), 44
- count_in, 47
- count_out (count_in), 47
- counts, 45
- counts, SummarizedExperiment-method
(counts), 45
- counts2cpm, 46
- counts2tpm, 46
- counts<- (counts), 45
- counts<-, SummarizedExperiment, matrix-method
(counts), 45
- counts<-, SummarizedExperiment, NULL-method
(counts), 45
- counts<-, SummarizedExperiment, numeric-method
(counts), 45
- cpm, 48
- cpm, SummarizedExperiment-method (cpm),
48
- cpm2counts (counts2cpm), 46
- cpm<- (cpm), 48
- cpm<-, SummarizedExperiment, matrix-method
(cpm), 48
- cpm<-, SummarizedExperiment, numeric-method
(cpm), 48
- create_design, 49
- data.table, 162
- data.table (reexports), 162
- DATADIR, 51
- default_formula (default_subgroupvar),
53
- default_geom, 52
- default_sfile, 53
- default_subgroupvar, 53
- demultiplex, 54
- dequantify, 55
- downfeatures (modelvar), 118
- download_contaminants, 56
- download_data (DATADIR), 51
- download_gtf, 56
- download_mcclain21, 57
- download_tcga_example, 58
- dt2mat, 58
- effectdt (modelvar), 118
- effectmat (modelvar), 118
- effectsizemat (modelvar), 118
- effectvar (modelvar), 118
- effectvec (modelvar), 118
- enrichment, 59
- ens2org, 60
- entrezg_to_symbol, 61
- EXISTENCE_TO_NUMBER (TAXON_TO_ORGNAME),
179
- exp2 (log2transform), 108
- explore_transformations, 61
- extract, 162
- extract (reexports), 162
- extract_coef_features
(.extract_p_features), 6
- extract_rectangle, 62
- factor2logical (logical2factor), 109
- fdata, 64

- fdata, SummarizedExperiment-method (fdata), 64
- fdata<- (fdata), 64
- fdata<- , SummarizedExperiment, data.frame-method (fdata), 64
- fdr2p, 66
- fdrmat (modelvar), 118
- fdrvar (modelvar), 118
- fdrvec (modelvar), 118
- fdt (fdata), 64
- fdt, SummarizedExperiment-method (fdata), 64
- fdt<- (fdata), 64
- fdt<- , SummarizedExperiment, data.table-method (fdata), 64
- filter_exprs_replicated_in_some_subgroup, 66
- filter_features, 67
- filter_medoid, 68
- filter_samples, 69
- fit, 69
- fit_limma (fit), 69
- fit_lm (fit_lmx), 75
- fit_lme (fit_lmx), 75
- fit_lmer (fit_lmx), 75
- fit_lmx, 75
- fit_survival, 77
- fit_wilcoxon (fit), 69
- fitcoefs, 72
- fitdt (fitvars), 74
- fits, 73
- FITSEP, 74
- fitvars, 74
- fix_xlgenes, 79
- flevels, 80
- fnames, 80
- fnames, SummarizedExperiment-method (fnames), 80
- fnames<- (fnames), 80
- fnames<- , SummarizedExperiment, character-method (fnames), 80
- formula2lm (block2lme), 38
- formula2lmer (block2lme), 38
- formula2str, 81
- fvalues, 82
- fvars, 82
- fvars, SummarizedExperiment-method (fvars), 82
- fvars<- (fvars), 82
- fvars<- , SummarizedExperiment, character-method (fvars), 82
- genome_to_orgdb, 83
- group_by_level, 84
- guess_fitsep, 85
- guess_maxquant_quantity, 85
- guess_sep, 86
- has_multiple_levels, 87
- hdlproteins, 89
- impute, 89
- inf_to_na (zero_to_na), 186
- invert_subgroups, 91
- invnorm (log2transform), 108
- is_collapsed_subset, 92
- is_diann_report, 92
- is_fastadt, 94
- is_file, 94
- is_fraction, 95
- is_fragpipe_tsv (is_diann_report), 92
- is_imputed, 95
- is_imputed, SummarizedExperiment-method (is_imputed), 95
- is_imputed<- (is_imputed), 95
- is_imputed<- , SummarizedExperiment, matrix-method (is_imputed), 95
- is_imputed<- , SummarizedExperiment, NULL-method (is_imputed), 95
- is_maxquant_phosphosites (is_diann_report), 92
- is_maxquant_proteingroups (is_diann_report), 92
- is_positive_number, 96
- is_scalar_subset, 97
- is_sig, 98
- is_valid_formula, 99
- is_weakly_positive_number (is_positive_number), 96
- keep_connected_blocks, 100
- keep_connected_features, 100
- keep_replicated_features, 101
- label2index, 101
- lda (pca), 126
- LINMOD_ENGINES, 102

- list2mat, 102
- list_files, 103
- loadingmat (scoremat), 165
- loadings (scoremat), 165
- log2counts, 103
- log2counts, SummarizedExperiment-method
(log2counts), 103
- log2counts<- (log2counts), 103
- log2counts<- , SummarizedExperiment, matrix-method
(log2counts), 103
- log2counts<- , SummarizedExperiment, numeric-method
(log2counts), 103
- log2cpm, 104
- log2cpm, SummarizedExperiment-method
(log2cpm), 104
- log2cpm<- (log2cpm), 104
- log2cpm<- , SummarizedExperiment, matrix-method
(log2cpm), 104
- log2cpm<- , SummarizedExperiment, numeric-method
(log2cpm), 104
- log2diffs, 105
- log2diffs, SummarizedExperiment-method
(log2diffs), 105
- log2diffs<- (log2diffs), 105
- log2diffs<- , SummarizedExperiment, matrix-method
(log2diffs), 105
- log2diffs<- , SummarizedExperiment, numeric-method
(log2diffs), 105
- log2proteins, 106
- log2proteins, SummarizedExperiment-method
(log2proteins), 106
- log2proteins<- (log2proteins), 106
- log2proteins<- , SummarizedExperiment, matrix-method
(log2proteins), 106
- log2proteins<- , SummarizedExperiment, numeric-method
(log2proteins), 106
- log2sites, 106
- log2sites, SummarizedExperiment-method
(log2sites), 106
- log2sites<- (log2sites), 106
- log2sites<- , SummarizedExperiment, matrix-method
(log2sites), 106
- log2sites<- , SummarizedExperiment, numeric-method
(log2sites), 106
- log2tpm, 107
- log2tpm, SummarizedExperiment-method
(log2tpm), 107
- log2tpm<- (log2tpm), 107
- log2tpm<- , SummarizedExperiment, matrix-method
(log2tpm), 107
- log2tpm<- , SummarizedExperiment, numeric-method
(log2tpm), 107
- log2transform, 108
- logical2factor, 109
- make_alpha_palette, 110
- make_colors, 111
- make_volcano_dt, 111
- map_fvalues, 112
- mat2dt (dt2mat), 58
- matrix2sumexp, 113
- MAXQUANT_PATTERNS, 113
- merge_fdata (merge_sdata), 116
- merge_fdt (merge_sdata), 116
- merge_ffile (merge_sample_file), 115
- merge_sample_excel, 114
- merge_sample_file, 115
- merge_sdata, 116
- merge_sdt (merge_sdata), 116
- message_df, 117
- minusinf_to_na (zero_to_na), 186
- modeldt (modelvar), 118
- modelfeatures (modelvar), 118
- modelmat (modelvar), 118
- modelvar, 118
- modelvec (modelvar), 118
- MSIGCOLLECTIONSHUMAN, 123
- MSIGCOLLECTIONSMOUSE
(MSIGCOLLECTIONSHUMAN), 123
- MSIGDIR, 123
- na_to_string (zero_to_na), 186
- na_to_zero (zero_to_na), 186
- nan_to_na (zero_to_na), 186
- nfactors, 124
- no_nas (systematic_nas), 177
- OPENTARGETSDIR, 125
- opls (pca), 126
- order_on_effect (order_on_p), 125
- order_on_p, 125
- parse_maxquant_hdrs (read_uniprot),
161
- pca, 126
- pdt (modelvar), 118
- percentiles, 128

- pg_to_canonical, 129
- pg_to_isoforms (pg_to_canonical), 129
- plot_contrast_venn, 130
- plot_contrastogram, 129
- plot_data, 131
- plot_densities, 132, 149
- plot_design, 134
- plot_detections, 135
- plot_exprs, 136, 149
- plot_exprs_per_coef, 140
- plot_feature_boxplots (plot_exprs), 136
- plot_feature_densities
(plot_densities), 132
- plot_feature_violins (plot_violins), 147
- plot_fit_summary, 141
- plot_heatmap, 142
- plot_matrix, 143
- plot_sample_boxplots, 134
- plot_sample_boxplots (plot_exprs), 136
- plot_sample_densities, 139, 141
- plot_sample_densities (plot_densities),
132
- plot_sample_nas (plot_detections), 135
- plot_sample_violins, 134, 139, 141
- plot_sample_violins (plot_violins), 147
- plot_subgroup_nas (plot_detections), 135
- plot_subgroup_points, 143
- plot_subgroup_violins (plot_violins),
147
- plot_summarized_detections
(plot_detections), 135
- plot_summary, 145
- plot_survival (fit_survival), 77
- plot_venn, 146
- plot_venn_heatmap, 146
- plot_violins, 147
- plot_volcano, 149
- plotmat, 130
- pls (pca), 126
- pmat (modelvar), 118
- PPATTERN (FITSEP), 74
- PRECURSOR_QUANTITY, 151
- preprocess_rnaseq_counts, 151
- pull_columns, 152
- pvar (modelvar), 118
- pvec (modelvar), 118
- quantnorm (log2transform), 108
- random_nas (systematic_nas), 177
- read_affymetrix, 153
- read_contaminantdt (read_uniprot), 161
- read_contaminants, 153
- read_diann (.read_diann_precursors), 9
- read_diann_proteingroups
(.read_diann_precursors), 9
- read_fragpipe, 154
- read_maxquant_phosphosites, 155
- read_maxquant_proteingroups, 157
- read_metabolon (.read_metabolon), 12
- read_msigdt, 27, 159
- read_olink, 159
- read_phosphosites
(read_maxquant_phosphosites),
155
- read_proteingroups
(read_maxquant_proteingroups),
157
- read_rectangles (.read_rectangles), 14
- read_rnaseq_bams (.read_rnaseq_bams), 16
- read_rnaseq_counts (.read_rnaseq_bams),
16
- read_salmon, 160
- read_somascan (.read_somascan), 19
- read_uniprot, 161
- recollapse (uncollapse), 181
- reexports, 162
- reset_fit, 162
- REVIEWED_TO_NUMBER (TAXON_TO_ORGNAME),
179
- rm_diann_contaminants, 163
- rm_missing_in_all_samples, 163
- rm_missing_in_some_samples
(rm_missing_in_all_samples),
163
- rm_singleton_samples
(rm_unmatched_samples), 164
- rm_unmatched_samples, 164
- sampleid_values (svalues), 175
- scaledlibsizes, 165
- scoremat, 165
- scores (scoremat), 165
- sdata (fdata), 64
- sdata, SummarizedExperiment-method
(fdata), 64
- sdata<- (fdata), 64

- sdata<- , SummarizedExperiment, data.frame-method (fdata), 64
- sdata<- , SummarizedExperiment, DataFrame-method (fdata), 64
- sdt (fdata), 64
- sdt, SummarizedExperiment-method (fdata), 64
- sdt<- (fdata), 64
- sdt<- , SummarizedExperiment, data.table-method (fdata), 64
- slevels, 166
- sma (pca), 126
- snames, 167
- snames, SummarizedExperiment-method (snames), 167
- snames<- (snames), 167
- snames<- , SummarizedExperiment, character-method (snames), 167
- split_extract (nfactors), 124
- split_extract_fixed (nfactors), 124
- split_extract_regex (nfactors), 124
- split_features (split_samples), 167
- split_samples, 167
- spls (pca), 126
- stri_any_regex, 168
- stri_detect_fixed_in_collapsed, 169
- subgroup_array, 170
- subgroup_levels (slevels), 166
- subgroup_matrix (subgroup_array), 170
- subgroup_values (svalues), 175
- subtract_baseline, 170
- subtract_differences (subtract_baseline), 170
- subtract_pairs (subtract_baseline), 170
- sumexp_to_longdt (sumexp_to_widedt), 173
- sumexp_to_subrep_dt (sumexp_to_widedt), 173
- sumexp_to_tsv, 173
- sumexp_to_widedt, 173
- sumexplist_to_longdt, 172
- summarize_fit, 174
- svalues, 175
- svalues<- (svalues), 175
- svalues<- , SummarizedExperiment, character-method (svalues), 175
- svars, 176
- svars, MultiAssayExperiment-method (svars), 176
- svars, SummarizedExperiment-method (svars), 176
- svars<- (svars), 176
- svars<- , MultiAssayExperiment, character-method (svars), 176
- svars<- , SummarizedExperiment, character-method (svars), 176
- systematic_nas, 177
- tag_features, 178
- tag_hdlproteins, 179
- taxon2org (ens2org), 60
- TAXON_TO_ORGNAME, 179
- tdt (modelvar), 118
- TESTS, 180
- tmat (modelvar), 118
- tpm, 180
- tpm, SummarizedExperiment-method (tpm), 180
- tpm<- (tpm), 180
- tpm<- , SummarizedExperiment, matrix-method (tpm), 180
- tpm<- , SummarizedExperiment, numeric-method (tpm), 180
- tvar (modelvar), 118
- tvec (modelvar), 118
- uncollapse, 181
- upfeatures (modelvar), 118
- values, 182
- values, SummarizedExperiment-method (values), 182
- values<- (values), 182
- values<- , SummarizedExperiment, matrix-method (values), 182
- values<- , SummarizedExperiment, numeric-method (values), 182
- varlevels_dont_clash, 183
- venn_detects, 184
- vsn (log2transform), 108
- weights, 184
- weights, SummarizedExperiment-method (weights), 184
- weights<- (weights), 184
- weights<- , SummarizedExperiment, matrix-method (weights), 184
- weights<- , SummarizedExperiment, NULL-method (weights), 184

`weights<-`, `SummarizedExperiment`, numeric-method
(`weights`), [184](#)

`write_ods` (`write_xl`), [185](#)

`write_xl`, [185](#)

`zero_to_na`, [186](#)

`zscore` (`log2transform`), [108](#)