

Package: gDRcore (via r-universe)

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Type Package

Title Processing functions and interface to process and analyze drug dose-response data

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Description This package contains core functions to process and analyze drug response data. The package provides tools for normalizing, averaging, and calculation of gDR metrics data. All core functions are wrapped into the pipeline function allowing analyzing the data in a straightforward way.

License Artistic-2.0

Depends R (>= 4.2)

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<https://gdrplatform.github.io/gDRcore/>

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<code>.map_references</code>	<i>Map references</i>
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Description

Map references

Usage

```
.map_references(
  mat_elem,
  rowData_colnames = c(gDRutils::get_env_identifiers("duration"), paste0(c("drug",
    "drug_name", "drug_moa"), "3"))
)
```

Arguments

<code>mat_elem</code>	data.table input containing experimental metadata and row identifiers.
<code>rowData_colnames</code>	character vector of variables (column names) used to identify and map reference treatments.

Value

list

<code>annotate_dt_with_cell_line</code>	<i>annotate_dt_with_cell_line</i>
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Description

Annotate cell line data with the provided annotation table

Usage

```
annotate_dt_with_cell_line(data, cell_line_annotation, fill = "unknown")
```

Arguments

`data` data.table with dose-response data
`cell_line_annotation` data.table with cell line annotations
`fill` string indicating how unknown cell lines should be filled in the DB

Value

data.table with annotated cell lines

Examples

```
data <- data.table::data.table(
  clid = c("CL1", "CL2", "CL3"),
  Gnumber = c("D1", "D2", "D3")
)
cell_line_annotation <- get_cell_line_annotation(data)
annotated_metadata <- annotate_dt_with_cell_line(data, cell_line_annotation)
```

`annotate_dt_with_drug` *annotate_dt_with_drug*

Description

Annotate drug data with the provided annotation table

Usage

```
annotate_dt_with_drug(data, drug_annotation, fill = "unknown")
```

Arguments

`data` data.table with dose-response data
`drug_annotation` data.table with drug annotations
`fill` string indicating how unknown drugs should be filled in the DB

Value

data.table with annotated drugs

Examples

```
data <- data.table::data.table(
  clid = c("CL1", "CL2", "CL3"),
  Gnumber = c("D1", "D2", "D3")
)
drug_annotation <- get_drug_annotation(data)
annotated_metadata <- annotate_dt_with_drug(data, drug_annotation)
```

```

annotate_mae_with_cell_line
      annotate_mae_with_cell_line

```

Description

Annotate MultiAssayExperiment object with cell line annotations

Usage

```

annotate_mae_with_cell_line(mae, cell_line_annotation, fill = "unknown")

```

Arguments

mae MultiAssayExperiment object containing dose-response data
cell_line_annotation data.table with cell line annotations
fill string indicating how unknown cell lines should be filled in the DB

Value

MultiAssayExperiment object with annotated cell lines

Examples

```

mae <- MultiAssayExperiment::MultiAssayExperiment(
  experiments = list(exp1 = SummarizedExperiment::SummarizedExperiment(
    rowData = data.table::data.table(clid = c("CL1", "CL2", "CL3"))
  ))
)
cell_line_annotation <- get_cell_line_annotation(data.table::as.data.table(
  SummarizedExperiment::rowData(
    MultiAssayExperiment::experiments(mae)[[1]]))
)
annotated_mae <- annotate_mae_with_cell_line(mae, cell_line_annotation)

```

```

annotate_mae_with_drug
      annotate_mae_with_drug

```

Description

Annotate MultiAssayExperiment object with drug annotations

Usage

```

annotate_mae_with_drug(mae, drug_annotation, fill = "unknown")

```

Arguments

mae MultiAssayExperiment object containing dose-response data
 drug_annotation data.table with drug annotations
 fill string indicating how unknown drugs should be filled in the DB

Value

MultiAssayExperiment object with annotated drugs

Examples

```
mae <- MultiAssayExperiment::MultiAssayExperiment(
  experiments = list(exp1 = SummarizedExperiment::SummarizedExperiment(
    rowData = data.table::data.table(Gnumber = c("D1", "D2", "D3"))
  ))
)
drug_annotation <- get_drug_annotation(data.table::as.data.table(
  SummarizedExperiment::rowData(
    MultiAssayExperiment::experiments(mae)[[1]]))
)
annotated_mae <- annotate_mae_with_drug(mae, drug_annotation)
```

annotate_se_with_cell_line

annotate_se_with_cell_line

Description

Annotate SummarizedExperiment object with cell line annotations

Usage

```
annotate_se_with_cell_line(se, cell_line_annotation, fill = "unknown")
```

Arguments

se SummarizedExperiment object containing dose-response data
 cell_line_annotation data.table with cell line annotations
 fill string indicating how unknown cell lines should be filled in the DB

Value

SummarizedExperiment object with annotated cell lines

Examples

```
se <- SummarizedExperiment::SummarizedExperiment(
  rowData = data.table::data.table(clid = c("CL1", "CL2", "CL3"))
)
cell_line_annotation <- get_cell_line_annotation(data.table::as.data.table(SummarizedExperiment::rowData(se)))
annotated_se <- annotate_se_with_cell_line(se, cell_line_annotation)
```

annotate_se_with_drug *annotate_se_with_drug*

Description

Annotate SummarizedExperiment object with drug annotations

Usage

```
annotate_se_with_drug(se, drug_annotation, fill = "unknown")
```

Arguments

- `se` SummarizedExperiment object containing dose-response data
- `drug_annotation` data.table with drug annotations
- `fill` string indicating how unknown drugs should be filled in the DB

Value

SummarizedExperiment object with annotated drugs

Examples

```
se <- SummarizedExperiment::SummarizedExperiment(
  rowData = data.table::data.table(Gnumber = c("D1", "D2", "D3"))
)
drug_annotation <- get_drug_annotation(data.table::as.data.table(SummarizedExperiment::rowData(se)))
annotated_se <- annotate_se_with_drug(se, drug_annotation)
```

average_SE

Run drug response processing pipeline

Description

Run different components of the gDR drug response processing pipeline. Either: create a SummarizedExperiment and normalize raw treated and control data (create_and_normalize_SE), average data (average_SE), or fit the processed data (fit_SE). See details for more in-depth explanations.

Usage

```
average_SE(
  se,
  data_type,
  series_identifiers = NULL,
  normalized_assay = "Normalized",
  averaged_assay = "Averaged"
)

create_SE(
  df_,
  data_type,
  readout = "ReadoutValue",
  nested_identifiers = NULL,
  nested_confounders = intersect(names(df_), gDRutils::get_env_identifiers("barcode")),
  override_untrt_controls = NULL
)

fit_SE(
  se,
  data_type = "single-agent",
  nested_identifiers = NULL,
  averaged_assay = "Averaged",
  metrics_assay = "Metrics",
  n_point_cutoff = 4,
  range_conc = c(0.005, 5),
  force_fit = FALSE,
  pcutoff = 0.05,
  cap = 0.1,
  curve_type = c("GR", "RV")
)

normalize_SE(
  se,
  data_type,
  nested_identifiers = NULL,
  nested_confounders = gDRutils::get_SE_identifiers(se, "barcode", simplify = TRUE),
```

```
    control_mean_fxn = function(x) {
      mean(x, trim = 0.25)
    },
    control_assay = "Controls",
    raw_treated_assay = "RawTreated",
    normalized_assay = "Normalized",
    ndigit_rounding = 4
  )

create_and_normalize_SE(
  df_,
  data_type,
  readout = "ReadoutValue",
  control_mean_fxn = function(x) {
    mean(x, trim = 0.25)
  },
  nested_identifiers = NULL,
  nested_confounders = intersect(names(df_), gDRutils::get_env_identifiers("barcode")),
  override_untrt_controls = NULL,
  ndigit_rounding = 4,
  control_assay = "Controls",
  raw_treated_assay = "RawTreated",
  normalized_assay = "Normalized"
)

runDrugResponseProcessingPipeline(
  x,
  readout = "ReadoutValue",
  control_mean_fxn = function(x) {
    mean(x, trim = 0.25)
  },
  nested_identifiers_l = NULL,
  nested_confounders = gDRutils::get_env_identifiers("barcode"),
  override_untrt_controls = NULL,
  ndigit_rounding = 4,
  n_point_cutoff = 4,
  control_assay = "Controls",
  raw_treated_assay = "RawTreated",
  normalized_assay = "Normalized",
  averaged_assay = "Averaged",
  metrics_assay = "Metrics",
  split_data = TRUE,
  data_dir = NULL,
  partial_run = FALSE,
  start_from = get_pipeline_steps()[1],
  selected_experiments = NULL
)
```

Arguments

se	SummarizedExperiment object.
data_type	single-agent vs combination
series_identifiers	character vector of identifiers in measured or metric which define a unique data point.
normalized_assay	string of the assay name containing the normalized data. Defaults to "Normalized".
averaged_assay	string of the name of the averaged assay in the SummarizedExperiment . Defaults to "Averaged".
df_	data.table of raw drug response data containing both treated and untreated values. If a column called "BackgroundValue" exists in df_, it will be removed from the readout column.
readout	string of the name containing the cell viability readout values.
nested_identifiers	character vector with the nested_identifiers for the given SE with a given data_type
nested_confounders	Character vector of the nested_confounders for a given assay. nested_keys is character vector of column names to include in the data.tables in the assays of the resulting SummarizedExperiment object. Defaults to the nested_identifiers and nested_confounders if passed through create_and_normalize_SE or runDrugResponseProcessingPipeline.
override_untrt_controls	named list containing defining factors in the treatments. Defaults to NULL.
metrics_assay	string of the name of the metrics assay to output in the returned SummarizedExperiment Defaults to "Metrics".
n_point_cutoff	integer of how many points should be considered the minimum required to try to fit a curve. Defaults to 4.
range_conc	vector of concentrations range values.
force_fit	boolean indicating whether or not to force the fit.
pcutoff	numeric cutoff value.
cap	numeric value representing the value to cap the highest allowed relative viability at.
curve_type	vector of curve type values.
control_mean_fxn	function indicating how to average controls. Defaults to mean(x, trim = 0.25).
control_assay	string containing the name of the assay representing the controls in the se. Defaults to "Controls".
raw_treated_assay	string containing the name of the assay representing the raw treated data in the se. Defaults to "RawTreated".
ndigit_rounding	integer indicating number of digits to round to in calculations. Defaults to 4.

x	data.table of MAE with drug response data
nested_identifiers_l	list with the nested_identifiers(character vectors) for single-agent and (optionally) for combination data
split_data	boolean indicating whether data provided as the MultiAssayExperiment should be split again into appropriate data types
data_dir	string with the path to the directory with intermediate data of experiments (qs2 files). If set to NULL (default) intermediate data is not saved/read in.
partial_run	logical flag indicating if the pipeline should be run partially (from the step defined with start_from)
start_from	string indicating the pipeline step from which partial run should be launched
selected_experiments	character vector with experiments for which pipeline should be run. This option works only for the pipeline being run partially (i.e. with partial_run flag set to TRUE)

Details

runDrugResponseProcessingPipeline is made up of 3 separate steps:

- "create_and_normalize_SE"
- "average_SE"
- "fit_SE"

For create_and_normalize_SE, this creates a SummarizedExperiment object from a data.table, where the data.table contains treatments on rows, and conditions on columns. A [SummarizedExperiment](#) object containing two assays is created: treated readouts will live in an assay called "RawTreated", and reference readouts live in an assay called "Controls". Subsequently, the treated and control elements will be normalized to output two metrics:

For average_SE, take the normalized assay and average the nested DataFrames across uniquely nested_identifiers.

For fit_SE, take the averaged assay and fit curves to obtain metrics, one set of metrics for each normalization type set.

Pipeline can be run partially with partial_run flag set to TRUE. The start_from string defines the step from which the pipeline will be launched. However, partial run of the pipeline is possible only if the whole pipeline was launched at least once with defined data_dir and intermediate data was saved as qs2 files into data_dir.

Pipeline can be run for the selected experiments by changing the default value of selected_experiments param. This scenario only works when partial_run is enabled.

Value

MAE object

Examples

```

d <- rep(seq(0.1, 0.9, 0.1), each = 4)
v <- rep(seq(0.1, 0.4, 0.1), 9)
df <- S4Vectors::DataFrame(
  Concentration = d,
  normalization_type = rep(c("GR", "RV"), length(v) * 2),
  x = rep(v, 2)
)
normalized <- BumpyMatrix::splitAsBumpyMatrix(row = 1, column = 1, x = df)

keys <- list(Trt = "Concentration")
assays <- list("Normalized" = normalized)
se <- SummarizedExperiment::SummarizedExperiment(assays = assays)
se <- gDRutils::set_SE_keys(se, keys)
se <- gDRutils::set_SE_identifiers(se, gDRutils::get_env_identifiers())
se1 <- average_SE(
  se,
  data_type = "single-agent",
  normalized_assay = "Normalized",
  averaged_assay = "Averaged"
)

td <- gDRimport::get_test_data()
l_tbl <- gDRimport::load_data(
  manifest_file = gDRimport::manifest_path(td),
  df_template_files = gDRimport::template_path(td),
  results_file = gDRimport::result_path(td)
)
imported_data <- merge_data(
  l_tbl$manifest,
  l_tbl$treatments,
  l_tbl$data
)

se <- purrr::quietly(create_SE)(imported_data, data_type = "single-agent")

td <- gDRimport::get_test_data()
l_tbl <- gDRimport::load_data(
  manifest_file = gDRimport::manifest_path(td),
  df_template_files = gDRimport::template_path(td),
  results_file = gDRimport::result_path(td)
)
imported_data <- merge_data(
  l_tbl$manifest,
  l_tbl$treatments,
  l_tbl$data
)

inl <- prepare_input(imported_data)
se <- create_SE(

```

```

inl$df_list[["single-agent"]],
data_type = "single-agent",
nested_confounders = inl$nested_confounders)

normalize_SE(se, data_type = "single-agent")
p_dir <- file.path(tempdir(), "pcheck")
dir.create(p_dir)
td <- gDRimport::get_test_data()
l_tbl <- gDRimport::load_data(
  manifest_file = gDRimport::manifest_path(td),
  df_template_files = gDRimport::template_path(td),
  results_file = gDRimport::result_path(td)
)
imported_data <- merge_data(
  l_tbl$manifest,
  l_tbl$treatments,
  l_tbl$data
)
runDrugResponseProcessingPipeline(
  imported_data,
  data_dir = p_dir
)

```

calculate_excess

Calculate the difference between values in two data.tables

Description

Calculate the difference between values, likely representing the same metric, from two data.tables.

Usage

```

calculate_excess(
  metric,
  measured,
  series_identifiers,
  metric_col,
  measured_col
)

```

Arguments

metric	data.table often representing readouts derived by calculating some metric. Examples of this could include hsa or bliss calculations from single-agent data.
measured	data.table often representing measured data from an experiment.
series_identifiers	character vector of identifiers in measured or metric which define a unique data point.

metric_col string of the column in metric to use in excess calculation.
 measured_col string of the column in measured to use in excess calculation.

Value

data.table of measured, now with an additional column named excess (positive values for synergy/benefit).

Examples

```
metric <- data.table::data.table(
  Concentration = c(1, 2, 3, 1, 2, 3),
  Concentration_2 = c(1, 1, 1, 2, 2, 2),
  GRvalue = c(100, 200, 300, 400, 500, 600)
)
measured <- data.table::data.table(
  Concentration = c(3, 1, 2, 2, 1, 3),
  Concentration_2 = c(1, 1, 1, 2, 2, 2),
  testvalue = c(200, 0, 100, 400, 300, 500)
)
series_identifiers <- c("Concentration", "Concentration_2")
metric_col <- "GRvalue"
measured_col <- "testvalue"
calculate_excess(
  metric,
  measured,
  series_identifiers,
  metric_col,
  measured_col
)
```

calculate_GR_value *Calculate a GR value.*

Description

Calculate a GR value for a given set of dose response values.

Usage

```
calculate_GR_value(
  rel_viability,
  corrected_readout,
  day0_readout,
  untrt_readout,
  ndigit_rounding,
  duration,
  ref_div_time,
```

```
    cap = 1.25
  )

  calculate_time_dep_GR_value(
    corrected_readout,
    day0_readout,
    untrt_readout,
    ndigit_rounding
  )

  calculate_endpt_GR_value(
    rel_viability,
    duration,
    ref_div_time,
    cap = 1.25,
    ndigit_rounding
  )
```

Arguments

rel_viability numeric vector representing the Relative Viability.

corrected_readout numeric vector containing the corrected readout.

day0_readout numeric vector containing the day 0 readout.

untrt_readout numeric vector containing the untreated readout.

ndigit_rounding integer specifying the number of digits to use for calculation rounding.

duration numeric value specifying the length of time the cells were treated (in hours).

ref_div_time numeric value specifying the reference division time for the cell line in the experiment.

cap numeric value representing the value to cap the highest allowed relative viability at.

Details

Note that this function expects that all numeric vectors are of the same length. `calculate_GR_value` will try to greedily calculate a GR value. If no day 0 readouts are available, the `duration` and `ref_div_time` will be used to try to back-calculate a day 0 value in order to produce a GR value.

In the case of calculating the reference GR value from multiple reference readout values, the vectorized calculation is performed and then the resulting vector should be averaged outside of this function.

Note that it is expected that the `ref_div_time` and `duration` are reported in the same units.

Value

numeric vector containing GR values, one value for each element of the input vectors.

See Also

normalize_SE2

Examples

```

duration <- 144
rv <- seq(0.1, 1, 0.1)
corrected <- seq(41000, 50000, 1000)
day0 <- seq(91000, 95500, 500)
untrt <- rep(c(115000, 118000), 5)

calculate_GR_value(
  rel_viability = rv,
  corrected_readout = corrected,
  day0_readout = day0,
  untrt_readout = untrt,
  ndigit_rounding = 4,
  duration = duration,
  ref_div_time = duration / 2
)

readouts <- rep(10000, 5)
calculate_time_dep_GR_value(readouts, readouts * 1.32, readouts * 2, 2)

readouts <- rep(10000, 5)
calculate_endpt_GR_value(readouts, 72, 1, ndigit_rounding = 2)

```

calculate_matrix_metric

Calculate a metric for combination data.

Description

Calculate a metric based off of single-agent values in combination screens.

Usage

```

calculate_HSA(sa1, series_id1, sa2, series_id2, metric)

calculate_Bliss(
  sa1,
  series_id1,
  sa2,
  series_id2,
  metric,
  measured_col = "smooth"
)

```

```
.calculate_matrix_metric(
  sa1,
  series_id1,
  sa2,
  series_id2,
  metric,
  FXN,
  measured_col = "x"
)
```

Arguments

sa1	data.table containing single agent data where entries in series_id2 are all 0. Columns of the data.table include identifiers and the metric of interest. Metric is stored in the 'x' column.
series_id1	String representing the column within sa1 that represents id1.
sa2	data.table containing single agent data where entries in series_id1 are all 0. Columns of the data.table include identifiers and the metric of interest. Metric is stored in the 'x' column.
series_id2	String representing the column within sa2 that represents id2.
metric	String specifying the metric of interest. Usually either 'GRvalue' or 'Relative-Viability'.
measured_col	String specifying the measured colname.
FXN	Function to apply to the single-agent fits to calculate a metric.

Details

calculate_HSA takes the minimum of the two single agents readouts. calculate_Bliss performs Bliss additivity calculation based on the single agent effects, defined as $1-x$ for the corresponding normalization. See <https://www.sciencedirect.com/science/article/pii/S1359644619303460?via%3Dihub#tb0005> for more details.

Value

data.table containing a single row for every unique combination of the two series identifiers and the corresponding calculated metric for each row.

Examples

```
n <- 10
sa1 <- data.table::data.table(conc = seq(n), conc2 = rep(0, n), smooth = seq(n))
sa2 <- data.table::data.table(conc = rep(0, n), conc2 = seq(n), smooth = seq(n))
calculate_HSA(sa1, "conc", sa2, "conc2", "smooth")
n <- 10
sa1 <- data.table::data.table(conc = seq(n), conc2 = rep(0, n), smooth = seq(n))
sa2 <- data.table::data.table(conc = rep(0, n), conc2 = seq(n), smooth = seq(n))
calculate_Bliss(sa1, "conc", sa2, "conc2", "smooth")
```

calculate_score	<i>Calculate score for HSA and Bliss</i>
-----------------	--

Description

Calculate score for HSA and Bliss

Usage

```
calculate_score(excess)
```

Arguments

excess numeric vector with excess

Value

numeric vector with calculated score

Examples

```
metric <- data.table::data.table(  
  Concentration = c(1, 2, 3, 1, 2, 3),  
  Concentration_2 = c(1, 1, 1, 2, 2, 2),  
  GRvalue = c(100, 200, 300, 400, 500, 600)  
)  
measured <- data.table::data.table(  
  Concentration = c(3, 1, 2, 2, 1, 3),  
  Concentration_2 = c(1, 1, 1, 2, 2, 2),  
  testvalue = c(200, 0, 100, 400, 300, 500)  
)  
series_identifiers <- c("Concentration", "Concentration_2")  
metric_col <- "GRvalue"  
measured_col <- "testvalue"  
x <- calculate_excess(  
  metric,  
  measured,  
  series_identifiers,  
  metric_col,  
  measured_col  
)  
calculate_score(x$x)
```

cleanup_metadata	<i>cleanup_metadata</i>
------------------	-------------------------

Description

Cleanup a data.table with metadata

Usage

```
cleanup_metadata(df_metadata)
```

Arguments

df_metadata a data.table with metadata

Details

Adds annotations and check whether user provided correct input data.

Value

a data.table with cleaned metadata

Examples

```
df <- data.table::data.table(  
  clid = "CELL_LINE",  
  Gnumber = "DRUG_1",  
  Concentration = c(0, 1),  
  Duration = 72  
)  
cleanup_df <- cleanup_metadata(df)
```

convert_mae_to_raw_data

Transform mae into raw data

Description

Transform mae into raw data

Usage

```
convert_mae_to_raw_data(mae)
```

Arguments

mae MultiAssayExperiment object with SummarizedExperiments containing "RawTreated" and "Controls" assays

Value

data.table with raw data

Examples

```
mae <- gDRutils::get_synthetic_data("finalMAE_small")
convert_mae_to_raw_data(mae)
```

convert_se_to_raw_data

Transform se into raw_data

Description

Transform se into raw_data

Usage

```
convert_se_to_raw_data(se)
```

Arguments

se SummarizedExperiment object with "RawTreated" and "Controls" assays

Value

data.table with raw data

Examples

```
mae <- gDRutils::get_synthetic_data("finalMAE_small")
se <- mae[[1]]
convert_se_to_raw_data(se)
```

data_model	<i>Detect model of data</i>
------------	-----------------------------

Description

Detect model of data

Usage

```
data_model(x)
```

Arguments

x data.table with raw data or SummarizedExperiment object with gDR assays

Value

string with the information of the raw data follows single-agent or combination data model

Examples

```
data_model("single-agent")
```

data_model.character	<i>Detect model of data from experiment name</i>
----------------------	--

Description

Detect model of data from experiment name

Usage

```
## S3 method for class 'character'  
data_model(x)
```

Arguments

x character with experiment name

Value

string with the information of the raw data follows single-agent or combination data model

data_model.data.table *Detect model of data in data.table*

Description

Detect model of data in data.table

Usage

```
## S3 method for class 'data.table'  
data_model(x)
```

Arguments

x data.table of raw drug response data containing both treated and untreated values.

Value

string with the information of the raw data follows single-agent or combination data model

fit_SE.combinations *fit_SE for combination screens*

Description

Perform fittings for combination screens.

Usage

```
fit_SE.combinations(  
  se,  
  data_type = gDRutils::get_supported_experiments("combo"),  
  series_identifiers = NULL,  
  normalization_types = c("GR", "RV"),  
  averaged_assay = "Averaged",  
  metrics_assay = "Metrics",  
  score_FUN = calculate_score  
)
```

Arguments

se	SummarizedExperiment object with a BumpyMatrix assay containing averaged data.
data_type	single-agent vs combination
series_identifiers	character vector of the column names in the nested DFrame corresponding to nested identifiers.
normalization_types	character vector of normalization types used for calculating combo matrix.
averaged_assay	string of the name of the averaged assay to use as input. in the se.
metrics_assay	string of the name of the metrics assay to output in the returned SummarizedExperiment . whose combination represents a unique series for which to fit curves.
score_FUN	function used to calculate score for HSA and Bliss

Details

This function assumes that the combination is set up with both concentrations nested in the assay.

Value

A SummarizedExperiment object with an additional assay containing the combination metrics.

Examples

```
fmae_cms <- gDRutils::get_synthetic_data("finalMAE_combo_matrix_small")

se1 <- fmae_cms[[gDRutils::get_supported_experiments("combo")]]
SummarizedExperiment::assays(se1) <-
  SummarizedExperiment::assays(se1)["Averaged"]
fit_SE.combinations(se1[1, 1])
```

get_assays_per_pipeline_step

get info about created/present assays in SE at the given pipeline step

Description

get info about created/present assays in SE at the given pipeline step

Usage

```
get_assays_per_pipeline_step(
  step,
  data_model,
  status = c("created", "present")
)
```

Arguments

step	string with pipeline step
data_model	single-agent vs combination
status	string return vector of assays created or present at the given step?

Value

assay

```
get_cell_line_annotation
      get_cell_line_annotation
```

Description

Get cell line annotation data table

Usage

```
get_cell_line_annotation(
  data,
  fname = "cell_lines.csv",
  fill = "unknown",
  annotation_package = if ("gDRinternal" %in% .packages(all.available = TRUE)) {
    "gDRinternal"
  } else {
    "gDRtestData"
  }
)
```

Arguments

data	data.table with cell line identifiers to be matched
fname	string with file name containing the annotation
fill	string indicating how unknown cell lines should be filled in the DB
annotation_package	string indicating name of the package containing cell line annotation

Value

data.table with cell line annotations

Examples

```
data <- data.table::data.table(clid = c("CL1", "CL2", "CL3"))
cell_line_annotation <- get_cell_line_annotation(data)
```

`get_cellline_annotation_from_dt`*Retrieve the cell line annotation from the annotated dt input*

Description

Retrieve the cell line annotation from the annotated dt input

Usage

```
get_cellline_annotation_from_dt(dt)
```

Arguments

dt annotated data.table

Value

data.table with cell line annotation

Examples

```
dt <- data.table::data.table(Gnumber = "A",
  clid = "CL123",
  CellLineName = "cl name",
  Tissue = "Bone",
  parental_identifier = "some cl",
  subtype = "cortical",
  ReferenceDivisionTime = 5)
get_cellline_annotation_from_dt(dt)
```

`get_default_nested_identifiers`*Get default nested identifiers*

Description

Get default nested identifiers

Usage

```
get_default_nested_identifiers(x, data_model = NULL)
```

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

```
get_default_nested_identifiers(x, data_model = NULL)
```

```
## S3 method for class 'SummarizedExperiment'
```

```
get_default_nested_identifiers(x, data_model = NULL)
```

Arguments

`x` data.table with raw data or SummarizedExperiment object with gDR assays
`data_model` single-agent vs combination

Value

vector of nested identifiers

Examples

```
get_default_nested_identifiers(data.table::data.table())
```

```
get_drug_annotation  get_drug_annotation
```

Description

Get drug annotation data table

Usage

```
get_drug_annotation(
  data,
  fname = "drugs.csv",
  fill = "unknown",
  annotation_package = if ("gDRinternal" %in% .packages(all.available = TRUE)) {
    "gDRinternal"
  } else {
    "gDRtestData"
  }
)
```

Arguments

`data` data.table with drug identifiers to be matched
`fname` string with file name containing the annotation
`fill` string indicating how unknown drugs should be filled in the DB
`annotation_package` string indicating name of the package containing drug annotation

Value

data.table with drug annotations

Examples

```
data <- data.table::data.table(Gnumber = c("drug1", "drug2", "drug3"))
drug_annotation <- get_drug_annotation(data)
```

get_drug_annotation_from_dt

Retrieve the drug annotation from the annotated dt input

Description

Retrieve the drug annotation from the annotated dt input

Usage

```
get_drug_annotation_from_dt(dt)
```

Arguments

dt annotated data.table

Value

data.table with drug annotation

Examples

```
dt <- data.table::data.table(Gnumber = "A",
DrugName = "drugA",
drug_moa = "drug_moa_A")
get_drug_annotation_from_dt(dt)
```

grr_matches

Value Matching

Description

Returns a lookup table or list of the positions of ALL matches of its first argument in its second and vice versa. Similar to [match](#), though that function only returns the first match.

Usage

```
grr_matches(
  x,
  y,
  all.x = TRUE,
  all.y = TRUE,
  list = FALSE,
  indexes = TRUE,
  nomatch = NA
)
```

Arguments

<code>x</code>	vector. The values to be matched. Long vectors are not currently supported.
<code>y</code>	vector. The values to be matched. Long vectors are not currently supported.
<code>all.x</code>	logical; if TRUE, then each value in x will be included even if it has no matching values in y
<code>all.y</code>	logical; if TRUE, then each value in y will be included even if it has no matching values in x
<code>list</code>	logical. If TRUE, the result will be returned as a list of vectors, each vector being the matching values in y. If FALSE, result is returned as a data.table with repeated values for each match.
<code>indexes</code>	logical. Whether to return the indices of the matches or the actual values.
<code>nomatch</code>	the value to be returned in the case when no match is found. If not provided and <code>indexes=TRUE</code> , items with no match will be represented as NA. If set to NULL, items with no match will be set to an index value of <code>length+1</code> . If <code>indexes=FALSE</code> , they will default to NA.

Details

This behavior can be imitated by using joins to create lookup tables, but `matches` is simpler and faster: usually faster than the best joins in other packages and thousands of times faster than the built in `merge`.

`all.x/all.y` correspond to the four types of database joins in the following way:

left `all.x=TRUE, all.y=FALSE`

right `all.x=FALSE, all.y=TRUE`

inner `all.x=FALSE, all.y=FALSE`

full `all.x=TRUE, all.y=TRUE`

Note that NA values will match other NA values.

Source of the function: <https://github.com/cran/grr/blob/master/R/grr.R>

Value

data.table

Examples

```

mat_elem <- data.table::data.table(
  DrugName = rep(c("untreated", "drugA", "drugB", "untreated"), 2),
  DrugName_2 = rep(c("untreated", "vehicle", "drugA", "drugB"), 2),
  clid = rep(c("C1", "C2"), each = 4)
)
untreated_tag <- gDRutils::get_env_identifiers("untreated_tag")
ref_idx <- which(
  mat_elem$DrugName %in% untreated_tag |
  mat_elem$DrugName_2 %in% untreated_tag
)
ref <- mat_elem[ref_idx, ]
treated <- mat_elem[-ref_idx, ]
valid <- c("DrugName", "DrugName_2")
trt <- lapply(valid, function(x) {
  colnames <- c("clid", x)
  treated[, colnames, with = FALSE]
})
trt <- do.call(paste,
  do.call(rbind, lapply(trt, function(x) setNames(x, names(trt[[1]]))))
)
ref <- lapply(valid, function(x) {
  colnames <- c("clid", x)
  ref[, colnames, with = FALSE]
})
ref <- do.call(paste,
  do.call(rbind, lapply(ref, function(x) setNames(x, names(ref[[1]]))))
)
grr_matches(trt, ref, list = FALSE, all.y = FALSE)

```

identify_data_type *Identify type of data*

Description

Identify type of data

Usage

```
identify_data_type(dt, codilution_conc = 2, matrix_conc = 1)
```

Arguments

dt	data.table of raw drug response data containing both treated and untreated values
codilution_conc	integer of maximum number of concentration ratio of co-treatment to classify as codilution data type; defaults to 2
matrix_conc	integer of minimum number of concentration pairs of co-treatment to classify as co-treatment or matrix data type; defaults to 1

Value

data.table of raw drug response data with additional column type with the info of data type for a given row of data.table

Author(s)

Bartosz Czech bartosz.czech@contractors.roche.com

Examples

```
conc <- rep(seq(0, 0.3, 0.1), 2)
ctrl_dt <- S4Vectors::DataFrame(
  ReadoutValue = c(2, 2, 1, 1, 2, 1),
  Concentration = rep(0, 6),
  masked = FALSE,
  DrugName = rep(c("DRUG_10", "vehicle", "DRUG_8"), 2),
  CellLineName = "CELL1"
)

trt_dt <- S4Vectors::DataFrame(
  ReadoutValue = rep(seq(1, 4, 1), 2),
  Concentration = conc,
  masked = rep(FALSE, 8),
  DrugName = c("DRUG_10", "DRUG_8"),
  CellLineName = "CELL1"
)

input_dt <- data.table::as.data.table(rbind(ctrl_dt, trt_dt))
input_dt$Duration <- 72
input_dt$CorrectedReadout2 <- input_dt$ReadoutValue
identify_data_type(input_dt)
```

identify_keys

identify_keys

Description

Group columns from a data.table that correspond to different

Usage

```
identify_keys(
  df_,
  nested_keys = NULL,
  override_untrt_controls = NULL,
  identifiers = gDRutils::get_env_identifiers()
)
```

Arguments

<code>df_</code>	a data.table to identify keys for.
<code>nested_keys</code>	character vector of keys to exclude from the returned list. The keys discarded should be identical to the keys in the third dimension of the SummarizedExperiment. Defaults to the "Barcode" and the masked identifier.
<code>override_untrt_controls</code>	named list containing defining factors in the treatments. Defaults to NULL.
<code>identifiers</code>	named list containing all identifiers to use during processing. By default, this value will be obtained by the environment.

Details

This is most likely to be used for provenance tracking and will be placed on the SummarizedExperiment metadata for downstream analyses to reference.

Value

named list of key types and their corresponding key values.

See Also

`map_df`, `create_SE`

Examples

```
n <- 64
md_df <- data.table::data.table(
  Gnumber = rep(c("vehicle", "untreated", paste0("G", seq(2))), each = 16),
  DrugName = rep(c("vehicle", "untreated", paste0("GN", seq(2))), each = 16),
  clid = paste0("C", rep_len(seq(4), n)),
  CellLineName = paste0("N", rep_len(seq(4), n)),
  replicates = rep_len(paste0("R", rep(seq(4), each = 4)), 64),
  drug_moa = "inhibitor",
  ReferenceDivisionTime = rep_len(c(120, 60), n),
  Tissue = "Lung",
  parental_identifier = "CL12345",
  Duration = 160
)
md_df <- unique(md_df)
ref <- md_df$Gnumber %in% c("vehicle", "untreated")
trt_df <- md_df[!ref, ]
identify_keys(trt_df)
```

map_df	<i>Map treated conditions to their respective references.</i>
--------	---

Description

Map treated conditions to their respective Day0, untreated, or single-agent references using condition metadata.

Usage

```
map_df(  
  trt_md,  
  ref_md,  
  override_untrt_controls = NULL,  
  ref_cols,  
  ref_type = c("Day0", "untrt_Endpoint")  
)
```

Arguments

trt_md	data.table of treated metadata.
ref_md	data.table of untreated metadata.
override_untrt_controls	named list indicating what treatment metadata fields should be used as a control. Defaults to NULL.
ref_cols	character vector of the names of reference columns to include. Likely obtained from <code>identify_keys()</code> .
ref_type	string of the reference type to map to. Should be one of <code>c("Day0", "untrt_Endpoint")</code> .

Details

If `override_untrt_controls` is specified, the values in the named list will supersede the values in `trt_md` during the matching process. This is useful for mapping treatments to specific "standard" untreated controls.

Value

named list mapping treated metadata to untreated metadata.

See Also

`identify_keys`

Examples

```
# Standard Endpoint Mapping
trt_dt <- data.table::data.table(
  clid = c("C1", "C2"),
  Duration = 72,
  rn = c("T1", "T2")
)
ref_dt <- data.table::data.table(
  clid = c("C1", "C2"),
  Duration = 72,
  rn = c("R1", "R2")
)
map_df(trt_dt, ref_dt, ref_cols = "clid", ref_type = "untrt_Endpoint")
```

map_ids_to_fits

Get predicted values for a given fit and input.

Description

Map fittings to identifiers and compute the predicted values for corresponding fits.

Usage

```
map_ids_to_fits(pred, match_col, fittings, fitting_id_col)
```

Arguments

pred numeric vector for which you want predictions.
match_col vector to match on fittings to get the correct fit.
fittings data.table of fit metrics.
fitting_id_col string of the column name in fittings that should be used to match with match_col.

Value

Numeric vector of predicted values given pred inputs and fittings values.

Examples

```
pred <- c(1, 5, 5)
match_col <- c(1, 1, 2)
fitting_id_col <- "match_on_me"

fit1 <- data.table::data.table(h = 2.09, x_inf = 0.68, x_0 = 1, ec50 = 0.003)
fit2 <- data.table::data.table(h = 0.906, x_inf = 0.46, x_0 = 1, ec50 = 0.001)
fittings <- do.call(rbind, list(fit1, fit2))
fittings[[fitting_id_col]] <- c(1, 2)
```

```
map_ids_to_fits(pred, match_col, fittings, fitting_id_col)
```

map_untreated	<i>Identify untreated rows based on Drug treatment alone</i>
---------------	--

Description

Identify untreated rows based on Drug treatment alone

Usage

```
map_untreated(mat_elem)
```

Arguments

mat_elem data.table input containing drug name or drug identifier columns.

Value

logical vector

merge_data	<i>merge_data</i>
------------	-------------------

Description

Merge all the input data into a single data.table

Usage

```
merge_data(manifest, treatments, data)
```

Arguments

manifest a data.table with a manifest info
treatments a data.table with a treatatments info
data a data.table with a raw data info

Value

a data.table with merged data and metadata.

Examples

```
td <- gDRimport::get_test_data()
l_tbl <- gDRimport::load_data(
  manifest_file = gDRimport::manifest_path(td),
  df_template_files = gDRimport::template_path(td),
  results_file = gDRimport::result_path(td)
)
merge_data(
  l_tbl$manifest,
  l_tbl$treatments,
  l_tbl$data
)
```

order_result_df	<i>Order_result_df</i>
-----------------	------------------------

Description

Order a data.table with results

Usage

```
order_result_df(df_)
```

Arguments

df_ a data.table with results

Value

a ordered data.table with results

prepare_input	<i>Prepare input data common for all experiments</i>
---------------	--

Description

Current steps

- refining nested confounders
- refining nested identifiers
- splitting df_ into (per experiment) df_list

Usage

```
prepare_input(x, ...)
```

Arguments

x data.table with raw data or MAE object with dose-response data
 ... additional parameters

Value

list of input data

Examples

```
td <- gDRimport::get_test_data()
l_tbl <- gDRimport::load_data(
  manifest_file = gDRimport::manifest_path(td),
  df_template_files = gDRimport::template_path(td),
  results_file = gDRimport::result_path(td)
)
df_ <- merge_data(
  l_tbl$manifest,
  l_tbl$treatments,
  l_tbl$data
)
nested_confounders = intersect(
  names(df_),
  gDRutils::get_env_identifiers("barcode")
)
prepare_input(df_, nested_confounders, NULL)
```

prepare_input.data.table

Prepare input data common for all experiments

Description

Current steps

- refining nested confounders
- refining nested identifiers
- splitting df_ into (per experiment) df_list

Usage

```
## S3 method for class 'data.table'
prepare_input(
  x,
  nested_confounders = gDRutils::get_env_identifiers("barcode"),
  nested_identifiers_l = .get_default_nested_identifiers(),
  ...
)
```

Arguments

x data.table with raw data
nested_confounders Character vector of the nested_confounders for a given assay. **nested_keys** is character vector of column names to include in the data.tables in the assays of the resulting SummarizedExperiment object. Defaults to the **nested_identifiers** and **nested_confounders** if passed through
nested_identifiers_l list with the nested_identifiers(character vectors) for single-agent and (optionally) for combination data
... additional parameters

Value

list of input data

```
prepare_input.MultiAssayExperiment
```

Prepare input data common for all experiments

Description

Current steps

- refining nested confounders
- refining nested identifiers
- splitting df_ into (per experiment) df_list

Usage

```
## S3 method for class 'MultiAssayExperiment'
prepare_input(
  x,
  nested_confounders = gDRutils::get_SE_identifiers(x[[1]], "barcode"),
  nested_identifiers_l = .get_default_nested_identifiers(x[[1]]),
  raw_data_field = "experiment_raw_data",
  split_data = TRUE,
  ...
)
```

Arguments

x	MAE object with dose-response data
nested_confounders	Character vector of the nested_confounders for a given assay. nested_keys is character vector of column names to include in the data.tables in the assays of the resulting SummarizedExperiment object. Defaults to the nested_identifiers and nested_confounders if passed through
nested_identifiers_l	list with the nested_identifiers(character vectors) for single-agent and (optionally) for combination data
raw_data_field	metadata field with raw data
split_data	Boolean indicating need of splitting the data into experiment types
...	additional parameters

Value

list of input data

process_perturbations *Cleanup additional perturbations in the data.table*

Description

This function processes drug and concentration columns in a data.table. It checks if there is only one unique drug (excluding a specified untreated tag) and if there are exactly two doses (one of which is 0). If these conditions are met, it creates a new column named after the drug and fills it with the doses, then removes the original drug and concentration columns.

Usage

```
process_perturbations(
  dt,
  drugs_cotrt_ids,
  conc_cotrt_ids,
  untreated_tag = "vehicle"
)
```

Arguments

dt	A data.table containing the data.
drugs_cotrt_ids	A vector of column names related to drugs.
conc_cotrt_ids	A vector of column names related to concentrations.
untreated_tag	A string representing the untreated tag (default is "vehicle").

Value

A modified data.table with new columns for the drugs and removed original drug and concentration columns.

Examples

```
dt <- data.table::data.table(  
  drug1 = c("vehicle", "drugA", "drugA"),  
  conc1 = c(0, 10, 0),  
  drug2 = c("vehicle", "drugB", "drugB"),  
  conc2 = c(0, 20, 0)  
)  
drugs_cotrt_ids <- c("drug1", "drug2")  
conc_cotrt_ids <- c("conc1", "conc2")  
dt <- process_perturbations(dt, drugs_cotrt_ids, conc_cotrt_ids)  
print(dt)
```

replace_conc_with_standardized_conc
Standardize concentrations.

Description

Utilize a map to standardize concentrations.

Usage

```
replace_conc_with_standardized_conc(  
  original_concs,  
  conc_map,  
  original_conc_col,  
  standardized_conc_col  
)
```

Arguments

original_concs numeric vector of concentrations to replace using conc_map.
conc_map data.table of two columns named original_conc_col and standardized_conc_col.
original_conc_col string of the name of the column in conc_map containing the original concentrations to replace.
standardized_conc_col string of the name of the column in conc_map containing the standardized concentrations to use for replacement.

Value

numeric vector of standardized concentrations.

See Also

map_conc_to_standardized_conc

Examples

```
conc_map <- data.table::data.table(  
  orig = c(0.99, 0.6, 0.456, 0.4),  
  std = c(1, 0.6, 0.46, 0.4)  
)  
original_concs <- c(0.456, 0.456, 0.4, 0.99)  
exp <- c(0.46, 0.46, 0.4, 1)  
obs <- replace_conc_with_standardized_conc(  
  original_concs,  
  conc_map,  
  original_conc_col = "orig",  
  standardized_conc_col = "std"  
)
```

split_raw_data

Split raw data into list based on the data types

Description

Split raw data into list based on the data types

Usage

```
split_raw_data(dt, type_col = "type")
```

Arguments

dt	data.table of raw drug response data containing both treated and untreated values with column specified in type_col argument.
type_col	string with column names in dt with info about data type. Defaults to "type".

Value

list with split data based on its data type

Author(s)

Bartosz Czech bartosz.czech@contractors.roche.com

Examples

```

cell_lines <- gDRtestData::create_synthetic_cell_lines()
drugs <- gDRtestData::create_synthetic_drugs()
dt_layout <- drugs[4:6, as.list(cell_lines[7:8, ]), names(drugs)]
dt_layout <- gDRtestData::add_data_replicates(dt_layout)
dt_layout <- gDRtestData::add_concentration(
  dt_layout,
  concentrations = 10 ^ (seq(-3, .5, .5))
)

dt_2 <-
  drugs[c(21, 26), as.list(cell_lines[which(cell_lines$clid %in% dt_layout$clid)]), names(drugs)]
dt_2 <- gDRtestData::add_data_replicates(dt_2)
dt_2 <- gDRtestData::add_concentration(
  dt_2,
  concentrations = 10 ^ (seq(-3, .5, .5))
)
colnames(dt_2)[colnames(dt_2) %in% c(colnames(drugs), "Concentration")] <-
  paste0(
    colnames(dt_2)[colnames(dt_2) %in% c(colnames(drugs), "Concentration")],
    "_2"
  )
dt_layout_2 <- dt_layout[dt_2, on = intersect(names(dt_layout), names(dt_2)),
  allow.cartesian = TRUE]
dt_merged_data <- gDRtestData::generate_response_data(dt_layout_2, 0)
dt <- identify_data_type(dt_merged_data)
split_raw_data(dt)

conc <- rep(seq(0, 0.3, 0.1), 2)
ctrl_dt <- S4Vectors::DataFrame(
  ReadoutValue = c(2, 2, 1, 1, 2, 1),
  Concentration = rep(0, 6),
  masked = FALSE,
  DrugName = rep(c("DRUG_10", "vehicle", "DRUG_8"), 2),
  CellLineName = "CELL1"
)

trt_dt <- S4Vectors::DataFrame(
  ReadoutValue = rep(seq(1, 4, 1), 2),
  Concentration = conc,
  masked = rep(FALSE, 8),
  DrugName = c("DRUG_10", "DRUG_8"),
  CellLineName = "CELL1"
)
input_dt <- data.table::as.data.table(rbind(ctrl_dt, trt_dt))
input_dt$Duration <- 72
input_dt$CorrectedReadout2 <- input_dt$ReadoutValue
split_dt <- identify_data_type(input_dt)
split_raw_data(split_dt)

```

test_synthetic_data *Testing synthetic data form gDRtestData package*

Description

Testing synthetic data form gDRtestData package

Usage

```
test_synthetic_data(  
  original,  
  data,  
  dataName,  
  override_untrt_controls = NULL,  
  assays = c("Normalized", "Averaged", "Metrics"),  
  tolerance = 0.001  
)
```

Arguments

original	original MAE assay
data	datase MAE or data.table
dataName	dataset name
override_untrt_controls	named list containing defining factors in the treatments
assays	assays to test
tolerance	tolerance factor

Value

NULL

Examples

```
set.seed(2)  
cell_lines <- gDRtestData::create_synthetic_cell_lines()  
drugs <- gDRtestData::create_synthetic_drugs()  
data <- "finalMAE_small"  
original <- gDRutils::get_synthetic_data(data)  
test_synthetic_data(original, original, "test")
```

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