Package ‘rtry’

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Title Preprocessing Plant Trait Data

Version 1.1.0

Description Designed to support the application of plant trait data providing easy applicable functions for the basic steps of data preprocessing, e.g. data import, data exploration, selection of columns and rows, excluding trait data according to different attributes, geocoding, long- to wide-table transformation, and data export. 'rtry' was initially developed as part of the TRY R project to preprocess trait data received via the TRY database.

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Depends R (>= 4.0.0)

Imports utils, data.table, dplyr, tidyr, jsonlite, curl, magrittr

URL https://github.com/MPI-BGC-Functional-Biogeography/rtry,
  https://www.try-db.org/TryWeb/Home.php

BugReports https://github.com/MPI-BGC-Functional-Biogeography/rtry/issues

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Maintainer Olee Hoi Ying Lam <hlam9@wisc.edu>

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Author Olee Hoi Ying Lam [aut, cre] (<https://orcid.org/0000-0002-7731-3246>),
  Susanne Tautenhahn [aut] (<https://orcid.org/0000-0002-2753-3443>),
  Gabriel Walther [aut] (<https://orcid.org/0000-0003-3550-9045>),
  Gerhard Boenisch [aut],
  Pramod Baddam [aut] (<https://orcid.org/0000-0002-7858-9295>),
  Jens Kattge [aut] (<https://orcid.org/0000-0002-1022-8469>),
  Fellowship Group Functional Biogeography at MPI-BGC, Jena, Germany [cph]

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data_coordinates

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Description

A dataset containing 20 sets of latitudes and longitudes in WGS84 projection. The raw dataset (data_coordinates.csv) is also provided in the directory testdata.

Usage

data_coordinates

Format

A data frame with 20 rows and 2 variables:

- **Latitude**  Latitude, in WGS84 projection.
- **Longitude** Longitude, in WGS84 projection.

Value

A data frame with 20 rows and 2 variables of sample coordinates data.
**data_locations**  

**Sample locations data**

**Description**

A dataset containing 20 location information. The raw dataset (data_locations.csv) is also provided in the directory testdata.

**Usage**

data_locations

**Format**

A data frame with 20 rows and 3 variables:

- **Country code**  Country code.
- **Country** Full name of a country.
- **Location** Specific location, e.g. town or city name.

**Value**

A data frame with 20 rows and 3 variables of sample locations data.

---

**data_TRY_15160**  

**Sample TRY data (Request 15160)**

**Description**

A dataset requested from the TRY Database. The request ID of this dataset is 15160, which contains TraitID: 3115, 3116 and AccSpeciesID: 10773, 35846, 45737. The raw dataset (data_TRY_15160.txt) is also provided in the directory testdata.

**Usage**

data_TRY_15160

**Format**

A data frame with 1782 rows and 28 variables:

- **LastName** Surname of data contributor.
- **FirstName** First name of data contributor.
- **DatasetID** Unique identifier of contributed dataset.
- **Dataset** Name of contributed dataset
SpeciesName  Original name of species.
AccSpeciesID  Unique identifier of consolidated species name.
AccSpeciesName  Consolidated species name.
ObservationID  Unique identifier for each observation in TRY.
ObsDataID  Unique identifier for each row in the TRY data table, either trait record or ancillary data.
TraitID  Unique identifier for traits (only if the record is a trait).
TraitName  Name of trait (only if the record is a trait).
DataID  Unique identifier for each DataName (either sub-trait or ancillary data).
DataName  Name of sub-trait or ancillary data.
OrigName  Original name of sub-trait or ancillary data.
OrigValueStr  Original value of trait or ancillary data.
OrigUnitStr  Original unit of trait or ancillary data.
ValueKindName  Value kind (single measurement, mean, median, etc.).
OrigUncertaintyStr  Original uncertainty.
UncertaintyName  Kind of uncertainty (standard deviation, standard error, etc.).
Replicates  Number of replicates.
StdValue  Standardized trait value: available for frequent continuous traits.
UnitName  Standard unit: available for frequent continuous traits.
RelUncertaintyPercent  Relative uncertainty in %.
OrigObsDataID  Unique identifier for duplicate trait records.
ErrorRisk  Indication for outlier trait values: distance to mean in standard deviations.
Reference  Reference to be cited if trait record is used in analysis.
Comment  Explanation for the OrigName in the contributed dataset.
V28  Empty, an artifact due to different interpretation of column separator by MySQL and R.

Value
A data frame with 1782 rows and 28 variables of sample TRY data (Request 15160).

Value
Sample TRY data (Request 15161)

data_TRY_15161

Description
A dataset requested from the TRY Database. The request ID of this dataset is 15161, which contains TraitID: 3117 and AccSpeciesID: 10773, 35846, 45737. The raw dataset (data_TRY_15161.txt) is also provided in the directory testdata.
Usage

data_TRY_15161

Format

A data frame with 4627 rows and 28 variables:

- **LastName**: Surname of data contributor.
- **FirstName**: First name of data contributor.
- **DatasetID**: Unique identifier of contributed dataset.
- **Dataset**: Name of contributed dataset
- **SpeciesName**: Original name of species.
- **AccSpeciesID**: Unique identifier of consolidated species name.
- **AccSpeciesName**: Consolidated species name.
- **ObservationID**: Unique identifier for each observation in TRY.
- **ObsDataID**: Unique identifier for each row in the TRY data table, either trait record or ancillary data.
- **TraitID**: Unique identifier for traits (only if the record is a trait).
- **TraitName**: Name of trait (only if the record is a trait).
- **DataID**: Unique identifier for each **DataName** (either sub-trait or ancillary data).
- **DataName**: Name of sub-trait or ancillary data.
- **OriglName**: Original name of sub-trait or ancillary data.
- **OrigValueStr**: Original value of trait or ancillary data.
- **OrigUnitStr**: Original unit of trait or ancillary data.
- **ValueKindName**: Value kind (single measurement, mean, median, etc.).
- **OrigUncertaintyStr**: Original uncertainty.
- **UncertaintyName**: Kind of uncertainty (standard deviation, standard error, etc.).
- **Replicates**: Number of replicates.
- **StdValue**: Standardized trait value: available for frequent continuous traits.
- **UnitName**: Standard unit: available for frequent continuous traits.
- **RelUncertaintyPercent**: Relative uncertainty in %.
- **OrigObsDataID**: Unique identifier for duplicate trait records.
- **ErrorRisk**: Indication for outlier trait values: distance to mean in standard deviations.
- **Reference**: Reference to be cited if trait record is used in analysis.
- **Comment**: Explanation for the **OriglName** in the contributed dataset.
- **V28**: Empty, an artifact due to different interpretation of column separator by MySQL and R.

Value

A data frame with 4627 rows and 28 variables of sample TRY data (Request 15161).
rtry_bind_col  
Bind data by columns

Description
This function takes a list of data frames or data tables and combines them by columns. The data have to have the same number and sequence of rows.

Usage
rtry_bind_col(..., showOverview = TRUE)

Arguments
...                        A list of data frames or data tables to be combined by columns.
showOverview              Default TRUE displays the dimension and column names of the combined data.

Value
An object of the same type as the first input.

Note
A common attribute is not necessary (difference to the function rtry_join_left and rtry_join_outer): the binding process simply puts the data side-by-side.

References
This function makes use of the bind_cols function within the dplyr package.

See Also
rtry_bind_row, rtry_join_left, rtry_join_outer

Examples
# Assuming a user has selected different columns as separated data tables
# and later on would like to combine them as one for further processing.
data1 <- rtry_select_col(data_TRY_15160, ObsDataID, ObservationID, AccSpeciesID, AccSpeciesName, ValueKindName, TraitID, TraitName, DataID, DataName, OrigObsDataID, ErrorRisk, Comment)
data2 <- rtry_select_col(data_TRY_15160, OriglName, OrigValueStr, OrigUnitStr, StdValue, UnitName)
data <- rtry_bind_col(data1, data2)

# Expected messages:
# dim: 1782 12
**rtry_bind_row**

Bind data by rows

**Description**

This function takes a list of data frames or data tables and combines them by rows, it adds the rows of the second data below the rows of the first one.

**Usage**

```r
rtry_bind_row(..., showOverview = TRUE)
```

**Arguments**

- `...`: A list of data frames or data tables to be combined by rows.
- `showOverview`: Default `TRUE` displays the dimension and column names of the combined data.

**Value**

An object of the same type as the first input. The object will contain a column if that column appears in any of the inputs.

**Note**

A common attribute is not necessary (difference to the function `rtry_join_left` and `rtry_join_outer`): the binding process simply puts the data one after another while matching the column names, and any missing columns will be filled with `NA`.

**References**

This function makes use of the `bind_rows` function within the `dplyr` package.

**See Also**

`rtry_bind_col`, `rtry_join_left`, `rtry_join_outer`
Examples

# Combine the two provided sample data (data_TRY_15160 and data_TRY_15161)
data <- rtry_bind_row(data_TRY_15160, data_TRY_15161)

# Expected message:
# dim: 6409 28
# col: LastName FirstName DatasetID Dataset SpeciesName AccSpeciesID AccSpeciesName
# ObservationID ObsDataID TraitID TraitName DataID DataName OrigName
# OrigValueStr OrigUnitStr ValueKindName OrigUncertaintyStr UncertaintyName
# Replicates StdValue UnitName RelUncertaintyPercent OrigObsDataID ErrorRisk
# Reference Comment V28

rtry_exclude Exclude (remove) data

Description

This function takes the input data frame or data table and excludes all records (rows) with the same value in the attribute specified in the argument baseOn if the criteria specified in the arguments for excluding (…) are fulfilled for one of those records.

Usage

rtry_exclude(input, ..., baseOn, showOverview = TRUE)

Arguments

input Input data frame or data table.
...
Criteria for excluding.
baseOn The attribute on which excluding is based on. If it is set to ObservationID, the function excludes all records with the respective ObservationID if the specified criteria for excluding is fulfilled for one record. Alternatively, use ObsDataID to exclude only the record (row) for which the specified criterion is fulfilled. Other reasonable parameter values are TraitID, DataID or AccSpeciesID.
showOverview Default TRUE displays the dimension of the data after excluding.

Value

An object of the same type as the input data after excluding.

References

This function makes use of the subset function within the base package.
Examples

# Example 1: Exclude observations on juvenile plants or unknown state:
# Identify observations where the plant developmental status (DataID 413) is either
# "juvenile" or "unknown", and exclude the whole observation
data_filtered <- rtry_exclude(data_TRY_15160,
   (DataID %in% 413) & (OrigValueStr %in% c("juvenile", "unknown")),
   baseOn = ObservationID)

# Expected message:
# dim: 1618 28

# Example 2: Exclude outliers:
# Identify the outliers, i.e. trait records where the ErrorRisk is larger than 4
# and exclude these records (not the whole observation)
data_filtered <- rtry_exclude(data_TRY_15160,
   ErrorRisk > 4,
   baseOn = ObsDataID)

# Expected message:
# dim: 1778 28

# Learn more applications of the excluding function via the vignette (Workflow for
# general data preprocessing using rtry): vignette("rtry-workflow-general").

rtry_explore

Explore data

Description

This function takes a data frame or data table and converts it into a grouped data frame of unique
values based on the specified column names. A column (Count) is added, which shows the number
of records within each group. The data are grouped by the first attribute if not specified with the
argument sortBy.

Usage

rtry_explore(input, ..., sortBy = "", showOverview = TRUE)

Arguments

input Data frame or data table, e.g. from rtry_import().
...
sortBy (Optional) Default "" indicates no sorting is applied to the grouped data. Specify
the attribute name used to re-order the rows in ascending order.
showOverview Default TRUE displays the dimension of the result data table.

Value

A data frame of unique values grouped and sorted by the specified attribute(s).
rtry_export

References

This function makes use of the group_by, summarise and arrange functions within the dplyr package.

Examples

# Explore the unique values in the provided sample data (data_TRY_15160)
# based on the attributes AccSpeciesID, AccSpeciesName, TraitID, TraitName, DataID
# and DataName, sorted by TraitID
data_explore <- rtry_explore(data_TRY_15160,
    AccSpeciesID, AccSpeciesName, TraitID, TraitName, DataID, DataName,
    sortBy = TraitID)

# Expected message:
# dim: 235 7

# Learn more applications of the explore function via the vignette (Workflow for
# general data preprocessing using rtry): vignette("rtry-workflow-general").

rtry_export 

Export preprocessed data

Description

This function exports the preprocessed data as comma separated values to a .csv file. If the specified output directory does not exist, it will be created.

Usage

rtry_export(data, output, quote = TRUE, encoding = "UTF-8")

Arguments

data The data to be saved.

output Output path.

quote Default TRUE inserts double quotes around any character or factor columns.

encoding Default "UTF-8". File encoding.

Value

No return value, called for exporting a .csv file.

References

This function makes use of the write.csv function within the utils package.
rtry_geocoding

Examples

# Export the preprocessed data to a specific location
rtry_export(data_TRY_15160, file.path(tempdir(), "TRYdata_unprocessed.csv"))

# Expected message:
# File saved at: C:\Users\user\AppData\Local\Temp\Rtmp4wJAvQ/TRYdata_unprocessed.csv

rtry_geocoding  Perform geocoding

Description

This function uses Nominatim, a search engine for OpenStreetMap (OSM) data, to perform geocoding, i.e. converting an address into coordinates (latitudes, longitudes). The data provided by OSM is free to use for any purpose, including commercial use, and is governed by the distribution license ODbL.

Usage

rtry_geocoding(address, email)

Arguments

address  String of an address.
email  String of an email address.

Value

A data frame that contains latitudes (lat) and longitudes (lon) in WGS84 projection.

See Also

rtry_revgeocoding

Examples

## Not run:
# Convert the address of MPI-BGC ("Hans-Knoell-Strasse 10, 07745 Jena, Germany")
# into coordinates in latitudes and longitudes
# Note: Please change to your own email address when executing this function
rtry_geocoding("Hans-Knoell-Strasse 10, 07745 Jena, Germany",
              email = "john.doe@example.com")

# Expected message:
# lat  lon
# 1 50.9101 11.56674

## End(Not run)
# Learn to perform geocoding to a list of locations via the vignette (Workflow for geocoding using rtry): vignette("rtry-workflow-geocoding").

---

**rtry_import**

**Import data**

## Description

This function imports a data file as a `data.table` for further processing. The default arguments are set to import tabular delimited data files in text format (.txt) exported from the TRY database. It can also be used to import other file formats, such as .csv files with comma separated values.

## Usage

```r
rtry_import(
  input,
  separator = "\t",
  encoding = "Latin-1",
  quote = "",
  showOverview = TRUE
)
```

## Arguments

- **input** Path to the data file.
- **separator** Default "\t" for the TRY data output. Data separator.
- **encoding** Default "Latin-1". File encoding.
- **quote** Default "" reads the fields as is. If the fields in the data file are by a double quote, use "\"" instead.
- **showOverview** Default TRUE displays the input path, the dimension and the column names of the imported data.

## Value

A `data.table`.

## References

This function makes use of the `fread` function within the `data.table` package.
Examples

# Example 1: Import data exported from the TRY database
# Specify file path to the raw data provided within the rtry package
input_path <- system.file("testdata", "data_TRY_15160.txt", package = "rtry")

# For own data and Windows users the path might rather look similar to this:
# input_path <- "C:/Users/User/Desktop/data_TRY_15160.txt"

# Import data file using rtry_import
input <- rtry_import(input_path)

# Explicit notation:
# input <- rtry_import(input_path, separator = "\t", encoding = "Latin-1",
# quote = "", showOverview = TRUE)

# Expected message:
# input: ~/R/R-4.0.5/library/rtry/testdata/data_TRY_15160.txt
# dim: 1782 28
# col: LastName FirstName DatasetID DatasetSpeciesName AccSpeciesName
# ObservationID ObsDataID TraitID TraitName DataID DataName OrigName
# OrigValueStr OrigUnitStr ValueKindName OrigUncertaintyStr UncertaintyName
# Replicates StdValue UnitName RelUncertaintyPercent OrigObsDataID ErrorRisk
# Reference Comment V28

# Example 2: Import CSV file
# Specify file path to the raw data provided within the rtry package
input_path <- system.file("testdata", "data_locations.csv", package = "rtry")

# Import data file using rtry_import
input <- rtry_import(input_path, separator = ",", encoding = "UTF-8",
quote = "\\", showOverview = TRUE)

# Expected message:
# input: ~/R/R-4.0.5/library/rtry/testdata/data_locations.csv
# dim: 20 3
# col: Country code Country Location

---

**rtry_join_left**

*Left join for two data frames*

## Description

This function merges two data frames or data tables based on a specified common column and returns all records from the left data frame (x) together with the matched records from the right data frame (y), while discards all the records in the right data frame that does not exist in the left data frame. In other words, this function performs a left join on the two provided data frames or data tables.
rtry_join_left

Usage

rtry_join_left(x, y, baseOn, showOverview = TRUE)

Arguments

x  A data frame or data table to be coerced and will be considered as the data on
    the left.
y  A data frame or data table to be coerced and will be considered as the data on
    the right.
baseOn  The common column used for merging.
showOverview  Default TRUE displays the dimension and column names of the merged data.

Value

An object of the same type of the input data. The merged data is by default lexicographically sorted
on the common column. The columns are the common column followed by the remaining columns
in x and then those in y.

References

This function makes use of the merge function within the base package.

See Also

rtry_join_outer, rtry_bind_col, rtry_bind_row

Examples

# Assume a user has obtained two unique data tables, one with the ancillary data
# Longitude and one with Latitude (e.g. using rtry_select_anc()), and would like to
# add a column Latitude to the data table with Longitude based on the common
# identifier ObservationID
lon <- rtry_select_anc(data_TRY_15160, 60)
lit <- rtry_select_anc(data_TRY_15160, 59)

georef <- rtry_join_left(lon, lat, baseOn = ObservationID)

# Expected messages:
# dim: 97 2
# col: ObservationID Longitude
# 98 2
# col: ObservationID Latitude
# 97 3
# col: ObservationID Longitude Latitude
Outer join for two data frames

Description

This function merges two data frames or data tables based on a specified common column and returns all rows from both data, join records from the left (\(x\)) which have matching keys in the right data frame (\(y\)). In order words, this functions performs an outer join on the two provided data frames, i.e. the join table will contain all records from both data frames or data tables.

Usage

```r
rtry_join_outer(x, y, baseOn, showOverview = TRUE)
```

Arguments

- `x`: A data frame or data table to be coerced and will be considered as the data on the left.
- `y`: A data frame or data table to be coerced and will be considered as the data on the right.
- `baseOn`: The common column used for merging.
- `showOverview`: Default `TRUE` displays the dimension and column names of the merged data.

Value

An object of the same type of the input data. The merged data is by default lexicographically sorted on the common column. The columns are the common column followed by the remaining columns in \(x\) and then those in \(y\).

References

This function makes use of the `merge` function within the base package.

See Also

`rtry_join_left`, `rtry_bind_col`, `rtry_bind_row`

Examples

```r
# Assume a user has obtained two unique data tables, one with the ancillary data
# Longitude and one with Latitude (e.g. using rtry_select_anc()), and would like to
# merge two data tables into one according to the common identifier ObservationID.
# It does not matter if either Longitude or Latitude data has no record
lon <- rtry_select_anc(data_TRY_15160, 60)
lat <- rtry_select_anc(data_TRY_15160, 59)

georef <- rtry_join_outer(lon, lat, baseOn = ObservationID)
```
rtry_remove_col

Remove columns

Description

This function removes specified columns from the imported data for further processing.

Usage

rtry_remove_col(input, ..., showOverview = TRUE)

Arguments

input Input data frame or data table.
... Names of columns to be removed separated by commas. The operator : can be used for selecting a range of consecutive variables.
showOverview Default TRUE displays the dimension of the remaining data.

Value

An object of the same type as the input data.

References

This function makes use of the select function within the dplyr package.

See Also

rtry_select_col

Examples

# Remove certain columns from the provided sample data (data_TRY_15160)
data_rm_col <- rtry_remove_col(data_TRY_15160,
   LastName, FirstName, DatasetID, Dataset, SpeciesName,
   OrigUncertaintyStr, UncertaintyName, Replicates,
   RelUncertaintyPercent, Reference, V28)

# Expected message:
Description

This function removes the duplicates from the input data using the duplicate identifier `OrigObsDataID` provided within the TRY data. Once the function is called and executed, the number of duplicates removed will be displayed on the console as reference.

Usage

```r
rtry_remove_dup(input, showOverview = TRUE)
```

Arguments

- `input`: Input data frame or data table.
- `showOverview`: Default `TRUE` displays the the dimension of the data after removing the duplicates.

Value

An object of the same type as the input data after removing the duplicates.

Note

This function depends on the duplicate identifier `OrigObsDataID` listed in the data exported from the TRY database, therefore, if the column `OrigObsDataID` has been removed, this function will not work. Also, if the original value of an indicated duplicate is a restricted value, which has not been requested from the TRY database (if only public data were requested), the duplicate will be removed and this may result in data loss.

References

This function makes use of the `subset` function within the base package.

Examples

```r
# Remove the duplicates within the provided sample data (data_TRY_15160)
data_rm_dup <- rtry_remove_dup(data_TRY_15160)

# Expected message:
# 45 duplicates removed.
# dim: 1737 28
```
rtry_revgeocoding  

Perform reverse geocoding

Description

This function uses Nominatim, a search engine for OpenStreetMap data, to perform reverse geocoding, i.e. converting coordinates (latitudes, longitudes) into an address. The data provided by OSM is free to use for any purpose, including commercial use, and is governed by the distribution license ODbL.

Usage

rtry_revgeocoding(lat_lon, email)

Arguments

- lat_lon: A data frame containing latitude and longitude in WGS84 projection.
- email: String of an email address.

Value

A data frame that contains address.

See Also

rtry_geocoding

Examples

```r
## Not run:
# Convert the coordinates of MPI-BGC (50.9101, 11.56674) into an address
# Note: Please change to your own email address when executing this function
rtry_revgeocoding(data.frame(50.9101, 11.56674),
                   email = "john.doe@example.com")

# Expected message:
# full_address town city country country_code
# 1 Jena, Thuringia, Germany NA Jena Germany de

## End(Not run)

# Learn to perform reverse geocoding to a list of coordinates via the vignette
# (Workflow for geocoding using rtry): vignette("rtry-workflow-geocoding").
```
**Description**

This function selects one specified ancillary data together with the ObservationID from the imported data and transforms it into a wide table format for further processing.

**Usage**

```r
rtry_select_anc(input, ..., showOverview = TRUE)
```

**Arguments**

- `input`: Input data frame or data table.
- `...`: The IDs of the ancillary data (DataID in the TRY data) to be selected.
- `showOverview`: Default TRUE displays the dimension and column names of the selected data.

**Value**

An object of the same type as the input data.

**References**

This function makes use of the `subset` and `distinct` functions within the base and `dplyr` packages respectively. It also uses the functions `rtry_select_col` and `rtry_remove_col`, as well as the function `rtry_join_outer` to select and combine the extracted ancillary data with the ObservationID.

**Examples**

```r
# Obtain a list of ObservationID and the corresponding ancillary data of interest
# using the specified DataID (e.g. DataID 60 for longitude and 59 for latitude) from
# the provided sample data (e.g. data_TRY_15160)
georef <- rtry_select_anc(data_TRY_15160, 60, 59)

# Expected message:
# dim: 98 3
# col: ObservationID Longitude Latitude

# Obtain a list of ObservationID and one corresponding ancillary data of interest
# using the specified DataID (e.g. DataID 61 for altitude) from the provided sample
# data (e.g. data_TRY_15160)
alt <- rtry_select_anc(data_TRY_15160, 61)

# Expected message:
# dim: 23 2
# col: ObservationID Altitude
```
rtry_select_col  Select columns

Description
This function selects the specified columns from the input data.

Usage
rtry_select_col(input, ..., showOverview = TRUE)

Arguments
- input: Input data frame or data table.
- ...: Column names to be selected.
- showOverview: Default TRUE displays the dimension and column names of the selected columns.

Value
An object of the same type as the input data.

References
This function makes use of the `select` function within the dplyr package.

See Also
rtry_remove_col

Examples
# Select certain columns from the provided sample data (data_TRY_15160)
data_selected <- rtry_select_col(data_TRY_15160, ObsDataID, ObservationID, AccSpeciesID, AccSpeciesName, ValueKindName, TraitID, TraitName, DataID, DataName, OriglName, OrigValueStr, OrigUnitStr, StdValue, UnitName, OrigObsDataID, ErrorRisk, Comment)

# Expected message:
# dim: 1782 17
# col:  ObsDataID ObservationID AccSpeciesID AccSpeciesName ValueKindName TraitID TraitName DataID DataName OriglName OrigValueStr OrigUnitStr StdValue UnitName OrigObsDataID ErrorRisk Comment
**rtry_select_row**

**Select rows**

Description

This function selects rows based on specified criteria and the corresponding `ObservationID` from the imported data for further processing.

Usage

```r
rtry_select_row(
  input,
  ..., 
  getAncillary = FALSE,
  rmDuplicates = FALSE,
  showOverview = TRUE
)
```

Arguments

- `input` Input data frame or data table.
- `...` Criteria for row selection.
- `getAncillary` Default FALSE, set to TRUE selects all ancillary data based on the row selection criteria.
- `rmDuplicates` Default FALSE, set to TRUE calls the function `rtry_remove_dup`.
- `showOverview` Default TRUE displays the dimension of the data after row selection.

Value

An object of the same type as the input data.

Note

This function by default filters data based on the unique identifier `ObservationID` listed in the TRY data, therefore, if the column `ObservationID` has been removed, this function will not work.

References

This function makes use of the `unique` and `subset` functions within the base package. It also uses the function `rtry_remove_dup`. 
Examples

```r
# Within the provided sample data (data_TRY_15160) select the georeferenced traits
# records together with records for Latitude and Longitude (DataID 59 and 60) and
# exclude duplicate trait records
data_selected <- rtry_select_row(data_TRY_15160,
  (TraitID > 0) | (DataID %in% c(59, 60)),
  getAncillary = TRUE,
  rmDuplicates = TRUE)

# Expected message:
# 45 duplicates removed.
# dim: 1737 28
```

---

**rtry_trans_wider**  
*Transform data from long to wide table*

**Description**

This function transforms the original long table format of the data into a wide table format.

**Usage**

```r
rtry_trans_wider(
  input,
  names_from = NULL,
  values_from = NULL,
  values_fn = NULL,
  showOverview = TRUE
)
```

**Arguments**

- `input`: Input data frame or data table.
- `names_from`: The column(s) from which the output column names to be obtained.
- `values_from`: The column(s) from which the output values to be obtained.
- `values_fn`: (Optional) Function to be applied to the output values.
- `showOverview`: Default TRUE displays the dimension of the wide table.

**Value**

A data frame of the transformed wide table.

**References**

This function makes use of the `pivot_wider` function within the **tidyr** package.
Examples

# Provide the standardized trait values per observation, together with species names
# and the georeferences of the sampling site (Latitude and Longitude), if available,
# in a wide table format. Several steps are necessary:

# 1. Select only the trait records that have standardized numeric values.
#    The complete.cases() is used to ensure the cases are complete, i.e. have no
#    missing values.
num_traits <- rtry_select_row(data_TRY_15160, 
    complete.cases(TraitID) & complete.cases(StdValue))

# 2. Select the relevant columns for transformation.
num_traits <- rtry_select_col(num_traits, 
    ObservationID, AccSpeciesID, AccSpeciesName, TraitID, TraitName, 
    StdValue, UnitName)

# 3. Extract the values of georeferences and the corresponding ObservationID.
lat <- rtry_select_anc(data_TRY_15160, 59)
lon <- rtry_select_anc(data_TRY_15160, 60)

# 4. Merge the relevant data frames based on the ObservationID using rtry_join_left().
num_traits_georef <- rtry_join_left(num_traits, lat, baseOn = ObservationID)
num_traits_georef <- rtry_join_left(num_traits_georef, lon, baseOn = ObservationID)

# 5. Perform wide table transformation of TraitID, TraitName and UnitName based on
#    ObservationID, AccSpeciesID and AccSpeciesName with cell values from StdValue.
#    If several records with StdValue were provided for one trait with the same
#    ObservationID, AccSpeciesID and AccSpeciesName, calculate their mean.
num_traits_georef_wider <- rtry_trans_wider(num_traits_georef, 
    names_from = c(TraitID, TraitName, UnitName),
    values_from = c(StdValue),
    values_fn = list(StdValue = mean))

# Expected messages:
# dim: 150 28
# dim: 150 7
# col: ObservationID AccSpeciesID AccSpeciesName TraitID TraitName
#      StdValue UnitName
# dim: 98 2
# col: ObservationID Latitude
# dim: 97 2
# col: ObservationID Longitude
# dim: 150 8
# col: ObservationID AccSpeciesID AccSpeciesName TraitID TraitName
#      StdValue UnitName Latitude

See Also

rtry_select_row, rtry_select_col, rtry_select_anc, rtry_join_left
# dim: 150 9
# col: ObservationID AccSpeciesID AccSpeciesName TraitID TraitName
#     StdValue UnitName Latitude Longitude
#
# dim: 146 7

# Learn more via the vignette (Workflow for general data preprocessing using rtry):
# vignette("rtry-workflow-general")
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