

Package ‘file2meco’

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Type Package

Title Transform Files to 'microtable' Object with 'microeco' Package

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Description Transform output files of some tools to the 'microtable' object of 'microtable' class in 'microeco' package. The 'microtable' class is the basic class in 'microeco' package and is necessary for the downstream microbial community data analysis.

URL <https://github.com/ChiLiubio/file2meco>

Depends R (>= 3.5.0)

Imports microeco (>= 1.2.0), ape, magrittr, dplyr, tidyr, yaml, rhdf5,
Matrix

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License GPL-3

LazyData true

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check_match_table	<i>Replace the names use match table</i>
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Description

Replace the names use match table

Usage

```
check_match_table(match_table = NULL, abund_new = NULL)
```

Arguments

match_table	default NULL; character or data.frame; matching table used.
abund_new	default NULL; data.frame; the abundance table used.

Value

new abundance table.

check_sample_table	<i>Read sample table</i>
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Description

Read sample table

Usage

```
check_sample_table(sample_table = NULL)
```

Arguments

sample_table	default NULL; character or data.frame; matching table used.
--------------	---

Value

sample information table.

CHOCOPhlan_taxonomy *The CHOCOPhlan_taxonomy data*

Description

The CHOCOPhlan_taxonomy data is used for the parsing the 'HUMAAAN' metagenomic results and add the taxonomy hierarchical information to the 'tax_table'.

Usage

data(CHOCOPhlan_taxonomy)

file2meco *Introduction to file2meco package*
 (Rhref<https://github.com/ChiLiubio/file2meco><https://github.com/ChiLiubio/file2meco>)

Description

For the detailed tutorial on the file2meco package, please follow the tutorial link in the github repository (<https://github.com/ChiLiubio/file2meco>)

Please open the help document by using help function or by clicking the following links collected:

[qiime1meco](#)

[qiime2meco](#)

[humann2meco](#)

[mpa2meco](#)

[ncyc2meco](#)

[phyloseq2meco](#)

[meco2phyloseq](#)

[vs2meco](#)

To report bugs or discuss questions, please use Github Issues (<https://github.com/ChiLiubio/file2meco/issues>).

Before creating a new issue, please read the guideline (https://chiliubio.github.io/microeco_tutorial/notes.html#github-issues).

To cite file2meco package in publications, please run the following command to get the reference:

```
citation("file2meco")
```

Reference:

Liu, C., Li, X., Mansoldo, F.R.P., An, J., Kou, Y., Zhang, X., Wang, J., Zeng, J., Vermelho, A.B., Yao, M., 2022. Microbial habitat specificity largely affects microbial co-occurrence patterns and functional profiles in wetland soils. *Geoderma* 418, 115866.

humann2meco

Transform 'HUMANn' metagenomic results to 'microtable' object.

Description

Transform 'HUMANn' metagenomic results to microtable object, reference: Franzosa et al. (2018) <doi:10.1038/s41592-018-0176-y>.

Usage

```
humann2meco(
  feature_table,
  db = c("MetaCyc", "KEGG", "gene")[1],
  sample_table = NULL,
  match_table = NULL,
  ...
)
```

Arguments

feature_table	file path of 'HUMANn' output abundance table; Please see the example.
db	default "MetaCyc"; one of "MetaCyc", "KEGG" or "gene"; "MetaCyc" or "KEGG" means the input feature table is pathway abundance. "gene" represents the abundance of genes, such as 'eggNOG', 'KO' and 'EC'. When using "gene", the generated tax_table has only taxonomic lineages and gene name, no higher functional levels.
sample_table	default NULL; sample metadata table; If provided, must be one of the several types of formats: 1) comma seperated file with the suffix csv or tab seperated file with suffix tsv or txt; 2) Excel type file with the suffix xlsx or xls; require readxl package to be installed; 3) data.frame object from R.
match_table	default NULL; a two column table used to replace the sample names in feature table; Must be two columns without column names; The first column must be raw sample names same with those in feature table, the second column must be new sample names same with the rownames in sample_table; Please also see the example files. If provided, must be one of the several types of formats: 1) comma seperated file with the suffix csv or tab seperated file with suffix tsv/txt; 2) Excel type file with the suffix xlsx or xls; require readxl package to be installed; 3) data.frame object from R.
...	parameter passed to microtable\$new function of microeco package, such as auto_tidy parameter.

Value

microtable object.

Examples

```

library(file2meco)
library(microeco)
library(magrittr)
sample_file_path <- system.file("extdata", "example_metagenome_sample_info.tsv",
  package="file2meco")
match_file_path <- system.file("extdata", "example_metagenome_match_table.tsv", package="file2meco")
# MetaCyc pathway examples
# use the raw data files stored inside the package for MetaCyc pathway database based analysis
abund_file_path <- system.file("extdata", "example_HUMAN_MetaCyc_abund.tsv", package="file2meco")
# the default db is "MetaCyc"
humann2meco(abund_file_path, db = "MetaCyc")
humann2meco(abund_file_path, db = "MetaCyc", sample_table = sample_file_path,
  match_table = match_file_path)
test <- humann2meco(abund_file_path, db = "MetaCyc", sample_table = sample_file_path,
  match_table = match_file_path)
test$tidy_dataset()
# rel = FALSE sum original abundance instead of relative abundance
test$cal_abund(select_cols = 1:3, rel = FALSE)
test$taxa_abund$Superclass1 %<>% .[!grepl("unclass", rownames(.)), ]
# use_percentage = FALSE disable percentage for relative abundance
test1 <- trans_abund$new(test, taxrank = "Superclass1", ntaxa = 10, use_percentage = FALSE)
# reassign ylab title instead of default 'Relative Abundance'
test1$ylabname <- "Abundance (RPK)"
# bar_type = "notfull" show original abundance instead of normalized 0-1
test1$plot_bar(facet = "Group", bar_type = "notfull")
# select both function and taxa
test$cal_abund(select_cols = c("Superclass1", "Phylum", "Genus"), rel = TRUE)
test1 <- trans_abund$new(test, taxrank = "Phylum", ntaxa = 10, delete_taxonomy_lineage = TRUE)
test1$plot_bar(facet = "Group")
test$taxa_abund$Phylum %<>% .[!grepl("unclass", rownames(.)), ]
test1 <- trans_abund$new(test, taxrank = "Phylum", ntaxa = 10, delete_taxonomy_lineage = FALSE)
test1$plot_bar(facet = "Group")
# functional biomarker
test$cal_abund(select_cols = 1:3, rel = TRUE)
test$taxa_abund$Superclass1 %<>% .[!grepl("unclass", rownames(.)), ]
test$taxa_abund$Superclass2 %<>% .[!grepl("unclass", rownames(.)), ]
test$taxa_abund$pathway %<>% .[!grepl("unclass", rownames(.)), ]
test1 <- trans_diff$new(test, method = "lefse", group = "Group")
test1$plot_diff_bar(use_number = 1:20)
# taxa biomarker
test$cal_abund(select_cols = 4:9, rel = TRUE)
test$taxa_abund$Phylum %<>% .[!grepl("unclass", rownames(.)), ]
test1 <- trans_diff$new(test, method = "lefse", group = "Group", p_adjust_method = "none")
test1$plot_diff_bar(threshold = 2)
#####
# KEGG pathway examples

```

```

abund_file_path <- system.file("extdata", "example_HUMANN_KEGG_abund.tsv", package="file2meco")
humann2meco(abund_file_path, db = "KEGG")
test <- humann2meco(abund_file_path, db = "KEGG",
  sample_table = sample_file_path, match_table = match_file_path)
test$tax_table %<>% subset(Level.1 != "unclassified")
test$tidy_dataset()
test$cal_abund(select_cols = 1:3, rel = FALSE)
# use_percentage = FALSE disable percentage for relative abundance
test1 <- trans_abund$new(test, taxrank = "Level.2", ntaxa = 10, use_percentage = FALSE)
# or use ggplot2::ylab to change ylab title
test1$ylabname <- "Abundance (RPK)"
test1$plot_bar(facet = "Group", bar_type = "notfull")
# select both function and taxa
test$cal_abund(select_cols = c("Level.1", "Phylum", "Genus"), rel = TRUE)
test1 <- trans_abund$new(test, taxrank = "Phylum", ntaxa = 10, delete_taxonomy_lineage = FALSE)
test1$plot_bar(facet = "Group")
# functional biomarker
test$cal_abund(select_cols = 1:3, rel = TRUE)
test1 <- trans_diff$new(test, method = "lefse", group = "Group")
test1$plot_diff_bar(threshold = 3)
# taxa biomarker
test$cal_abund(select_cols = 4:9, rel = TRUE)
test1 <- trans_diff$new(test, method = "lefse", group = "Group", p_adjust_method = "none")
test1$plot_diff_bar(threshold = 2)

```

meco2phyloseq

Transform 'microtable' object of 'microeco' package to the 'phyloseq' object of 'phyloseq' package.

Description

Transform 'microtable' object of 'microeco' package to the 'phyloseq' object of 'phyloseq' package.

Usage

```
meco2phyloseq(dataset)
```

Arguments

dataset a microtable object.

Value

phyloseq object.

Examples

```
## Not run:  
library(microeco)  
data("dataset")  
meco2phyloseq(dataset)  
  
## End(Not run)
```

MetaCyc_pathway_map *The MetaCyc_pathway_map data*

Description

The MetaCyc_pathway_map data is a manually curated 'MetaCyc' pathway hierarchical structure data. It is used for the parsing the 'HUMAaN' metagenomic abundance table associated with 'MetaCyc' database. Currently, only superclass 1, 2 and the pathway are used in this data.

Usage

```
data(MetaCyc_pathway_map)
```

metacyc_pathway_website
Get the website for a 'MetaCyc' pathway name

Description

Get the website for a 'MetaCyc' pathway name

Usage

```
metacyc_pathway_website(pathway = NULL)
```

Arguments

pathway default NULL; character vector; one or more MetaCyc pathway names.

Value

character vector.

Examples

```
metacyc_pathway_website("FOLSYN-PWY")
```

mpa2meco	<i>Transform metagenomic classification results of 'mpa' format to 'microtable' object.</i>
----------	---

Description

Transform the classification results of mpa (MetaPhlAn) format to microtable object, such as MetaPhlAn and Kraken2 results. Kraken2 results can be obtained by `merge_metaphlan_tables.py` from MetaPhlAn or `combine_mpa.py` from KrakenTools (<https://ccb.jhu.edu/software/krakentools/>). The algorithm of Kraken2 determines that the abundance of a taxon is not equal to the sum of abundances of taxa in its subordinate lineage. So the default tables in `taxa_abund` of return microtable object are extracted from the abundances of raw file. It is totally different with the return `taxa_abund` of `cal_abund` function, which sums the abundances of taxa at different taxonomic levels based on the taxonomic table and the `otu_table` (i.e., taxa abundance table at a specified level, e.g., 's__').

Usage

```
mpa2meco(
  feature_table,
  sample_table = NULL,
  match_table = NULL,
  use_level = "s__",
  ...
)
```

Arguments

<code>feature_table</code>	'mpa' format abundance table, see the example.
<code>sample_table</code>	default NULL; sample metadata table; If provided, must be one of the several types of formats: 1) comma separated file with the suffix <code>csv</code> or tab separated file with suffix <code>tsv/txt</code> ; 2) Excel type file with the suffix <code>xlsx</code> or <code>xls</code> ; require <code>readxl</code> package to be installed; 3) <code>data.frame</code> object from R.
<code>match_table</code>	default NULL; a two column table used to replace the sample names in abundance table; Must be two columns without column names; The first column must be raw sample names same with those in feature table, the second column must be new sample names same with the rownames in <code>sample_table</code> ; Please also see the example files.
<code>use_level</code>	default "s__"; the prefix parsed for the <code>otu_table</code> and <code>tax_table</code> ; must be one of 'd__', 'k__', 'p__', 'c__', 'o__', 'f__', 'g__' and 's__'.
...	parameter passed to <code>microtable\$new</code> function of <code>microeco</code> package, such as <code>auto_tidy</code> parameter.

Value

microtable object.

Examples

```

library(microeco)
library(file2meco)
library(magrittr)
# use Kraken2 file stored inside the package
abund_file_path <- system.file("extdata", "example_kraken2_merge.txt", package="file2meco")
mpa2meco(abund_file_path)
# add sample information table
sample_file_path <- system.file("extdata", "example_metagenome_sample_info.tsv",
  package="file2meco")
# sample names are different between abund_file_path and sample_file_path;
# use a matching table to adjust them
match_file_path <- system.file("extdata", "example_metagenome_match_table.tsv", package="file2meco")
test <- mpa2meco(abund_file_path, sample_table = sample_file_path,
  match_table = match_file_path, use_level = "s__")
# make the taxonomy standard for the following analysis
test$tax_table %<>% tidy_taxonomy
test$tidy_dataset()
# convert the data of default taxa_abund to relative abundance
test$taxa_abund %<>% lapply(function(x){apply(x, 2, function(y){y/sum(y)}})}
# calculate taxa_abund with specified level instead of raw kraken results
test1 <- clone(test)
test1$cal_abund()
identical(test$taxa_abund$Kingdom, test1$taxa_abund$Kingdom)

```

ncyc2meco

Transform 'NCycDB' or 'PCycDB' metagenomic abundance to 'microtable' object.

Description

Transform 'NCycDB' or 'PCycDB' metagenomic abundance to microtable object. The function can identify the mapping database according to the gene names of input feature abundance table. Reference: Qichao et al. (2019) <doi: 10.1093/bioinformatics/bty741> and Zeng et al. (2022) <doi: 10.1186/s40168-022-01292-1>.

Usage

```
ncyc2meco(feature_table, sample_table = NULL, match_table = NULL, ...)
```

Arguments

feature_table 'NCycDB' or 'PCycDB' output abundance table, see the example file.

sample_table default NULL; sample metadata table; If provided, must be one of the several types of formats: 1) comma separated file with the suffix csv or tab separated file with suffix tsv/txt; 2) Excel type file with the suffix xls/xlsx; require readxl

package to be installed; 3) data.frame object from R. A file path must be tab or comma separated file, generally, a file with suffix "tsv" or "csv".

`match_table` default NULL; a two column table used to replace the sample names in abundance table; Must be two columns without column names; The first column must be raw sample names same with those in feature table, the second column must be new sample names same with the rownames in `sample_table`; Please also see the example files. A file path must be tab or comma separated file, e.g. a file with suffix "tsv" or "csv".

... parameter passed to `microtable$new` function of `microeco` package, such as `auto_tidy` parameter.

Value

microtable object.

Examples

```
# NCycDB
abund_file_path <- system.file("extdata", "example_Ncyc_table.tsv", package="file2meco")
sample_file_path <- system.file("extdata", "example_metagenome_sample_info.tsv",
  package="file2meco")
match_file_path <- system.file("extdata", "example_metagenome_match_table.tsv", package="file2meco")
library(microeco)
library(file2meco)
library(magrittr)
ncyc2meco(abund_file_path)
test <- ncyc2meco(abund_file_path, sample_table = sample_file_path,
  match_table = match_file_path)
test$tidy_dataset()
# use split_group = TRUE to calculate the pathway abundance with multiple map correspondence
test$cal_abund(select_cols = 1, rel = TRUE, split_group = TRUE, split_column = "Pathway")
test$taxa_abund$Pathway %<>% .[!grepl("unclass", rownames(.)), ]
test1 <- trans_abund$new(test, taxrank = "Pathway")
test1$plot_bar(bar_type = "notfull")
# for gene abundance, no splitting on the Pathway
test$cal_abund(select_cols = 1:2, rel = TRUE, split_group = FALSE)
test$taxa_abund$Gene %<>% .[!grepl("unclass", rownames(.)), ]
test1 <- trans_abund$new(test, taxrank = "Gene")
test1$plot_bar(bar_type = "notfull")

# PCycDB
abund_file_path <- system.file("extdata", "example_Pcyc_table.tsv", package="file2meco")
test <- ncyc2meco(abund_file_path)
test$tidy_dataset()
# show pathway abundance
test$cal_abund(select_cols = 1, rel = TRUE, split_group = TRUE, split_by = "&&",
  split_column = "Pathway")
test$taxa_abund$Pathway %<>% .[!grepl("unclass|Others", rownames(.)), ]
test1 <- trans_abund$new(test, taxrank = "Pathway")
test1$plot_bar(bar_type = "notfull")
```

```
# show gene abundance
test$cal_abund(select_cols = 2, rel = TRUE, split_group = FALSE)
test$taxa_abund$Gene %<>% .[!grepl("unclass", rownames(.)), ]
test1 <- trans_abund$new(test, taxrank = "Gene")
test1$plot_bar(bar_type = "notfull")
```

ncyc_map

The ncyc_map data

Description

The ncyc_map data is used for the parsing the 'NCycDB' metagenomic results and add the N cycle pathway information to the 'tax_table' of 'microtable' object.

Usage

```
data(ncyc_map)
```

pcyc_map

The pcyc_map data

Description

The pcyc_map data is used for the parsing the 'PCycDB' metagenomic results and add the P cycle pathway information to the 'tax_table' of 'microtable' object.

Usage

```
data(pcyc_map)
```

phyloseq2meco

Transform the 'phyloseq' object of 'phyloseq' package to 'microtable' object of 'microeco' package.

Description

Transform the 'phyloseq' object of 'phyloseq' package to 'microtable' object of 'microeco' package.

Usage

```
phyloseq2meco(physeq, ...)
```

Arguments

physeq a phyloseq object.
 ... parameter passed to `microtable$new` function of `microeco` package, such as `auto_tidy` parameter.

Value

microtable object.

Examples

```
## Not run:
library(phyloseq)
data("GlobalPatterns")
phyloseq2meco(GlobalPatterns)

## End(Not run)
```

qiime1meco

Transform 'QIIME' results to 'microtable' object.

Description

Transform 'QIIME' results to microtable object. The QIIME results refer in particular to the files of qiime1 software.

Usage

```
qiime1meco(
  feature_table,
  sample_table = NULL,
  match_table = NULL,
  phylo_tree = NULL,
  rep_fasta = NULL,
  ...
)
```

Arguments

feature_table the otu table generated from 'QIIME'. Taxonomic information should be in the end of the file.

sample_table default NULL; sample metadata table; If provided, must be one of the several types of formats: 1) comma separated file with the suffix `csv` or tab separated file with suffix `tsv/txt`; 2) Excel type file with the suffix `xlsx` or `xls`; require `readxl` package to be installed; 3) `data.frame` object from R.

match_table	default NULL; a two column table used to replace the sample names in feature table; Must be two columns without column names; The first column must be raw sample names same with those in feature table, the second column must be new sample names same with the rownames in sample_table; Please also see the example files. If provided, must be one of the several types of formats: 1) comma seperated file with the suffix csv or tab seperated file with suffix tsv/txt; 2) Excel type file with the suffix xlsx or xls; require readxl package to be installed; 3) data.frame object from R.
phylo_tree	default NULL; the phylogenetic tree; generally, a file with suffix "tre".
rep_fasta	default NULL; the representative sequences; a fasta file, generally with suffix "fasta" or "fna" or "fa".
...	parameter passed to microtable\$new function of microeco package, such as auto_tidy parameter.

Value

microtable object.

Examples

```
## Not run:
# use the raw data files stored inside the package
otu_file_path <- system.file("extdata", "otu_table_raw.txt", package="file2meco")
sample_file_path <- system.file("extdata", "sample_info.csv", package="file2meco")
phylo_file_path <- system.file("extdata", "rep_phylo.tre", package="file2meco")
rep_fasta_path <- system.file("extdata", "rep.fna", package="file2meco")
qiime1meco(otu_file_path, sample_table = sample_file_path)
qiime1meco(otu_file_path, sample_table = sample_file_path,
  phylo_tree = phylo_file_path)
qiime1meco(otu_file_path, sample_table = sample_file_path,
  phylo_tree = phylo_file_path, rep_fasta = rep_fasta_path)

## End(Not run)
```

qiime2meco

Transform 'QIIME2' results to 'microtable' object.

Description

Transform 'QIIME2' qza results to microtable object.

Usage

```
qiime2meco(
  feature_table,
  sample_table = NULL,
  match_table = NULL,
  taxonomy_table = NULL,
  phylo_tree = NULL,
  rep_fasta = NULL,
  ...
)
```

Arguments

<code>feature_table</code>	the ASV abundance data with qza format, such as the 'data2_table.qza' in the example.
<code>sample_table</code>	default NULL; the sample metadata table; four types of formats are available: 1) q2-type tab separated file of QIIME2, such as the 'sample-metadata.tsv' in the example; 2) comma separated file with the suffix csv or tab separated file with suffix tsv or txt; 3) Excel type file with the suffix xlsx or xls; require readxl package to be installed; 4) data.frame object from R.
<code>match_table</code>	default NULL; a two column table used to replace the sample names in feature table; Must be two columns without column names; The first column must be raw sample names same with those in feature table, the second column must be new sample names same with the rownames in sample_table; Please also see the example files. If provided, must be one of the several types of formats: 1) comma separated file with the suffix csv or tab separated file with suffix tsv or txt; 2) Excel type file with the suffix xlsx or xls; require readxl package to be installed; 3) data.frame object from R.
<code>taxonomy_table</code>	default NULL; the taxonomy assignment data with qza format, such as the 'taxonomy.qza' in the example.
<code>phylo_tree</code>	default NULL; the phylogenetic tree with qza format, such as the 'tree.qza' in the example.
<code>rep_fasta</code>	default NULL; the representative sequences with qza format, such as the 'data2_rep_set.qza' in the example.
<code>...</code>	parameter passed to <code>microtable\$new</code> function of <code>microeco</code> package, such as <code>auto_tidy</code> parameter.

Value

microtable object.

Examples

```
## Not run:
# The data files is downloaded from https://docs.qiime2.org/2020.8/tutorials/pd-mice/
# and stored inside the package.
abund_file_path <- system.file("extdata", "dada2_table.qza", package="file2mecoco")
sample_file_path <- system.file("extdata", "sample-metadata.tsv", package="file2mecoco")
taxonomy_file_path <- system.file("extdata", "taxonomy.qza", package="file2mecoco")
qiime2mecoco(abund_file_path)
qiime2mecoco(abund_file_path, sample_table = sample_file_path)
qiime2mecoco(abund_file_path, sample_table = sample_file_path,
  taxonomy_table = taxonomy_file_path)

## End(Not run)
```

vs2mecoco

Transform viromescan results to 'microtable' object.

Description

Transform the results of viromescan software to microtable object. The output of viromescan is single file for each sample. All the results are needed to be merged and adjusted (for several chaotic taxonomy). The input should be the 'count' tables at Species level, i.e. Species_level_results-Counts.txt. For more details, please see the reference <DOI: 10.1186/s12864-016-2446-3>.

Usage

```
vs2mecoco(input_dir, sample_table = NULL, match_table = NULL, ...)
```

Arguments

input_dir	the input directory, containing all the result folders for each sample. Each folder should be named by the sample name.
sample_table	default NULL; sample metadata table; If provided, must be one of the several types of formats: 1) comma separated file with the suffix csv or tab separated file with suffix tsv/txt; 2) Excel type file with the suffix xlsx or xls; require readxl package to be installed; 3) data.frame object from R.
match_table	default NULL; a two column table used to replace the sample names in abundance table; Must be two columns without column names; The first column must be raw sample names same with those in feature table, the second column must be new sample names same with the rownames in sample_table; Please also see the example files.
...	parameter passed to microtable\$new function of microeco package, such as auto_tidy parameter.

Value

microtable object.

Examples

```
library(microeco)
library(file2meco)
# use viromescan directory inside the package
dir_path <- system.file("extdata", "viromescan", package="file2meco")
d1 <- vs2meco(dir_path)
d1$cal_abund()
# d1$taxa_abund$Family is same with the percentage output of viromescan at
# Family level, i.e. Family_level_results-%.txt file
d1$cal_abund(rel = FALSE)
# d1$taxa_abund$Family is same with the count output of viromescan at
# Family level, i.e. Family_level_results-Counts.txt file
```


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