

Package ‘Rbec’

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Type Package

Title Rbec: a tool for analysis of amplicon sequencing data from synthetic microbial communities

Version 1.17.0

Description Rbec is a adapted version of DADA2 for analyzing amplicon sequencing data from synthetic communities (SynComs), where the reference sequences for each strain exists. Rbec can not only accurately profile the microbial compositions in SynComs, but also predict the contaminants in SynCom samples.

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Imports Rcpp (>= 1.0.6), dada2, ggplot2, readr, doParallel, foreach, grDevices, stats, utils

LinkingTo Rcpp

RoxygenNote 7.1.1

biocViews Sequencing, MicrobialStrain, Microbiome

Suggests knitr, rmarkdown

VignetteBuilder knitr

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Contam_detect

Reference-based error correction of amplicon sequencing data

Description

This function is designed for predicting the contaminated samples

Usage

```
Contam_detect(log_file, outdir, outlier_constant=1.5)
```

Arguments

| | |
|------------------|-----------------------------------------------------------------------------------|
| log_file | the file contains a list of log files of each sample outputted with Rbec function |
| outdir | output directory |
| outlier_constant | the multiplier of variance to define the outlier |

Details

Ruben Garrido-Oter's group, Plant-Microbe interaction, Max Planck Institute for Plant Breeding Research

Value

Returns a plot showing the distribution of percentage of corrected reads across the whole sample set and a summary file recording which samples might be contaminated

Author(s)

Pengfan Zhang

Examples

```
#log_file <- system.file("extdata", "rbec_test.list", package = "Rbec")
log_path <- list.files(paste(path.package("Rbec"),
  "extdata/contamination_test", sep="/"),
  recursive=TRUE, full.names=TRUE)
log_file <- tempfile()
writeLines(log_path, log_file)
Contam_detect(log_file, tempdir())
```

Rbec

Reference-based error correction of amplicon sequencing data

Description

This function corrects the amplicon sequencing data from synthetic communities where the reference sequences are known a priori

Usage

```
Rbec(fastq, reference, outdir, threads=1, sampling_size=5000, ascii=33, min_cont_obs_abd=200, min_
```

Arguments

| | |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| fastq | the path of the fastq file containing merged amplicon sequencing reads (Ns are not allowed in the reads) |
| reference | the path of the unique reference sequences, each sequence must be in one line (Ns are not allowed in the sequences) |
| outdir | the output directory, which should be created by the user |
| threads | the number of threads used, default 1 |
| sampling_size | the sampling size for calculating the error matrix, default 5000 |
| ascii | ascii characters used to encode phred scores (33 or 64), default 33 |
| min_cont_obs_abd | the minimum observed abundance of unique tags for detecting contamination sequences, default 200 |
| min_cont_abd | the relative abundance of unique tags for detecting contamination sequences that can't be corrected by any of the references, default 0.03 |
| min_E | the minimum expectation of the Poisson distribution for the identification of paralogues, default 0.05 |
| min_P | the minimum P value threshold of the Poisson distribution to correct a read, default 1e-40 |
| ref_seeker | the method for finding the candidate error-producing reference sequence for a tag showing identical lowest K-mer distance to multiple references. 1 for the abundance-based method; 2 for the transition probability-based method, default 1. |
| cn | the copy number table documenting the copy number of the marker gene in each strain. Rbec will normalize the strain abundance if the copy number is available |

Details

Ruben Garrido-Oter's group, Plant-Microbe interaction, Max Planck Institute for Plant Breeding Research

Value

lambda_final.out the lambda value and pvalue of the Poisson distribution for each read
error_matrix_final.out the error matrix in the final iteration
strain_table.txt the strain composition of the sample
strain_table_normalized.txt the copy-number-normalized strain composition of the sample if the copy number table is provided
contamination_seq.fna the potential sequences generated by contaminants
rbec.log percentage of corrected reads, which can be used to predict contaminated samples
paralogue_seq.fna paralogue sequences found in each strain except for the reference provided

Author(s)

Pengfan Zhang

Examples

```
fastq <- system.file("extdata", "test_raw_merged_reads.fastq.gz", package = "Rbec")  
ref <- system.file("extdata", "test_ref.fasta", package = "Rbec")  
Rbec(fastq=fastq, reference=ref, outdir=tempdir(), threads=1, sampling_size=500, ascii=33)
```

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