

Package ‘scfind’

February 21, 2019

Type Package

Title A search tool for single cell RNA-seq data by gene lists

Version 1.4.1

Author Vladimir Kiselev

Maintainer Vladimir Kiselev <vladimir.yu.kiselev@gmail.com>

Description Recently a very large collection of single-cell RNA-seq (scRNA-seq) datasets has been generated and publicly released. For the collection to be useful, the information must be organized in a way that supports queries that are relevant to researchers. `scfind` builds an index from scRNA-seq datasets which organizes the information in a suitable and compact manner so that the datasets can be very efficiently searched for either cells or cell types in which a given list of genes is expressed.

License GPL-3

Imports SingleCellExperiment, SummarizedExperiment, methods, stats, bit, dplyr, hash, reshape2, Rcpp(>= 0.12.12)

LinkingTo Rcpp

Depends R(>= 3.4)

Encoding UTF-8

LazyData true

RoxygenNote 6.0.1

Suggests knitr, rmarkdown, testthat

VignetteBuilder knitr

biocViews ImmunoOncology, SingleCell, Software, RNASeq, Transcriptomics, DataRepresentation, Transcription, Sequencing, GeneExpression

NeedsCompilation no

URL <https://github.com/hemberg-lab/scfind>

BugReports <https://support.bioconductor.org/t/scfind/>

git_url <https://git.bioconductor.org/packages/scfind>

git_branch RELEASE_3_8

git_last_commit 69ba6c2

git_last_commit_date 2019-01-04

Date/Publication 2019-02-20

R topics documented:

ann	2
buildCellIndex	2
buildCellTypeIndex	3
findCell	4
findCellType	5
yan	6

Index	7
--------------	----------

ann	<i>Cell type annotations for data extracted from a publication by Yan et al.</i>
-----	--

Description

Cell type annotations for data extracted from a publication by Yan et al.

Usage

```
ann
```

Format

An object of class `data.frame` with 90 rows and 1 columns.

Source

<http://dx.doi.org/10.1038/nsmb.2660>

Each row corresponds to a single cell from 'yan' dataset

buildCellIndex	<i>Build a cell Index</i>
----------------	---------------------------

Description

Creates a compressed cell Index

Usage

```
buildCellIndex(object = NULL, cell_type_column = "cell_type1")
```

```
buildCellIndex.SCESet(object, cell_type_column)
```

```
## S4 method for signature 'SingleCellExperiment'
buildCellIndex(object = NULL,
  cell_type_column = "cell_type1")
```

Arguments

object object of SingleCellExperiment class containing the cell classification information

cell_type_column column name in the colData slot of the object SingleCellExperiment containing the cell classification information

Value

a 'data.frame' containing calculated gene index

Examples

```
library(SingleCellExperiment)
sce <- SingleCellExperiment(assays = list(normcounts = as.matrix(yan)), colData = ann)
# this is needed to calculate dropout rate for feature selection
# important: normcounts have the same zeros as raw counts (fpkm)
counts(sce) <- normcounts(sce)
logcounts(sce) <- log2(normcounts(sce) + 1)
# use gene names as feature symbols
rowData(sce)$feature_symbol <- rownames(sce)
isSpike(sce, 'ERCC') <- grepl('^ERCC-', rownames(sce))
# remove features with duplicated names
sce <- sce[!duplicated(rownames(sce)), ]
index <- buildCellIndex(sce)
```

buildCellTypeIndex *Build a cell type Index*

Description

Calculates a fraction of expressed cells per gene per cell type

Usage

```
buildCellTypeIndex(object = NULL, cell_type_column = "cell_type1")
```

```
buildCellTypeIndex.SCESet(object, cell_type_column)
```

```
## S4 method for signature 'SingleCellExperiment'
buildCellTypeIndex(object = NULL,
  cell_type_column = "cell_type1")
```

Arguments

object object of SingleCellExperiment class

cell_type_column column name in the colData slot of the object SingleCellExperiment containing the cell classification information

Value

a 'data.frame' containing calculated gene index

Examples

```
library(SingleCellExperiment)
sce <- SingleCellExperiment(assays = list(normcounts = as.matrix(yan)), colData = ann)
# this is needed to calculate dropout rate for feature selection
# important: normcounts have the same zeros as raw counts (fpkm)
counts(sce) <- normcounts(sce)
logcounts(sce) <- log2(normcounts(sce) + 1)
# use gene names as feature symbols
rowData(sce)$feature_symbol <- rownames(sce)
isSpike(sce, 'ERCC') <- grepl('^ERCC-', rownames(sce))
# remove features with duplicated names
sce <- sce[!duplicated(rownames(sce)), ]
index <- buildCellTypeIndex(sce)
```

findCell

Find cells associated with a given gene list

Description

Calculates p-values of a log-likelihood of a list of genes to be associated with each cell type. Log-likelihood is based on gene expression values.

Usage

```
findCell(input = NULL, genelist = NULL)
```

```
findCell.SCESet(input, genelist)
```

```
## S4 method for signature 'list'
```

```
findCell(input = NULL, genelist = NULL)
```

Arguments

input object of SingleCellExperiment class

genelist column name in the colData slot of the object SingleCellExperiment containing the cell classification information

Value

a 'list' containing calculated gene index

Examples

```

library(SingleCellExperiment)
sce <- SingleCellExperiment(assays = list(normcounts = as.matrix(yan)), colData = ann)
# this is needed to calculate dropout rate for feature selection
# important: normcounts have the same zeros as raw counts (fpkm)
counts(sce) <- normcounts(sce)
logcounts(sce) <- log2(normcounts(sce) + 1)
# use gene names as feature symbols
rowData(sce)$feature_symbol <- rownames(sce)
isSpike(sce, 'ERCC') <- grepl('^ERCC-', rownames(sce))
# remove features with duplicated names
sce <- sce[!duplicated(rownames(sce)), ]
index <- buildCellIndex(sce)
res <- findCell(index, genelists = c('SOX6', 'SNAI3'))

```

findCellType

Find cell types associated with a given gene list

Description

Calculates p-values of a log-likelihood of a list of genes to be associated with each cell type. Log-likelihood is based on gene expression values.

Usage

```

findCellType(gene_index = NULL, gene_list = NULL)

findCellType.data.frame(gene_index, gene_list)

## S4 method for signature 'data.frame'
findCellType(gene_index = NULL, gene_list = NULL)

```

Arguments

gene_index	a data.frame with cell types in columns and genes in rows
gene_list	genes that need to be searched in the gene_index

Value

a named numeric vector containing p-values

Examples

```

library(SingleCellExperiment)
sce <- SingleCellExperiment(assays = list(normcounts = as.matrix(yan)), colData = ann)
# this is needed to calculate dropout rate for feature selection
# important: normcounts have the same zeros as raw counts (fpkm)
counts(sce) <- normcounts(sce)
logcounts(sce) <- log2(normcounts(sce) + 1)
# use gene names as feature symbols
rowData(sce)$feature_symbol <- rownames(sce)
isSpike(sce, 'ERCC') <- grepl('^ERCC-', rownames(sce))

```

```
# remove features with duplicated names
sce <- sce[!duplicated(rownames(sce)), ]
index <- buildCellTypeIndex(sce)
res <- findCellType(index, gene_list = c('SOX6', 'SNAI3'))
```

yan

Single cell RNA-Seq data extracted from a publication by Yan et al.

Description

Single cell RNA-Seq data extracted from a publication by Yan et al.

Usage

yan

Format

An object of class `data.frame` with 20214 rows and 90 columns.

Source

<http://dx.doi.org/10.1038/nsmb.2660>

Columns represent cells, rows represent genes expression values.

Index

*Topic **datasets**

ann, [2](#)

yan, [6](#)

ann, [2](#)

buildCellIndex, [2](#)

buildCellIndex, SingleCellExperiment-method
(buildCellIndex), [2](#)

buildCellIndex.SCESet (buildCellIndex),
[2](#)

buildCellTypeIndex, [3](#)

buildCellTypeIndex, SingleCellExperiment-method
(buildCellTypeIndex), [3](#)

buildCellTypeIndex.SCESet

(buildCellTypeIndex), [3](#)

findCell, [4](#)

findCell, list-method (findCell), [4](#)

findCell.SCESet (findCell), [4](#)

findCellType, [5](#)

findCellType, data.frame-method
(findCellType), [5](#)

findCellType.data.frame (findCellType),
[5](#)

yan, [6](#)