Package ‘NetActivity’

May 28, 2024

Type Package

Title Compute gene set scores from a deep learning framework

Version 1.6.0

Description

#' NetActivity enables to compute gene set scores from previously trained sparsely-connected autoencoders. The package contains a function to prepare the data (`prepareSummarizedExperiment`) and a function to compute the gene set scores (`computeGeneSetScores`). The package `NetActivityData` contains different pre-trained models to be directly applied to the data. Alternatively, the users might use the package to compute gene set scores using custom models.

License MIT + file LICENSE

Encoding UTF-8

LazyData false

Depends R (>= 4.1.0)

Suggests AnnotationDbi, BiocStyle, Fletcher2013a, knitr, org.Hs.eg.db, markdown, testthat (>= 3.0.0), tidyverse

Config/testthat/edition 3

biocViews RNASeq, Microarray, Transcription, FunctionalGenomics, GO, GeneExpression, Pathways, Software

RoxygenNote 7.2.1

Imports airway, DelayedArray, DelayedMatrixStats, DESeq2, methods, methods, NetActivityData, SummarizedExperiment, utils

VignetteBuilder knitr

git_url https://git.bioconductor.org/packages/NetActivity
git_branch RELEASE_3_19
git_last_commit 218f656
git_last_commit_date 2024-04-30

Repository Bioconductor 3.19

Date/Publication 2024-05-27
computeGeneSetScores

Author Carlos Ruiz-Arenas [aut, cre]
Maintainer Carlos Ruiz-Arenas <carlos.ruiza@upf.edu>

Contents

computeGeneSetScores ........................................... 2
NetActivity ......................................................... 3
prepareSummarizedExperiment ................................. 3

Index

5

computeGeneSetScores  Compute gene set scores

Description

This function will compute the gene set scores using gene weights previously computed. The package `NetActivityData` contains different pre-trained models that can be used to compute the gene set scores. Models included in `NetActivityData` also includes gene set annotation.

Usage

computeGeneSetScores(SE, model, annot = NULL)

Arguments

SE A `SummarizedExperiment`
model A string matching a model in `NetActivityData` or a custom matrix.
annot A `data.frame` with the gene set annotation, only when using a custom model.

Details

This function can also compute the gene set scores for a model not present in `NetActivityData`. In this case, `model` should be a matrix where the columns are the genes and the rows the gene sets. When using a custom model, we can add the gene set annotation using the `annot` parameter.

Notice that the function will not accept raw count data. We recommend to convert count data to continuous values using the Variant Stabilization Transformation from [DESeq2::varianceStabilizingTransformation].

Value

A `SummarizedExperiment` with the gene set scores.
NetActivity

Examples

library(airway)
data(airway)
ddsSE <- DESeq2::DESeqDataSet(airway, design = ~ cell + dex)
vst <- DESeq2::varianceStabilizingTransformation(ddsSE)
out <- prepareSummarizedExperiment(vst, "gtex_gokegg")
scores <- computeGeneSetScores(out, "gtex_gokegg")

NetActivity

NetActivity: compute gene set scores from a deep learning framework

Description

NetActivity enables to compute gene set scores from previously trained sparsely-connected autoen-coders. The package contains a function to prepare the data ('prepareSummarizedExperiment') and a function to compute the gene set scores ('computeGeneSetScores'). The package 'NetActivity-Data' contains different pre-trained models to be directly applied to the data. Alternatively, the users might use the package to compute gene set scores using custom models.

prepareSummarizedExperiment

Prepare a SummarizedExperiment for computing gene set scores computation

Description

This function will prepare the data for the computation of gene set scores. The function will perform two steps. First, the function will check whether the genes present in the trained model are present in the input ‘SummarizedExperiment’. Missing genes will be set to 0 for all samples. Second, the function will standardize the gene expression values, so gene values have a mean of 0 and a standard deviation of 1.

Usage

prepareSummarizedExperiment(SE, model)

Arguments

SE A ‘SummarizedExperiment’
model A string matching a model in ‘NetActivityData’ or a custom matrix.

Details

Notice that the function will not accept raw count data. We recommend to convert count data to continuous values using the Variant Stabilization Transformation from [DESeq2::varianceStabilizingTransformation]. This function can also prepare the data for a model not present in ‘NetActivityData’. In this case, ‘param’ should be a matrix where the columns are the genes and the rows the gene sets.
Value

A ‘SummarizedExperiment’ with the data prepared for gene set score computation with ‘computeGeneSetScores’

Examples

```r
library(airway)
data(airway)
ddsSE <- DESeq2::DESeqDataSet(airway, design = ~ cell + dex)
vst <- DESeq2::varianceStabilizingTransformation(ddsSE)
out <- prepareSummarizedExperiment(vst, "gtex_gokegg")
```
Index

computeGeneSetScores, 2
NetActivity, 3
prepareSummarizedExperiment, 3