Package ‘SLIDE’

October 12, 2022

**Title**  Single Cell Linkage by Distance Estimation is SLIDE

**Version**  1.0.0

**Description**  This statistical method uses the nearest neighbor algorithm to estimate absolute distances between single cells based on a chosen constellation of surface proteins, with these distances being a measure of the similarity between the two cells being compared. Based on Sen, N., Mukherjee, G., and Arvin, A.M. (2015) <DOI:10.1016/j.ymeth.2015.07.008>.

**Depends**  R (>= 3.4.0)

**License**  GPL-3

**Encoding**  UTF-8

**LazyData**  true

**RoxygenNote**  6.0.1

**Suggests**  knitr, rmarkdown

**VignetteBuilder**  knitr

**NeedsCompilation**  no

**Author**  Gourab Mukherjee [aut],
           Arjun Panda [aut, cre],
           Ann Arvin [aut],
           Adrish Sen [aut],
           Nandini Sen [aut]

**Maintainer**  Arjun Panda <arjunpanda@gwu.edu>

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**bootstrap_cutoff**  
*Bootstrap Cutoff for SLIDE*

**Description**

Bootstrap Cutoff for SLIDE

**Usage**

`bootstrap_cutoff(uninfected, fraction = 0.1, iter = 20, level = 0.05)`

**Arguments**

- `uninfected`: A dataframe of protein expression levels in an uninfected subset of cells. All columns must be numeric expression levels.
- `fraction`: Fraction of uninfected cells used for the SLIDE bootstrap. This value should reflect the size of the infected cell population relative to the uninfected cell population. Must be between >0 and <=0.2. Default is 0.1.
- `iter`: Iterations of the SLIDE bootstrap. Default is 20.
- `level`: Alpha level to determine cutoff for a significant mean distance ratio. Default is 0.05.

**Value**

This function bootstraps a cutoff for the mean distance ratio from the uninfected cell population by running the SLIDE procedure on a random subset of uninfected cells a specified number of times (default 20x). Only to be used if our pre-determined value of 1.2 is insufficient. Depending on how large the uninfected dataset is, this function may take many hours to complete.

**References**


**Examples**

```r
cutoff <- bootstrap_cutoff(uninfected = UN_sig, fraction = (nrow(I_sig)/nrow(UN_sig)), iter=1)
cutoff
```
I_sig

Protein Expression Levels in an Infected Cell Sample

Description

Simulated data from an experiment measuring viral reprogramming of lymphocyte surface proteins. These cells demonstrate evidence for significant reprogramming (see vignette for example).

Usage

I_sig

Format

An object of class data.frame with 38 rows and 7 columns.

slide

Single Cell Linkage by Distance Estimation is SLIDE

Description

Single Cell Linkage by Distance Estimation is SLIDE

Usage

slide(infected, uninfected, cutoff = 1.2)

Arguments

infected A dataframe of protein expression levels in an infected subset of cells. All columns must be numeric expression levels.

uninfected A dataframe of protein expression levels in uninfected cells. All columns must be numeric expression levels. This can be interpreted as the population of cells, of which the infected cells are a subset.

cutoff This is the fold-change in distances being tested from an infected cell to its nearest uninfected and infected cell. The default value is 1.2. Determine an exact value using the bootstrap_cutoff function.

Value

A list with containing five items. Non-parametric testing of up or downregulation in protein expression between the infected and uninfected cells, for both balanced and unbalanced comparisons. Three, it returns a boxplot mirroring these results. Four, the SLIDE Wilcoxon Rank Sum test results for evidence of cellular remodeling in the infected cells. Fifth, the mean ratio of the distances from each infected cell to its nearest uninfected cell and nearest infected cell.
References


Examples

slide(l_sig, UN_sig)

| UN_sig | Protein Expression Levels in an Uninfected Cell Population |

Description

Simulated data from an experiment measuring viral reprogramming of lymphocyte surface proteins. These cells represent the uninfected cell population to which the infected cells will be compared to.

Usage

UN_sig

Format

An object of class data.frame with 781 rows and 7 columns.
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