Package 'stepdownfdp'

July 23, 2025

Title A Step-Down Procedure to Control the False Discovery Proportion

Version 1.0.0

Description Provides a step-down procedure for controlling the False Discovery Proportion (FDP) in a competition-based setup, implementing Dong et al. (2020) <doi:10.48550/arXiv.2011.11939>. Such setups include target-decoy competition (TDC) in computational mass spectrometry and the knockoff construction in linear regression.

License MIT + file LICENSE

Encoding UTF-8

RoxygenNote 7.1.2

URL https://github.com/uni-Arya/stepdownfdp

Imports pracma, stats

NeedsCompilation no

Author Arya Ebadi [aut, cre],
Dong Luo [aut],
Kristen Emery [aut],
Yilun He [aut],
William Stafford Noble [aut],
Uri Keich [aut] (ORCID: <https://orcid.org/0000-0002-3209-5011>)

Maintainer Arya Ebadi <aeba3842@uni.sydney.edu.au>

Repository CRAN

Date/Publication 2022-03-16 12:50:02 UTC

Contents

fdp_sd *Convert winning scores and labels into discoveries*

Description

fdp_sd takes the output of mirandom and additional statistical parameters to return the indices and winning scores of hypotheses that were rejected.

Usage

```
fdp_sd(
  scores_and_labels,
  alpha,
  conf,
  c = 0.5,
  lambda = 0.5,
  procedure = "standard"
)
```

Arguments

scores_and_labels	An m x 2 matrix obtained via mirandom.
alpha	An FDP threshold.
conf	To control the FDP with 1 - conf confidence.
c	Determines the ranks of the target score that are considered winning. Defaults to c = 0.5 for single-decoy FDP-SD.
lambda	Determines the ranks of the target score that are considered losing. Defaults to lambda = 0.5 for single-decoy FDP-SD.
procedure	Takes a value of "standard" (for non-randomised FDP-SD) or "coinflip" (for randomised FDP-SD).

Value

A list of 2 objects: the winning scores (discoveries) and indices (discoveries_ind) of rejected hypotheses.

Examples

```
set.seed(123)
target_scores <- rnorm(200, mean = 1.5)
decoy_scores <- matrix(rnorm(600, mean = 0), ncol = 3)
scores <- cbind(target_scores, decoy_scores)
scores_and_labels <- mirandom(scores)
fdp_sd(scores_and_labels, alpha = 0.1, conf = 0.1)
```

`mirandom` *Convert target/decoy scores into winning scores and labels*

Description

`mirandom` takes a collection of target and decoy scores for m hypotheses and returns a winning score and label attached to each. The argument `scores` must be organised in an m x (d + 1) matrix, where d is the number of decoy scores. The first column of `scores` must contain the target scores.

Usage

```
mirandom(scores, c = 0.5, lambda = 0.5)
```

Arguments

`scores`	An m x (d + 1) matrix where m is the number of hypothesis and d is the number of decoy scores for each hypothesis. The first column of `scores` are target scores and subsequent columns are decoy scores.
`c`	Determines the ranks of the target score that are considered winning. Defaults to `c = 0.5` for single-decoy FDP-SD.
`lambda`	Determines the ranks of the target score that are considered losing. Defaults to `lambda = 0.5` for single-decoy FDP-SD.

Value

A m x 2 matrix where m is the number of hypotheses. The first column contains the winning scores and the second column contains the corresponding labels.

Examples

```
target_scores <- rnorm(200, mean = 1.5)
decoy_scores <- matrix(rnorm(600, mean = 0), ncol = 3)
scores <- cbind(target_scores, decoy_scores)
mirandom(scores)
```

Index