

# Package ‘bayefdr’

July 30, 2020

**Type** Package

**Title** Bayesian Estimation and Optimisation of Expected False Discovery Rate

**Version** 0.1.0

**Date** 2020-07-24

**Description** Implements the Bayesian FDR control described by Newton et al. (2004), <doi:10.1093/biostatistics/5.2.155>. Allows optimisation and visualisation of expected error rates based on tail posterior probability tests. Based on code written by Catalina Vallejos for BASiCS, see Beyond comparisons of means: understanding changes in gene expression at the single-cell level Vallejos et al. (2016) <doi:10.1186/s13059-016-0930-3>.

**Imports** ggplot2, reshape2, assertthat, utils, stats

**License** GPL-3

**BugReports** <https://github.com/VallejosGroup/bayefdr/issues>

**RoxygenNote** 7.1.1

**Encoding** UTF-8

**Suggests** testthat

**NeedsCompilation** no

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**Repository** CRAN

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bayefdr-package	<i>The 'nibbles' package.</i>
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### Description

A DESCRIPTION OF THE PACKAGE

### References

Detecting differential gene expression with a semiparametric hierarchical mixture method Michael A. Newton, Amine Noueiry, Deepayan Sarkar, Paul Ahlquist <https://doi.org/10.1093/biostatistics/5.2.155>

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efdr	<i>EFDR and EFNR estimation</i>
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### Description

Calculate the Expected False Discovery Rate (EFDR) or Expected False Negative Rate (EFNR) in a vector of probabilities, given a specified evidence threshold.

### Usage

```
efdr(evidence_threshold, probs)
```

```
efnr(evidence_threshold, probs)
```

### Arguments

evidence\_threshold  
Scalar value specifying the evidence threshold at which the EFDR or EFNR should be evaluated.

probs  
Vector of probabilities.

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efdr_search	<i>Bayesian EFDR optimisation.</i>
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## Description

Given a vector of probabilities, this function finds the probability threshold that matches a target expected false discovery rate as closely as possible.

## Usage

```
efdr_search(  
  probs,  
  target_efdr,  
  min_threshold = 0.7,  
  prob_thresholds = seq(0.5, 0.9995, by = 0.00025)  
)
```

## Arguments

probs	Vector of probabilities.
target_efdr	Numeric scalar specifying the expected false discovery rate to match.
min_threshold	Minimum probability threshold. If the optimal probability threshold is below this number, it is rejected and min_threshold is used instead.
prob_thresholds	Vector for probability thresholds to scan, with the aim of finding the threshold that matches the target EFDR.

## Value

An object of class "bayefdr" containing the probability thresholds tested, the EFDR and EFNR at each probability threshold, and the optimal threshold.

## Examples

```
probs <- runif(100)  
efdr <- efdr_search(probs, target_efdr = 0.1)  
plot(efdr)
```

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optimal	<i>Retrieve the index of the optimal probability threshold.</i>
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**Description**

Retrieve the index of the optimal probability threshold.

**Usage**

```
optimal(x)
```

**Arguments**

x                    An object of class "bayefdr".

**Value**

The integer index of the optimal probability threshold.

**Examples**

```
probs <- runif(100)
e <- efd_r_search(probs, target_efdr = 0.1)
optimal(e)
e[optimal(e), ]
```

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plot.bayefdr	<i>Plot the EFDR, EFNR grids of a bayefdr object.</i>
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**Description**

Plot the EFDR, EFNR grids of a bayefdr object.

**Usage**

```
## S3 method for class 'bayefdr'
plot(x, ...)
```

**Arguments**

x                    An object of class bayefdr.  
...                    Unused.

**Value**

A ggplot.

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`print.bayefdr`                    *Print methods for bayefdr objects.*

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**Description**

Print methods for bayefdr objects.

**Usage**

```
## S3 method for class 'bayefdr'  
print(x, ...)
```

```
## S3 method for class 'bayefdr'  
head(x, ...)
```

**Arguments**

<code>x</code>	An object of class bayefdr.
<code>...</code>	Unused.

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