

Package ‘nFDR’

February 14, 2012

Version 0.0-1

Date 2005-06-06

Title Nonparametric Estimate of FDR Based on Bernstein Polynomials

Author Zhong Guan <zguan@iusb.edu>, Baolin Wu <baolin@biostat.umn.edu>
and Hongyu Zhao <hongyu.zhao@yale.edu>.

Maintainer Zhong Guan <zguan@iusb.edu>

Depends R (>= 2.0.1)

Description nFDR is package that implements the nonparametric estimate of FDR based on Bernstein polynomials. It calculates the proportion of true null hypotheses, FDR, FNR, and q-values.

License GPL (>= 2)

Repository CRAN

Date/Publication 2010-08-01 09:51:56

R topics documented:

nFDR	2
nFDR-internal	3
Index	5

nFDR

*Nonparametric Estimate of FDR Based on Bernstein Polynomials***Description**

Using the Bernstein polynomial density estimation to estimate the proportion π_0 of true null hypotheses based p -values. A nonparametric estimate of false discovery rates (FDR's) are also calculated. nFDR calls a C program to search the minimizer (r, k) of a partial mean square error and returns the proportion of true null hypotheses, FDR, FNR, and q -values.

Usage

```
nFDR(x, r0, k0, K, alpha = 0.05, Trial.r = 5, Trial.k = 10, Method = "approx", Smooth = TRUE)
```

Arguments

x	a vector of p-values
r0	initial guess of r
k0	initial guess of k
K	Upper limit for r
alpha	significance level
Trial.r	number of trials for searching r
Trial.k	number of trials for searching k
Method	default is "approx"
Smooth	default is TRUE

Details

If either of Trial.r or Trial.k is zero, then the search of (r, k) is skipped and choose $(r, k) = (r_0, k_0)$.

Value

a list containing:

p	sorted p-values
(r, k)	minimizer of the partial mean square error pMSE
PI0	estimated proportion π_0 of true null hypotheses
cint.pi0	confidence interval for the proportion π_0 of true null hypotheses
FDR	estimated false discovery rate (FDR) according to p
FNR	estimated false nondiscovery rate (FNR) according to p
Cint.fdr	confidence interval for FDR according to p
qvalue	qvalue according to p

Author(s)

Zhong Guan zguan@iusb.edu

References

Zhong Guan, Baolin Wu and Hongyu Zhao(2005), Nonparametric estimator of false discovery rate based on Bernstein polynomials

Examples

```
set.seed (777)
library(nFDR) # load the package
n<-200 # sample size
pi0<-0.70 # proportion of true null hypotheses
x<-c(runif(n*pi0,0,1), rbeta(n*(1-pi0), 1, 6))
## simulate n p-values from mixture of beta(1,6) and uniform(0,1)
res<-nFDR(x, r0 = 5, k0 = 50, K = .5*n, alpha = 0.05, Trial.r = 3, Trial.k = 5, Method = "approx", Smooth = TRUE)
res$PI0 # estimated proportion of true nulls
```

nFDR-internal

Internal nFDR Functions

Description

Internal nFDR functions.

Usage

```
Bf(f, k, x)
hk(R,k)
F.tilde(tt,x,n)
f.tilde(tt,x,n, Smooth = TRUE)
```

Arguments

x	a vector of p-values
R	vector of r values
f	vector of sampled value of function f
k	order of Bernstein polynomial approximation
n	order of Bernstein polynomial approximation for cdf F or pdf f
tt	vector of values on $[0,1]$ at which Bernstein approximation are evaluated
Smooth	default is TRUE, F is smoothed first

Value

Function `bf` returns Bernstein approximation of function `f` based on sampled values given in argument `f`. Function `hk` returns value of $h(r, k)$ used in calculation of the variance of the estimator $\tilde{\pi}_0$ of π_0 . Function `F.tilde` returns values of Bernstein approximation \tilde{F} of cdf `F`. Function `f.tilde` returns values of Bernstein approximation \tilde{f} of pdf `f` with sampled values of `f` is numerically estimated by `F`, if `Smooth = FALSE`, or by \tilde{F} .

Author(s)

Zhong Guan zguan@iusb.edu

Index

*Topic **distribution**
nFDR-internal, 3

*Topic **htest**
nFDR, 2

*Topic **nonparametric**
nFDR, 2

*Topic **smooth**
nFDR, 2

Bf (nFDR-internal), 3

F.tilde (nFDR-internal), 3
f.tilde (nFDR-internal), 3

hk (nFDR-internal), 3

nFDR, 2
nFDR-internal, 3