

fdrcontrol

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The **fdrcontrol** package tends replace *p.adjust(method='BH')* or *p.adjust(method='fdr')* for a faster filtering step.

The *FDRcontrol* function takes in a vector of p-values and an alpha value (threshold) for controlling false discovery rate. The algorithm used was described in [here](#).

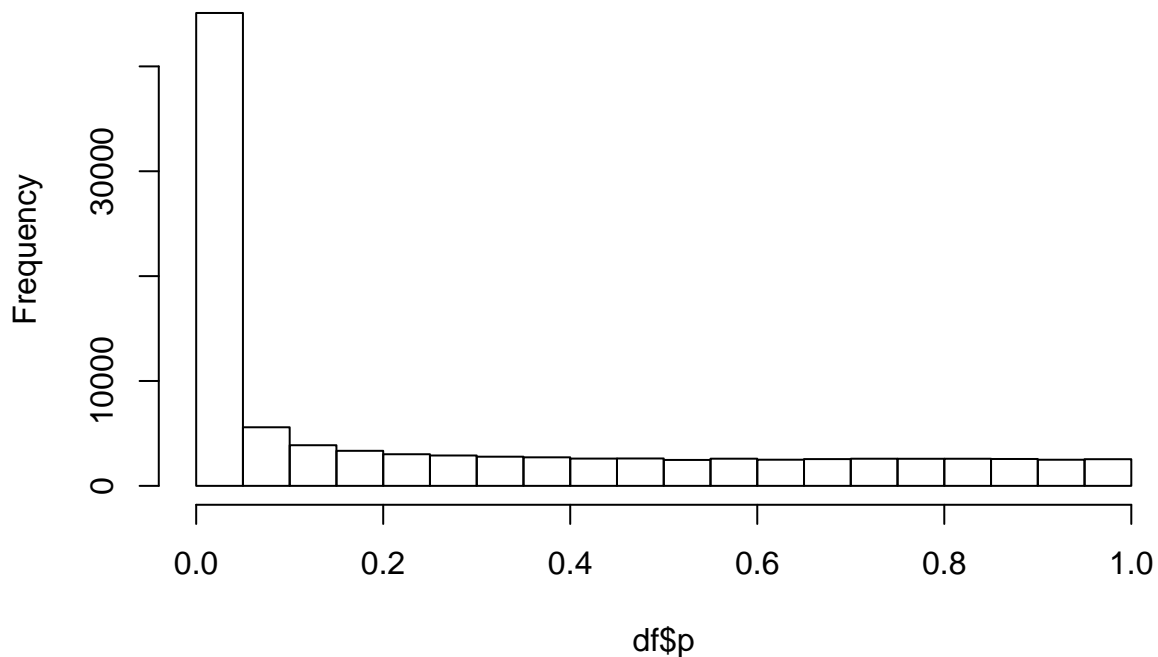
The function return 1 when the datapoint is below the threshold and 0 if it is above the threshold.

```
set.seed(0)
library(fdrcontrol)
library(ggplot2)
library(dplyr)
library(tidyr)

alpha <- 0.01
no_of_test <- 100000

#simulate data
x <- rnorm(no_of_test, mean = c(rep(0, 25), rep(3, 25)))
p <- 2*pnorm(sort(-abs(x)))
df <- data_frame(p)
hist(df$p)
```

Histogram of df\$p



```

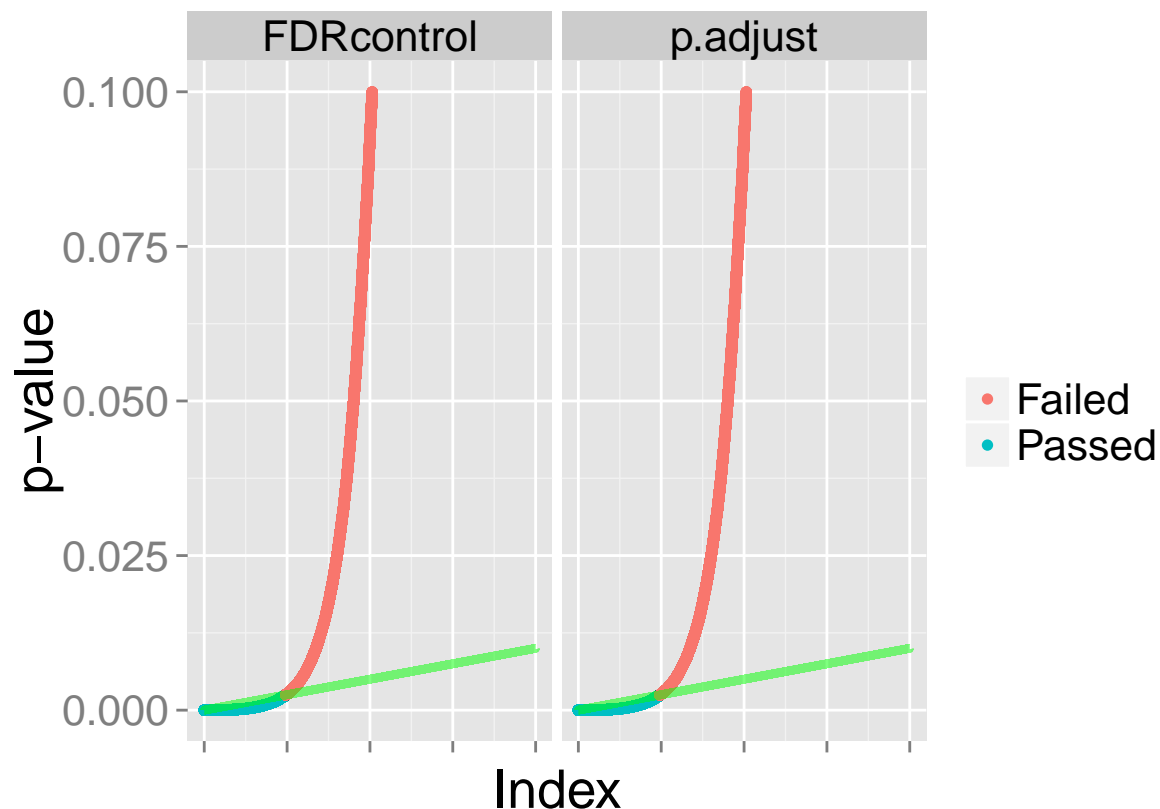
df %>%
  mutate(fdr = FDRcontrol(p,alpha))%>% #usage of the function FDRcontrol
  mutate(padj = p.adjust(p,method='BH')) %>%
  arrange(p) %>%
  mutate(idx = 1:nrow(.)) %>%
  tbl_df -> df

df %>%
  filter(fdr==1, padj > alpha) #none of the data point disagree

## Source: local data frame [0 x 4]
##
## Variables not shown: p (dbl), fdr (dbl), padj (dbl), idx (int)

df %>%
  mutate(FDRcontrol = ifelse(fdr==1,'Passed','Failed')) %>%
  mutate(p.adjust = ifelse(padj< alpha, 'Passed','Failed')) %>%
  select(-fdr,-padj) %>%
  gather(Method,tag,-p,-idx) %>%
  ggplot() +
    geom_point(aes(y=p,x=idx,color=factor(tag))) +
    geom_line(aes(y = idx/no_of_test * alpha, x=idx),color='green',size = 1.5,alpha=0.5) +
    facet_grid(.~Method)+
    theme(text=element_text(size=20)) +
    theme(axis.text.x = element_blank()) +
    ylim (0,0.1) +
    labs(color=' ', x = 'Index', y = 'p-value')

```



To compare the speed of computation:

```
library(microbenchmark)
microbenchmark(df %>% mutate(FDR = FDRcontrol(p,0.01)),
               df %>% mutate(padj = p.adjust(p,method='fdr')))
```

```
## Unit: milliseconds
```

```
##               expr              min              lq
##      df %>% mutate(FDR = FDRcontrol(p, 0.01))  2.053019  3.372034
##      df %>% mutate(padj = p.adjust(p, method = "fdr")) 16.232100 20.712554
##      mean      median      uq      max neval cld
##    4.069766   3.722019  4.30068 12.56710   100  a
##   23.811064  22.757177 25.27619 79.11734   100  b
```