```
## Load libraries
library(splines)
library(MASS)
library(FDRreg)

## Loading required package:  fda
## Warning:  package 'fda' was built under R version 3.3.3
## Loading required package:  Matrix
##
## Attaching package:  'fda'
## The following object is masked from 'package:graphics':
##
##    matplot
## Loading required package:  BayesLogit
## Warning:  package 'BayesLogit' was built under R version 3.3.2
## Loading required package:  mvtnorm
## Warning:  package 'mvtnorm' was built under R version 3.3.2

library(curl)

library(doParallel) ##to make cluster (on Windows)

## Loading required package:  foreach
## Loading required package:  iterators
## Loading required package:  parallel

library(foreach) ##to use foreach function that does the parallel processing
library(doRNG) ##for reproducible seeds when doing parallel processing

## Loading required package:  rngtools
## Warning:  package 'rngtools' was built under R version 3.3.2
## Loading required package:  pkgmaker
## Warning:  package 'pkgmaker' was built under R version 3.3.2
## Loading required package:  registry
## Warning:  package 'registry' was built under R version 3.3.2
##
## Attaching package:  'pkgmaker'
## The following object is masked from 'package:base':
##
##    isNamespaceLoaded

##Source functions
source("../functions.R")
```

Define nulltype for Scott method:

```
nulltype <- "theoretical"
```

Simulations are performed for a variety of alternative distributions:

```
altsGrid <- as.matrix(expand.grid(dist=c("z","t"),nrBlocks=c(10,20),corr=c(0.2,0.5,0.9)))
alts <- apply(altsGrid, 1, function(x){paste("alt",x[1],"large",x[2],x[3],sep="_")})
alts
```

```
##  [1] "alt_z_large_10_0.2" "alt_t_large_10_0.2"
##  [3] "alt_z_large_20_0.2" "alt_t_large_20_0.2"
##  [5] "alt_z_large_10_0.5" "alt_t_large_10_0.5"
##  [7] "alt_z_large_20_0.5" "alt_t_large_20_0.5"
##  [9] "alt_z_large_10_0.9" "alt_t_large_10_0.9"
## [11] "alt_z_large_20_0.9" "alt_t_large_20_0.9"
```

# 1 Probability of being a false positive is linear

Perform estimation and save estimates:

```
for(alt in alts)
{
  print(alt)
  load(paste(alt,"simResults_5.RData",sep="/"))
  ntest <- ncol(zValuesSims)

  pi0hatScottMat <- estimate_Scott_sims(zValuesSims, tme, nulltype)

  pi0hatScottMean <- colMeans(pi0hatScottMat[,1:ntest])
  pi0hatScottVar <- apply(pi0hatScottMat[,1:ntest],2,var)

  pi0hat.ScottMat <- pi0hatScottMat[,1:ntest]
  FDR.ScottMat <- pi0hatScottMat[,(ntest+1):(2*ntest)]

  ##save full results
  save(file=paste(alt,"simResults_pi0x_Scott_5_full.RData",sep="/"),
       list=c("pi0hat.ScottMat", "FDR.ScottMat"))

  ##save summary results
  save(file=paste(alt,"simResults_pi0x_Scott_5.RData",sep="/"),
       list=c("tme", "pi0",
            "pi0hatScottMean","pi0hatScottVar"))
}
```

```
## [1] "alt_z_large_10_0.2"
```

```
## [1] "alt_t_large_10_0.2"
## [1] "alt_z_large_20_0.2"
## [1] "alt_t_large_20_0.2"
## [1] "alt_z_large_10_0.5"
## [1] "alt_t_large_10_0.5"
## [1] "alt_z_large_20_0.5"
## [1] "alt_t_large_20_0.5"
## [1] "alt_z_large_10_0.9"
## [1] "alt_t_large_10_0.9"
## [1] "alt_z_large_20_0.9"
## [1] "alt_t_large_20_0.9"
```

Session info:

```
devtools::session_info()
```

```
## Session info -------------------------------------------------
```

```
##  setting  value
##  version  R version 3.3.1 (2016-06-21)
##  system   x86_64, mingw32
##  ui       RTerm
##  language (EN)
##  collate  English_United States.1252
##  tz       America/New_York
##  date     2018-09-04
```

```
## Packages -----------------------------------------------------
```

```
##  package    * version date
##  assertthat   0.1     2013-12-06
##  BayesLogit * 0.6     2016-10-20
##  bindr        0.1     2016-11-13
##  bindrcpp     0.2     2017-06-17
##  codetools    0.2-14  2015-07-15
##  colorspace   1.2-6   2015-03-11
##  curl       * 0.9.7   2016-04-10
##  devtools     1.12.0  2016-06-24
##  digest       0.6.12  2017-01-27
##  doParallel * 1.0.10  2015-10-14
##  doRNG      * 1.6     2014-03-07
##  dplyr        0.7.4   2017-09-28
##  evaluate     0.10    2016-10-11
##  fda        * 2.4.4   2014-12-16
##  FDRreg     * 0.2-1   2017-05-03
##  foreach    * 1.4.3   2015-10-13
##  ggdendro     0.1-20  2016-04-27
```

```
##  ggplot2      2.2.1   2016-12-30
##  glue         1.1.1   2017-06-21
##  gridExtra    2.2.1   2016-02-29
##  gtable       0.2.0   2016-02-26
##  highr        0.6     2016-05-09
##  iterators  * 1.0.8   2015-10-13
##  knitr      * 1.17    2017-08-10
##  lattice      0.20-33 2015-07-14
##  lazyeval     0.2.0   2016-06-12
##  magrittr     1.5     2014-11-22
##  MASS       * 7.3-45  2016-04-21
##  Matrix     * 1.2-6   2016-05-02
##  memoise      1.0.0   2016-01-29
##  mosaic       0.14.4  2016-07-29
##  mosaicData   0.14.0  2016-06-17
##  munsell      0.4.3   2016-02-13
##  mvtnorm    * 1.0-6   2017-03-02
##  pkgconfig    2.0.1   2017-03-21
##  pkgmaker   * 0.22    2014-05-14
##  plyr         1.8.4   2016-06-08
##  purrr        0.2.4   2017-10-18
##  R6           2.1.2   2016-01-26
##  Rcpp         0.12.13 2017-09-28
##  registry   * 0.3     2015-07-08
##  rlang        0.1.4   2017-11-05
##  rngtools   * 1.2.4   2014-03-06
##  scales       0.4.1   2016-11-09
##  stringi      1.1.1   2016-05-27
##  stringr      1.2.0   2017-02-18
##  tibble       1.3.3   2017-05-28
##  tidyr        0.7.2   2017-10-16
##  withr        1.0.2   2016-06-20
##  xtable       1.8-2   2016-02-05
##  source
##  CRAN (R 3.3.1)
##  CRAN (R 3.3.2)
##  CRAN (R 3.3.3)
##  CRAN (R 3.3.3)
##  CRAN (R 3.3.1)
##  CRAN (R 3.3.1)
##  CRAN (R 3.3.1)
##  CRAN (R 3.3.3)
##  CRAN (R 3.3.3)
##  CRAN (R 3.3.1)
##  CRAN (R 3.3.1)
```

```
##  CRAN (R 3.3.3)
##  CRAN (R 3.3.1)
##  CRAN (R 3.3.3)
##  Github (jgscott/FDRreg@8025d1a)
##  CRAN (R 3.3.1)
##  CRAN (R 3.3.3)
##  CRAN (R 3.3.3)
##  CRAN (R 3.3.3)
##  CRAN (R 3.3.1)
##  CRAN (R 3.3.1)
##  CRAN (R 3.3.1)
##  CRAN (R 3.3.0)
##  CRAN (R 3.3.3)
##  CRAN (R 3.3.1)
##  CRAN (R 3.3.1)
##  CRAN (R 3.3.1)
##  CRAN (R 3.3.1)
##  CRAN (R 3.3.1)
##  CRAN (R 3.3.1)
##  CRAN (R 3.3.1)
##  CRAN (R 3.3.3)
##  CRAN (R 3.3.3)
##  CRAN (R 3.3.1)
##  CRAN (R 3.3.2)
##  CRAN (R 3.3.3)
##  CRAN (R 3.3.2)
##  CRAN (R 3.3.1)
##  CRAN (R 3.3.3)
##  CRAN (R 3.3.1)
##  CRAN (R 3.3.3)
##  CRAN (R 3.3.2)
##  CRAN (R 3.3.3)
##  CRAN (R 3.3.2)
##  CRAN (R 3.3.3)
##  CRAN (R 3.3.0)
##  CRAN (R 3.3.3)
##  CRAN (R 3.3.3)
##  CRAN (R 3.3.3)
##  CRAN (R 3.3.1)
##  CRAN (R 3.3.1)
```