```
## Load libraries
library(splines)
library(MASS)
library(xtable)
library(qvalue)

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

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"
```

Make FDR-TPR table:

```
for(alt in alts)
{

  print(alt)

  ##For each simulation, get the FDR-TPR table: (BL = Boca-Leek method)
  scen5 <- NULL

  ##-------------------Set 5----------------##

  #Load p-values and £\pi_0(x)£ estimates for the simulations:
  for(l in listSimRes(alt, 5))
  {
    load(l)
  }

  ##Get BH and Storey q-values for each simulation:
  qValuesSimsBH <- getQValuesSimsBH(pValuesSims)
  qValuesSimsStorey <- getQValuesSimsStorey(pValuesSims)

  print(mean(qValuesSimsStorey))
```

```
  ##Get estimated FDR for each simulation for the final estimates
  FDRreg <- getFDRregSims(pi0EstSim, qValuesSimsBH)

  ##get FDR-TPR table
  scen5 <- estFDR.TPR(FDR.BL = FDRreg,
                      FDR.BH = qValuesSimsBH, FDR.Storey = qValuesSimsStorey,
                      FDR.Scott = FDR.ScottMat, FDR.Scott_emp = FDR.ScottMat_emp, nullHypSim

  print("Scenario 5")
  print(scen5)

  save(list=c("scen5"),
       file=paste(alt,"FDR_TPR_sims_additional.RData",sep="/"))


}
## [1] "alt_z_large_10_0.2"
## [1] 0.2038452
## [1] "Scenario 5"
##                   FDR       TPR Percent used
## BL        0.04384403 0.7852696        100.0
## Scott     0.05295432 0.8284737        100.0
## Scott_emp 0.21578115 0.7295263         96.5
## Storey    0.04806603 0.7376117        100.0
## BH        0.02543875 0.6665124        100.0
## [1] "alt_t_large_10_0.2"
## [1] 0.2581569
## [1] "Scenario 5"
##                   FDR       TPR Percent used
## BL        0.02749696 0.6968823          100
## Scott     0.05883499 0.8284932          100
## Scott_emp 0.22688644 0.6884147           81
## Storey    0.02958793 0.6033402          100
## BH        0.01191075 0.4801508          100
## [1] "alt_z_large_20_0.2"
## [1] 0.201459
## [1] "Scenario 5"
##                   FDR       TPR Percent used
## BL        0.04455568 0.7896449        100.0
## Scott     0.05249413 0.8299957        100.0
## Scott_emp 0.23180663 0.7463761         98.5
## Storey    0.04812457 0.7410345        100.0
## BH        0.02518617 0.6689237        100.0
## [1] "alt_t_large_20_0.2"
## [1] 0.255483
```

```
## [1] "Scenario 5"
##                  FDR       TPR Percent used
## BL        0.02858754 0.7028064          100
## Scott     0.05613503 0.8278707          100
## Scott_emp 0.23923495 0.7130798           87
## Storey    0.03059735 0.6080925          100
## BH        0.01197737 0.4806562          100
## [1] "alt_z_large_10_0.5"
## [1] 0.2023138
## [1] "Scenario 5"
##                  FDR       TPR Percent used
## BL        0.04684912 0.7863938        100.0
## Scott     0.06466836 0.8322615        100.0
## Scott_emp 0.20420944 0.6924605         82.5
## Storey    0.04876177 0.7382562        100.0
## BH        0.02297759 0.6649912        100.0
## [1] "alt_t_large_10_0.5"
## [1] 0.259942
## [1] "Scenario 5"
##                  FDR       TPR Percent used
## BL        0.03162842 0.6947253        100.0
## Scott     0.06937231 0.8243226        100.0
## Scott_emp 0.24647019 0.6897081         72.5
## Storey    0.03179415 0.5996393        100.0
## BH        0.01282315 0.4745612        100.0
## [1] "alt_z_large_20_0.5"
## [1] 0.1987436
## [1] "Scenario 5"
##                  FDR       TPR Percent used
## BL        0.04614794 0.7921250          100
## Scott     0.05967358 0.8324745          100
## Scott_emp 0.22382779 0.7209154           89
## Storey    0.04867717 0.7433375          100
## BH        0.02417761 0.6685842          100
## [1] "alt_t_large_20_0.5"
## [1] 0.2614939
## [1] "Scenario 5"
##                  FDR       TPR Percent used
## BL        0.03113831 0.6936843        100.0
## Scott     0.06170528 0.8258219        100.0
## Scott_emp 0.22969918 0.6942275         77.5
## Storey    0.03110451 0.5990668        100.0
## BH        0.01249104 0.4724635        100.0
## [1] "alt_z_large_10_0.9"
## [1] 0.2128832
```

```
## [1] "Scenario 5"
##                  FDR       TPR Percent used
## BL        0.07086974 0.7958868          100
## Scott     0.10283573 0.8422672          100
## Scott_emp 0.21943402 0.6748584           57
## Storey    0.05956991 0.7474144          100
## BH        0.02050542 0.6629680          100
## [1] "alt_t_large_10_0.9"
## [1] 0.2657172
## [1] "Scenario 5"
##                  FDR       TPR Percent used
## BL        0.06593947 0.6962632          100
## Scott     0.10326562 0.8302258          100
## Scott_emp 0.22459386 0.6720394           52
## Storey    0.04595940 0.6034374          100
## BH        0.01159207 0.4594634          100
## [1] "alt_z_large_20_0.9"
## [1] 0.20702
## [1] "Scenario 5"
##                  FDR       TPR Percent used
## BL        0.05538487 0.7905905          100
## Scott     0.07918687 0.8366723          100
## Scott_emp 0.22113936 0.6988184           69
## Storey    0.05264264 0.7450691          100
## BH        0.02235623 0.6681960          100
## [1] "alt_t_large_20_0.9"
## [1] 0.2644845
## [1] "Scenario 5"
##                  FDR       TPR Percent used
## BL        0.03730012 0.6867378          100
## Scott     0.07926463 0.8274981          100
## Scott_emp 0.21992045 0.6546266           56
## Storey    0.03480840 0.5956192          100
## BH        0.01067982 0.4627419          100
```

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       source
##  colorspace   1.2-6   2015-03-11 CRAN (R 3.3.1)
##  devtools     1.12.0  2016-06-24 CRAN (R 3.3.3)
##  digest       0.6.12  2017-01-27 CRAN (R 3.3.3)
##  evaluate     0.10    2016-10-11 CRAN (R 3.3.1)
##  ggplot2      2.2.1   2016-12-30 CRAN (R 3.3.3)
##  gtable       0.2.0   2016-02-26 CRAN (R 3.3.1)
##  highr        0.6     2016-05-09 CRAN (R 3.3.1)
##  knitr      * 1.17    2017-08-10 CRAN (R 3.3.3)
##  lazyeval     0.2.0   2016-06-12 CRAN (R 3.3.1)
##  magrittr     1.5     2014-11-22 CRAN (R 3.3.1)
##  MASS       * 7.3-45  2016-04-21 CRAN (R 3.3.1)
##  memoise      1.0.0   2016-01-29 CRAN (R 3.3.1)
##  munsell      0.4.3   2016-02-13 CRAN (R 3.3.1)
##  plyr         1.8.4   2016-06-08 CRAN (R 3.3.1)
##  qvalue     * 2.4.2   2016-05-16 Bioconductor
##  Rcpp         0.12.13 2017-09-28 CRAN (R 3.3.3)
##  reshape2     1.4.1   2014-12-06 CRAN (R 3.3.1)
##  rlang        0.1.4   2017-11-05 CRAN (R 3.3.3)
##  scales       0.4.1   2016-11-09 CRAN (R 3.3.3)
##  stringi      1.1.1   2016-05-27 CRAN (R 3.3.0)
##  stringr      1.2.0   2017-02-18 CRAN (R 3.3.3)
##  tibble       1.3.3   2017-05-28 CRAN (R 3.3.3)
##  withr        1.0.2   2016-06-20 CRAN (R 3.3.1)
##  xtable     * 1.8-2   2016-02-05 CRAN (R 3.3.1)
```