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

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

Simulations are performed for a variety of alternative distributions:

```
alts <- c("alt_beta","alt_chisq_large_3_3","alt_chisq_large",
          "alt_chisq_small_3_3","alt_chisq_small",
          "alt_t_large","alt_t_small",
          "alt_z_large",
          "alt_z_small")
```

Make FDR-TPR table:

```
for(a in 1:9)
{
  alt <- alts[a]

  print(alt)

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

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

  ##don't use Scott methods unless distribution of test statistics is normal or t
  if(a %in% 6:9)
  {
    #Load p-values and £\pi_0(x)£ estimates for the simulations:
    for(l in listSimRes(alt, 5))
    {
      load(l)
    }
  } else {
    load(paste(alt,"/simResults_", 5, ".RData",sep=""))
    load(paste(alt,"/simResults_pi0x_thresh_", 5, "_full.RData",sep=""))

    FDR.ScottMat <- NULL
    FDR.ScottMat_emp <- NULL
  }
```

```
  ##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_beta"
## [1] 0.1904941
## [1] "Scenario 5"
##                   FDR          TPR Percent used
## BL        0.03105247 0.6666875219          100
## Scott             NA           NA           NA
## Scott_emp         NA           NA           NA
## Storey    0.05073132 0.1306347337          100
## BH        0.02265890 0.0003893526          100
## [1] "alt_chisq_large_3_3"
## [1] 0.2273962
## [1] "Scenario 5"
##                   FDR       TPR Percent used
## BL        0.03924617 0.6233207          100
## Scott             NA        NA           NA
## Scott_emp         NA        NA           NA
## Storey    0.04624620 0.5546347          100
## BH        0.02474267 0.4673473          100
## [1] "alt_chisq_large"
## [1] 0.1989903
## [1] "Scenario 5"
##                   FDR       TPR Percent used
## BL        0.04228263 0.7885832          100
## Scott             NA        NA           NA
```

```
## Scott_emp         NA        NA           NA
## Storey    0.04682958 0.7390568          100
## BH        0.02484708 0.6687380          100
## [1] "alt_chisq_small_3_3"
## [1] 0.5882656
## [1] "Scenario 5"
##                  FDR        TPR Percent used
## BL        0.02637240 0.02109796          100
## Scott             NA         NA           NA
## Scott_emp         NA         NA           NA
## Storey    0.03277133 0.01887334          100
## BH        0.02679010 0.01478641          100
## [1] "alt_chisq_small"
## [1] 0.5164634
## [1] "Scenario 5"
##                  FDR        TPR Percent used
## BL        0.02646597 0.08845202          100
## Scott             NA         NA           NA
## Scott_emp         NA         NA           NA
## Storey    0.03191983 0.08105635          100
## BH        0.02414606 0.06772367          100
## [1] "alt_t_large"
## [1] 0.2196096
## [1] "Scenario 5"
##                  FDR       TPR Percent used
## BL        0.03852794 0.6596487          100
## Scott     0.07440891 0.8072412          100
## Scott_emp 0.07320590 0.4105162          100
## Storey    0.04624823 0.5710555          100
## BH        0.02529924 0.4339938          100
## [1] "alt_t_small"
## [1] 0.5601961
## [1] "Scenario 5"
##                  FDR         TPR Percent used
## BL        0.02207242 0.006316960          100
## Scott     0.07602841 0.169585083          100
## Scott_emp 0.04555690 0.052860737          100
## Storey    0.03460231 0.004470942          100
## BH        0.02734031 0.002127785          100
## [1] "alt_z_large"
## [1] 0.1978409
## [1] "Scenario 5"
##                  FDR       TPR Percent used
## BL        0.04216831 0.7895340          100
## Scott     0.04972832 0.8330208          100
```

```
## Scott_emp 0.23808262 0.7484873          100
## Storey    0.04685124 0.7409195          100
## BH        0.02477210 0.6694381          100
## [1] "alt_z_small"
## [1] 0.5103516
## [1] "Scenario 5"
##                   FDR        TPR Percent used
## BL        0.026764021 0.08916663           100
## Scott     0.018780658 0.16587578           100
## Scott_emp 0.001214749 0.02757974           100
## Storey    0.032463544 0.08160991           100
## BH        0.024569706 0.06757215           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)
```