

```

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

library(mnormt) ## for multivariate normal and t distributions

## Warning: package 'mnormt' was built under R version 3.3.2

library(Matrix) ##for the bdiag function to create block-diagonal matrices

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 the number of tests
ntest <- 1000

## Set number of simulations
nSims <- 200

```

Do the simulations 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

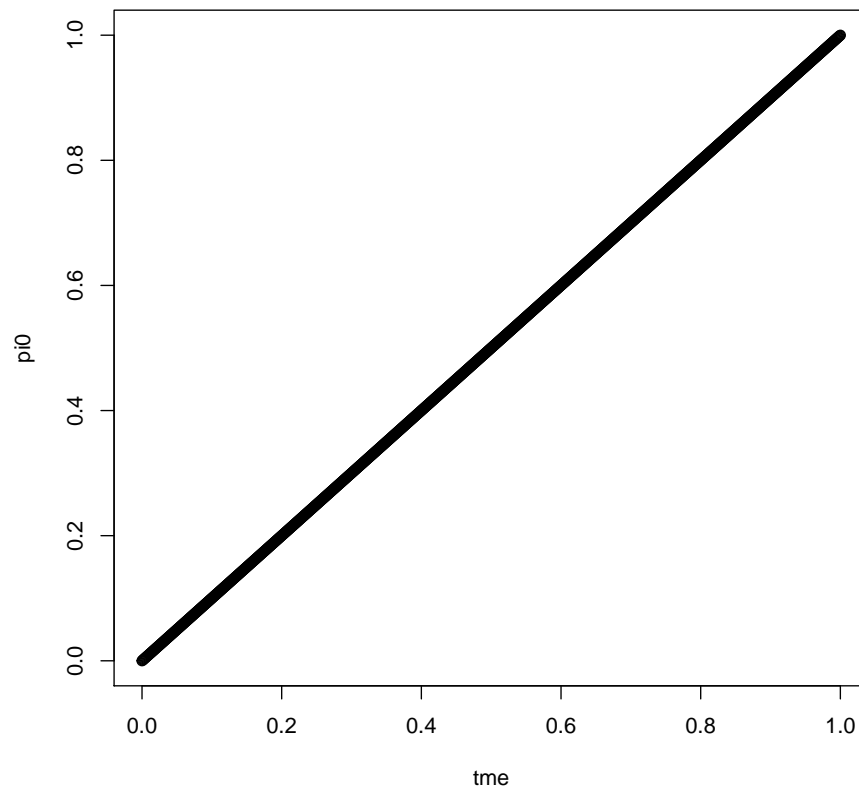
```
## Set up the time vector and the probability of being null
tme <- seq(0,1, length=ntest)
pi0 <- tme

plot(pi0 ~ tme)

for(alt in alts)
{
  pValuesSims <- run_sims_alt_corr(alt, nSims, pi0)

  zValuesSims <- pValuesSims[(2*ntest+1):(3*ntest)]
  nullHypSims <- pValuesSims[(ntest+1):(2*ntest)]
  pValuesSims <- pValuesSims[1:ntest]

  ##save results
  save(file=paste(alt, "simResults_5.RData", sep="/"),
        list=c("pi0", "tme", "nullHypSims", "pValuesSims", "zValuesSims"))
}
```



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
```

|    |            |          |            |      |           |
|----|------------|----------|------------|------|-----------|
| ## | codetools  | 0.2-14   | 2015-07-15 | 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) |
| ## | doParallel | * 1.0.10 | 2015-10-14 | CRAN | (R 3.3.1) |
| ## | doRNG      | * 1.6    | 2014-03-07 | CRAN | (R 3.3.1) |
| ## | evaluate   | 0.10     | 2016-10-11 | CRAN | (R 3.3.1) |
| ## | foreach    | * 1.4.3  | 2015-10-13 | CRAN | (R 3.3.1) |
| ## | highr      | 0.6      | 2016-05-09 | CRAN | (R 3.3.1) |
| ## | iterators  | * 1.0.8  | 2015-10-13 | CRAN | (R 3.3.0) |
| ## | knitr      | * 1.17   | 2017-08-10 | CRAN | (R 3.3.3) |
| ## | lattice    | 0.20-33  | 2015-07-14 | 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) |
| ## | Matrix     | * 1.2-6  | 2016-05-02 | CRAN | (R 3.3.1) |
| ## | memoise    | 1.0.0    | 2016-01-29 | CRAN | (R 3.3.1) |
| ## | mnormt     | * 1.5-5  | 2016-10-15 | CRAN | (R 3.3.2) |
| ## | pkgmaker   | * 0.22   | 2014-05-14 | CRAN | (R 3.3.2) |
| ## | registry   | * 0.3    | 2015-07-08 | CRAN | (R 3.3.2) |
| ## | rngtools   | * 1.2.4  | 2014-03-06 | CRAN | (R 3.3.2) |
| ## | stringi    | 1.1.1    | 2016-05-27 | CRAN | (R 3.3.0) |
| ## | stringr    | 1.2.0    | 2017-02-18 | 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) |