```r
library(MASS)
library(mirt)
```

```
## Loading required package: stats4
```

```
## Loading required package: lattice
```

```r
mirtCluster(4)
library(cacIRT)
library(mvtnorm)
library(graphics)

setwd('/Users/zhux0445/Documents/GitHub/RegDIF_SimData')
params=read.csv("Para1.csv",row.names = 1)
responses=read.csv("RESP1.csv",row.names = 1)

J=20

N1=N2=N3=500
Group=c(rep('G1', N1), rep('G2', N2), rep('G3', N3))
Group01=c(rep('G1', N1), rep('G2', N2))
Group02=c(rep('G1', N1), rep('G3', N3))
N=N1+N2+N3

m=2
r=2
```

```r
##### No anchor

rep=10

resp=responses[((rep-1)*N+1):((rep-1)*N+N1+N2+N3),]
  resp01=resp[1:(N1+N2),]
  resp02=rbind(resp[1:N1,],resp[(N1+N2+1):(N1+N2+N3),])
  s <- 'D1 = 1,3-11
          D2 = 2,12-20
          COV = D1*D2'
  #select anchor
  md.cons0 <- multipleGroup(resp, s, group = Group,SE=TRUE,invariance=c('free_means', 'free_var',colname
```

```
## Iteration: 1, Log-Lik: -16137.155, Max-Change: 0.95346Iteration: 2, Log-Lik: -15005.566, Max-Change:
##
## Calculating information matrix...
```

```r
  d=DIF(md.cons0, which.par = c('d'), p.adjust = 'fdr',scheme = 'drop')
  ratio1=d$X2/d$df
  (anchor1=which(ratio1==sort((d$X2/d$df)[c(1,3:11)])[1]))
```

```
## [1] 11
```

```r
  (anchor2=which(ratio1==sort((d$X2/d$df)[c(2,12:20)])[1]))
```

```
## [1] 14
```

```r
#omnibus dif
  md.noncons0 <- multipleGroup(resp, s, group = Group,SE=TRUE,invariance=c('free_means', 'free_var','sl
```

```
## Iteration: 1, Log-Lik: -16137.155, Max-Change: 0.96619Iteration: 2, Log-Lik: -14942.824, Max-Change:
```

```
## 
## Calculating information matrix...
    dif1=DIF(md.noncons0, which.par = c('d'), p.adjust = 'fdr',scheme = 'add',items2test=c(1:J)[-c(anchor
    dif1

##          AIC   AICc  SABIC     HQ    BIC    X2 df     p adj_pvals
## V1     3.210  3.714  7.483  7.168 13.836 0.790  2 0.674    0.765
## V2     0.803  1.307  5.076  4.761 11.429 3.197  2 0.202    0.455
## V3    -2.783 -2.278  1.490  1.176  7.844 6.783  2 0.034    0.151
## V4    -4.010 -3.505  0.263 -0.051  6.616 8.010  2 0.018    0.151
## V5    -2.846 -2.341  1.427  1.113  7.780 6.846  2 0.033    0.151
## V6     3.228  3.733  7.501  7.187 13.855 0.772  2 0.680    0.765
## V7     3.024  3.528  7.297  6.982 13.650 0.976  2 0.614    0.765
## V8     3.623  4.128  7.896  7.582 14.249 0.377  2 0.828    0.845
## V9     1.626  2.131  5.899  5.585 12.253 2.374  2 0.305    0.610
## V10    3.662  4.167  7.935  7.621 14.289 0.338  2 0.845    0.845
## V12   -0.907 -0.402  3.366  3.052  9.720 4.907  2 0.086    0.258
## V13   -5.024 -4.520 -0.751 -1.066  5.602 9.024  2 0.011    0.151
## V15   -0.579 -0.074  3.694  3.380 10.047 4.579  2 0.101    0.261
## V16   -1.524 -1.020  2.749  2.434  9.102 5.524  2 0.063    0.227
## V17    2.602  3.107  6.875  6.561 13.228 1.398  2 0.497    0.765
## V18    1.988  2.493  6.261  5.947 12.615 2.012  2 0.366    0.658
## V19    3.142  3.647  7.415  7.101 13.769 0.858  2 0.651    0.765
## V20    2.988  3.492  7.261  6.946 13.614 1.012  2 0.603    0.765
```

```
    #dif1.t=dif1[which(dif1$adj_pvals<0.05),]
    #power1[rep]=sum(c("V4" , "V5" , "V12", "V13")%in%rownames(dif1.t))
    #tpI1[rep]=sum(c("V1","V2","V3","V6", "V7","V8","V9","V10","V11","V14","V15","V16","V17","V18","V19",
```

Use two different anchors

```
anchor11=1
anchor21=2
#omnibus dif
  md.noncons01 <- multipleGroup(resp, s, group = Group,SE=TRUE,invariance=c('free_means', 'free_var','s

## Iteration: 1, Log-Lik: -16137.155, Max-Change: 0.96925Iteration: 2, Log-Lik: -14945.252, Max-Change:
## 
## Calculating information matrix...
    dif11=DIF(md.noncons01, which.par = c('d'), p.adjust = 'fdr',scheme = 'add',items2test=c(1:J)[-c(anch
    dif11

##           AIC    AICc   SABIC      HQ    BIC     X2 df     p adj_pvals
## V3     -1.614  -1.109   2.659   2.345  9.012  5.614  2 0.060    0.155
## V4     -8.793  -8.289  -4.520  -4.835  1.833 12.793  2 0.002    0.008
## V5     -8.910  -8.406  -4.637  -4.952  1.716 12.910  2 0.002    0.008
## V6      3.512   4.017   7.785   7.471 14.139  0.488  2 0.784    0.830
## V7      3.948   4.453   8.221   7.907 14.575  0.052  2 0.975    0.975
## V8      3.059   3.563   7.332   7.017 13.685  0.941  2 0.625    0.808
## V9      2.821   3.326   7.094   6.780 13.448  1.179  2 0.555    0.808
## V10     3.356   3.861   7.629   7.315 13.982  0.644  2 0.725    0.815
## V11     3.211   3.715   7.484   7.169 13.837  0.789  2 0.674    0.809
## V12   -10.865 -10.360  -6.592  -6.906 -0.238 14.865  2 0.001    0.005
## V13   -15.628 -15.123 -11.355 -11.669 -5.002 19.628  2 0.000    0.001
## V14     0.800   1.304   5.073   4.758 11.426  3.200  2 0.202    0.363
```

2

```
## V15  -1.207  -0.702   3.066   2.752  9.420  5.207  2 0.074      0.167
## V16   0.791   1.296   5.064   4.750 11.417  3.209  2 0.201      0.363
## V17  -3.110  -2.605   1.163   0.849  7.516  7.110  2 0.029      0.103
## V18   1.652   2.157   5.925   5.611 12.279  2.348  2 0.309      0.506
## V19  -2.146  -1.641   2.127   1.813  8.480  6.146  2 0.046      0.139
## V20   3.070   3.575   7.343   7.029 13.696  0.930  2 0.628      0.808
```

```
anchor12=3
anchor22=20
#omnibus dif
  md.noncons02 <- multipleGroup(resp, s, group = Group,SE=TRUE,invariance=c('free_means', 'free_var','s
```

```
## Iteration: 1, Log-Lik: -16137.155, Max-Change: 0.95483Iteration: 2, Log-Lik: -14951.267, Max-Change:
##
## Calculating information matrix...
```

```
  dif12=DIF(md.noncons02, which.par = c('d'), p.adjust = 'fdr',scheme = 'add',items2test=c(1:J)[-c(anch
  dif12
```

```
##          AIC     AICc    SABIC      HQ     BIC     X2 df      p adj_pvals
## V1    -1.618   -1.113   2.655   2.341   9.008  5.618  2 0.060     0.155
## V2     3.068    3.573   7.341   7.027  13.694  0.932  2 0.627     0.664
## V4   -26.926  -26.421 -22.653 -22.967 -16.299 30.926  2 0.000     0.000
## V5   -20.457  -19.952 -16.184 -16.498  -9.830 24.457  2 0.000     0.000
## V6     2.028    2.533   6.301   5.987  12.655  1.972  2 0.373     0.480
## V7    -1.694   -1.189   2.579   2.265   8.933  5.694  2 0.058     0.155
## V8     0.176    0.681   4.449   4.135  10.803  3.824  2 0.148     0.282
## V9     2.403    2.908   6.676   6.362  13.030  1.597  2 0.450     0.540
## V10    0.084    0.589   4.357   4.043  10.710  3.916  2 0.141     0.282
## V11   -2.785   -2.281   1.488   1.173   7.841  6.785  2 0.034     0.121
## V12   -6.041   -5.536  -1.768  -2.082   4.585 10.041  2 0.007     0.030
## V13  -11.173  -10.669  -6.900  -7.215  -0.547 15.173  2 0.001     0.003
## V14    2.982    3.486   7.255   6.940  13.608  1.018  2 0.601     0.664
## V15    1.534    2.039   5.807   5.493  12.160  2.466  2 0.291     0.477
## V16    1.935    2.440   6.208   5.894  12.562  2.065  2 0.356     0.480
## V17    0.290    0.794   4.563   4.248  10.916  3.710  2 0.156     0.282
## V18    3.505    4.010   7.778   7.464  14.131  0.495  2 0.781     0.781
## V19    1.886    2.391   6.159   5.845  12.512  2.114  2 0.347     0.480
```