

LSVT

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```
library(readxl)
LSVT_voice_rehabilitation<-read_excel("C:/Users/User/Desktop/LSVT_voice_rehabilitation.xlsx")
View(LSVT_voice_rehabilitation)

LSVT_voice_rehabilitation2<- read_excel("C:/Users/User/Desktop/LSVT_voice_rehabilitation.xlsx",
  sheet = "Binary response")
View(LSVT_voice_rehabilitation2)

lsvt<-cbind( LSVT_voice_rehabilitation2,LSVT_voice_rehabilitation )

lsvt[,1][1]
## [1] 1
for( i in 1:length( lsvt[,1] ) ){
  if( lsvt[,1][i]==2 ){
    lsvt[,1][i]=0
  }
}
response<-lsvt[,1]

lsvt<-cbind( response, lsvt[, -1] )

design<-as.matrix( lsvt[ , -1 ] )

train.lsvt<-lsvt[1:100,]
test.lsvt<-lsvt[101:126,]

train.lsvt<-as.matrix( train.lsvt )
test.lsvt<-as.matrix( test.lsvt )
response<-as.factor(response)

grp.lsvt<-grpreg(X=design, y=lsvt[,1] ,family="binomial" )
grp.lsvt2<-cv.grpreg(X=design, y=lsvt[,1],family="binomial" )
coef.lasso<-coef(grp.lsvt2,s="lambda.mi")

coef.work<-coef.lasso[coef.lasso!= 0]
coef.work
```

```
##          (Intercept) Shimmer->Ampl_abs0th_perturb
##          -2.004042e+00 -1.605927e+01
## Shimmer->Ampl_TKE0_prc75 Shimmer->Ampl_AM
##          -5.771695e+00 -1.033366e+00
##          HNR->HNR_dB_Praat_std OQ->std_cycle_open
##          -3.806757e-01 -2.988029e-03
##          VFER->entropy VFER->SNR_SEO
##          3.787703e-03 8.912381e-06
##          VFER->NSR_SEO IMF->NSR_SEO
##          2.004704e-01 2.130265e+01
##          MFCC_0th coef MFCC_1st coef
##          -2.011956e-01 3.492771e-01
##          MFCC_7th coef MFCC_8th coef
##          2.734122e-01 2.044658e-01
##          MFCC_9th coef MFCC_12th coef
##          -1.213171e-01 3.097515e-01
##          3rd delta 12th delta
##          5.575572e+00 -5.326639e+01
##          9th delta-delta entropy_log_4_coef
##          -2.879447e+02 -1.859177e-03
```

```
length(coef.work )
```

```
## [1] 20
```

```
grp.lsvt2$fit$y
```

```
## [1] 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1
## [36] 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0
## [71] 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0
## [106] 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0
## attr(,"m")
## [1] 1
```

```
mse( grp.lsvt2$fit$y, lsvt[,1] )
```

```
## [1] 0
```

```
grp.lsvt2$fit$y==lsvt[,1]
```

```
## [1] TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TR
## [15] TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TR
## [29] TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TR
## [43] TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TR
## [57] TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TR
```

```

UE TRUE
## [71] TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TR
UE TRUE
## [85] TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TR
UE TRUE
## [99] TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TR
UE TRUE
## [113] TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TR
UE TRUE

grp.lsvt.train<-grpreg(X=train.lsvt[, -1], y=train.lsvt[, 1] ,family="binomial" )
grp.lsvt.train2<-cv.grpreg(X=train.lsvt[, -1],y=train.lsvt[, 1],family="binomial" )
coef.lasso.train<-coef(grp.lsvt.train2,s="lambda.mi")

coef.work.train<-coef.lasso.train[coef.lasso.train!= 0]

coef.work.train

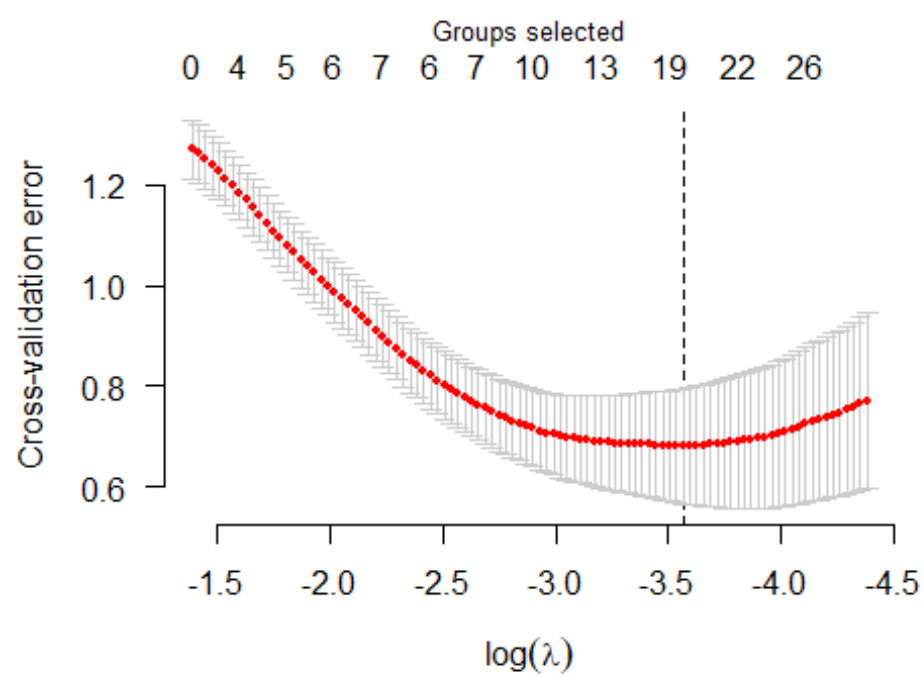
##           (Intercept) Shimmer->Ampl_abs0th_perturb
##           -2.214496884                -17.934526877
##           Shimmer->Ampl_AM           HNR->HNR_dB_Praat_std
##           -0.649488855                -0.091323621
##           DFA                        IMF->NSR_SEO
##           2.544382478                  3.055922132
##           IMF->NSR_entropy             MFCC_0th coef
##           11.682842343                 -0.145119660
##           MFCC_1st coef                MFCC_2nd coef
##           0.183533988                  0.122746714
##           MFCC_7th coef                MFCC_8th coef
##           0.028642115                  0.251687028
##           MFCC_12th coef               0th delta
##           0.132177721                  1.183782114
##           entropy_log_4_coef
##           -0.001394683

length(coef.work.train )

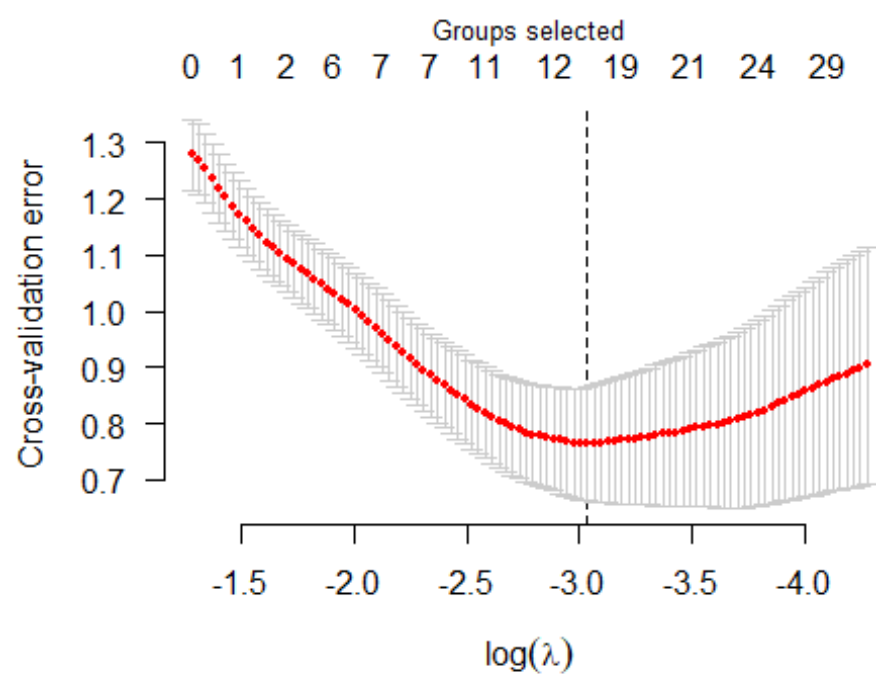
## [1] 15

pre<-predict(grp.lsvt.train2,test.lsvt[, -1],type="class",family="binomial")
pre.score<-predict(grp.lsvt.train2,test.lsvt[, -1],type="response",family="binomial")
plot( grp.lsvt2 )

```



```
plot( grp.lsvt.train2 )
```



```

pre<-as.factor(pre)
confusionMatrix( data= pre ,response[101:126] )

## Confusion Matrix and Statistics
##
##              Reference
## Prediction  0  1
##           0 15  0
##           1  3  8
##
##              Accuracy : 0.8846
##              95% CI : (0.6985, 0.9755)
##      No Information Rate : 0.6923
##      P-Value [Acc > NIR] : 0.02148
##
##              Kappa : 0.7547
##  Mcnemar's Test P-Value : 0.24821
##
##              Sensitivity : 0.8333
##              Specificity : 1.0000
##      Pos Pred Value : 1.0000
##      Neg Pred Value : 0.7273
##      Prevalence : 0.6923
##      Detection Rate : 0.5769
##      Detection Prevalence : 0.5769
##      Balanced Accuracy : 0.9167
##
##      'Positive' Class : 0
##

library(pROC)

## Warning: package 'pROC' was built under R version 3.4.4
## Type 'citation("pROC")' for a citation.
##
## Attaching package: 'pROC'

## The following object is masked from 'package:glmnet':
##
##      auc

## The following objects are masked from 'package:stats':
##
##      cov, smooth, var

plot(roc(response[101:126],pre.score , direction="<"),
      col="yellow", lwd=3, main="ROC curve")

```

