Univariate: Parkinson

Jose Tamez

2023-01-27

Contents

PARKINSON Univariate

Loading the libraries

```
library("FRESA.CAD")
library(readxl)
op <- par(no.readonly = TRUE)
pander::panderOptions('digits', 3)
pander::panderOptions('table.split.table', 400)
pander::panderOptions('keep.trailing.zeros',TRUE)
```

The Data

```
pd_speech_features <- as.data.frame(read_excel("~/GitHub/FCA/Data/pd_speech_features.xlsx",sheet = "pd_
```

The Average of the Three Repetitions

Each subject had three repeated observations. Here I'll use the average of the three experiments per subject.

```
rep1Parkison <- subset(pd_speech_features,RID==1)
rownames(rep1Parkison) <- rep1Parkison$id
rep1Parkison$id <- NULL
rep1Parkison$RID <- NULL
rep1Parkison[,1:ncol(rep1Parkison)] <- sapply(rep1Parkison,as.numeric)

rep2Parkison <- subset(pd_speech_features,RID==2)
rownames(rep2Parkison) <- rep2Parkison$id
rep2Parkison$id <- NULL
rep2Parkison$RID <- NULL
rep2Parkison[,1:ncol(rep2Parkison)] <- sapply(rep2Parkison,as.numeric)
```

```
rep3Parkison <- subset(pd_speech_features,RID==3)
rownames(rep3Parkison) <- rep3Parkison$id
rep3Parkison$id <- NULL
rep3Parkison$RID <- NULL
rep3Parkison[,1:ncol(rep3Parkison)] <- sapply(rep3Parkison,as.numeric)

whof <- !(colnames(rep1Parkison) %in% c("gender","class"));
avgParkison <- rep1Parkison;
avgParkison[,whof] <- (rep1Parkison[,whof] + rep2Parkison[,whof] + rep3Parkison[,whof])/3

pander::pander(table(avgParkison$class))
```

0	1
64	188

```
dataframe <- avgParkison
outcome <- "class"
```

```
pander::pander(c(rows=nrow(dataframe),col=ncol(dataframe)-1))
```

Standarize the names for the reporting

rows	col
252	753

```
pander::pander(table(dataframe[,outcome]))
```

0	1
64	188

```
varlist <- colnames(dataframe)
varlist <- varlist[varlist != outcome]
varlist <- as.data.frame(cbind(name=varlist,desc=varlist))
```

Univariate

```
univariate_columns <- c("caseMean","caseStd","controlMean","controlStd","controlKSP","ROCAUC","WilcoxRes
univar <- uniRankVar(varlist,
               paste(outcome,"~1"),
               outcome,
               dataframe,
               categorizationType = "Raw",
               type = "LOGIT",
               rankingTest = "AUC",
                cateGroups = c(0.1, 0.9),
                raw.dataFrame = NULL,
```

```
                description = ".",
                uniType = "Binary")
```

100 : std_MFCC_1st_coef 200 : app_entropy_shannon_10_coef 300 : app_LT_entropy_log_9_coef 400 : tqwt_entropy_log_dec_7 500 : tqwt_TKEO_std_dec_35
600 : tqwt_stdValue_dec_27 700 : tqwt_skewnessValue_dec_19

```
pander::pander(univar$orderframe[1:20,univariate_columns])
```

	caseMean	caseStd	controlMean	controlStd	controlKSPROCAUC	WilcoxRes.p	FRes.p
std_delta_delta_log_energy	1.56e-02	8.19e-03	8.83e-03	4.35e-03	0.151717	0.798	2.91e-11	4.44e-16
std_delta_log_energy	4.20e-02	2.76e-02	2.43e-02	1.23e-02	0.172528	0.794	5.93e-11	2.89e-15
std_9th_delta_delta	1.89e-02	4.69e-03	1.46e-02	2.48e-03	0.448029	0.787	1.72e-10	1.26e-13
std_8th_delta_delta	1.94e-02	4.73e-03	1.51e-02	2.23e-03	0.908376	0.780	1.39e-09	2.39e-12
std_7th_delta_delta	2.10e-02	5.62e-03	1.60e-02	2.94e-03	0.830363	0.776	4.53e-10	1.26e-12
tqwt_entropy_log_dec_12	1.68e+05	3.86e+04	-1.32e+05	3.25e+04	0.361893	0.770	3.44e-11	3.09e-13
std_6th_delta_delta	2.25e-02	6.42e-03	1.71e-02	2.97e-03	0.549789	0.768	3.41e-09	1.09e-11
std_8th_delta	4.09e-02	1.02e-02	3.20e-02	5.14e-03	0.960141	0.767	1.08e-08	1.04e-11
std_9th_delta	3.94e-02	1.01e-02	3.08e-02	5.80e-03	0.117295	0.764	7.85e-09	9.93e-12
tqwt_entropy_shannon_dec_12	6.13e+01	1.43e+02	2.18e+02	2.52e+02	0.013604	0.763	7.98e-17	3.78e-11
tqwt_stdValue_dec_12	2.81e-02	2.10e-02	4.45e-02	3.45e-02	0.292343	0.763	9.69e-16	3.45e-13
std_7th_delta	4.41e-02	1.21e-02	3.41e-02	6.99e-03	0.748746	0.760	4.85e-09	1.88e-11
tqwt_TKEO_mean_dec_12	8.95e-04	3.49e-03	4.06e-03	5.98e-03	0.000563	0.760	1.56e-18	5.80e-10
std_10th_delta_delta	1.86e-02	4.91e-03	1.46e-02	2.62e-03	0.920800	0.759	6.88e-09	9.10e-11
tqwt_TKEO_std_dec_12	1.02e-03	2.51e-03	4.21e-03	5.24e-03	0.001059	0.759	1.00e-17	3.60e-12
tqwt_entropy_log_dec_13	1.14e+05	3.17e+04	-8.82e+04	2.42e+04	0.265432	0.757	3.04e-09	8.77e-11
std_11th_delta_delta	1.73e-02	4.04e-03	1.40e-02	2.21e-03	0.963577	0.757	6.64e-09	2.24e-10
tqwt_stdValue_dec_13	4.35e-02	4.32e-02	8.75e-02	5.82e-02	0.650816	0.755	4.71e-13	1.61e-10
tqwt_entropy_log_dec_11	2.21e+05	4.22e+04	-1.86e+05	3.69e+04	0.321073	0.754	9.01e-10	3.73e-11
tqwt_entropy_shannon_dec_13	1.86e+02	1.84e+02	4.74e+02	4.39e+02	0.140805	0.754	4.68e-14	2.16e-09

```
topfiveOrg <- rownames(univar$orderframe[1:5,])
```

Decorrelation Analysis

```
DEdataframe <- GDSTMDecorrelation(dataframe,thr=0.80,verbose = TRUE)
```

Included: 717 , Uni p: 0.01155156 , Uncorrelated Base: 207 , Outcome-Driven Size: 0 , Base Size: 207

1 <R=1.000,w= 1,N= 291>, Top: 95(3)1 : 95 : 0.975,<|>Tot Used: 272 , Added: 178 , Zero Std: 0 , Max Cor: 1.000 2 <R=1.000,w= 1,N= 291>, Top: 15(2)1 : 15 : 0.975,<|>Tot Used: 282 , Added: 29 , Zero Std: 0 , Max Cor: 0.975 3 <R=0.975,w= 2,N= 227>, Top: 85(2)1 : 85 : 0.937,<|>Tot Used: 399 , Added: 113 , Zero Std: 0 , Max Cor: 0.991 4 <R=0.991,w= 2,N= 227>, Top: 9(1)1 : 9 : 0.946,<|>Tot Used: 403 , Added: 13 , Zero Std: 0 , Max Cor: 0.941 5 <R=0.941,w= 3,N= 249>, Top: 82(4)1 : 82 : 0.871,<|>Tot Used: 501 , Added: 124 , Zero Std: 0 , Max Cor: 0.990 6 <R=0.990,w= 3,N= 249>, Top: 12(1)1 : 12 : 0.895,<|>Tot Used: 509 , Added: 14 , Zero Std: 0 , Max Cor: 0.894 7 <R=0.894,w= 4,N= 183>, Top: 66(3)1 : 66 : 0.827,<|>Tot Used: 546 , Added: 83 , Zero Std: 0 , Max Cor: 0.942 8 <R=0.942,w= 4,N= 183>, Top: 12(2)1 : 12 : 0.821,<|>Tot Used: 551 , Added: 15 , Zero Std: 0 , Max Cor: 0.826 9 <R=0.826,w= 5,N= 20>, Top: 9(1)1 : 9 : 0.800,<|>Tot Used: 551 , Added: 10 , Zero Std: 0 , Max Cor: 0.945 10 <R=0.945,w= 5,N= 20>, Top: 1(1)1 : 1 : 0.800,<|>Tot Used: 551 , Added: 1 , Zero Std: 0 , Max Cor: 0.799 11 <R=0.000,w= 6,N= 0>-{ std_MFCC_4th_coef std_MFCC_6th_coef std_MFCC_8th_coef std_MFCC_10th_coef std_MFCC_12th_coef std_9th_delta Ed_1_coef det_entropy_shannon_2_coef det_entropy_log_5_coef det_LT_entropy_shannon_6_coef tqwt_energy_dec_7 tqwt_energy_dec_10 tqwt_energy_dec_33 tqwt_energy_dec_35 tqwt_entropy_shannon_dec_1 tqwt_entropy_shannon_dec_3 tqwt_entropy_shannon_dec_10 tqwt_entropy_shannon_dec_27 tqwt_entropy_shannon_dec_28 tqwt_entropy_shannon_dec_31 tqwt_entropy_log_dec_10 tqwt_entropy_log_dec_20 tqwt_entropy_log_dec_22 tqwt_TKEO_mean_dec_15 tqwt_TKEO_mean_dec_17 tqwt_TKEO_mean_dec_21 tqwt_TKEO_mean_dec_23 tqwt_TKEO_mean_dec_31 tqwt_TKEO_mean_dec_35 tqwt_TKEO_mean_dec_36 tqwt_TKEO_std_dec_19 tqwt_minValue_dec_1 tqwt_skewnessValue_dec_4 tqwt_skewnessValue_dec_34 tqwt_kurtosisValue_dec_34 }- [11], 0.799405 Decor Dimension: 551 . Cor to Base: 286 , ABase: 55 , Outcome Base: 0

```
pander::pander(c(Decorrleated_Fraction=sum(str_detect(colnames(DEdataframe),"La_"))/(ncol(DEdataframe)-
```

Decorrleated_Fraction
0.612

```
pander::pander(c(Base_Fraction=sum(str_detect(colnames(DEdataframe),"Ba_"))/(ncol(DEdataframe)-1)))
```

Base_Fraction
0

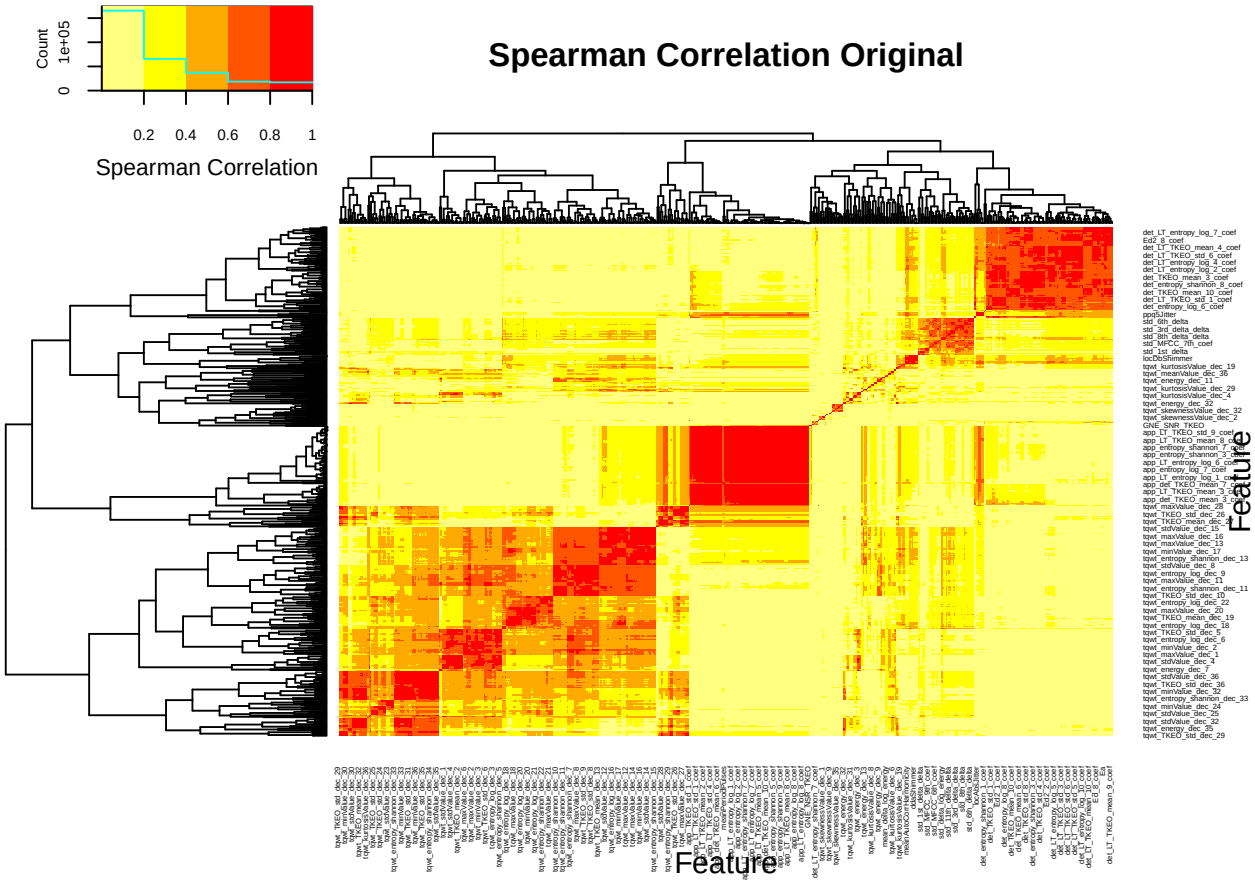
```
demat <- attr(DEdataframe,"GDSTM")
pander::pander(c(sparse_Fraction=1.0-sum(demat==0)/ncol(demat)/nrow(demat)))
```

sparse_Fraction
0.00386

```
varlistDe <-  colnames(DEdataframe)[colnames(DEdataframe) != "class"];
varlistDe <- as.data.frame(cbind(name=varlistDe,desc=varlistDe))
```

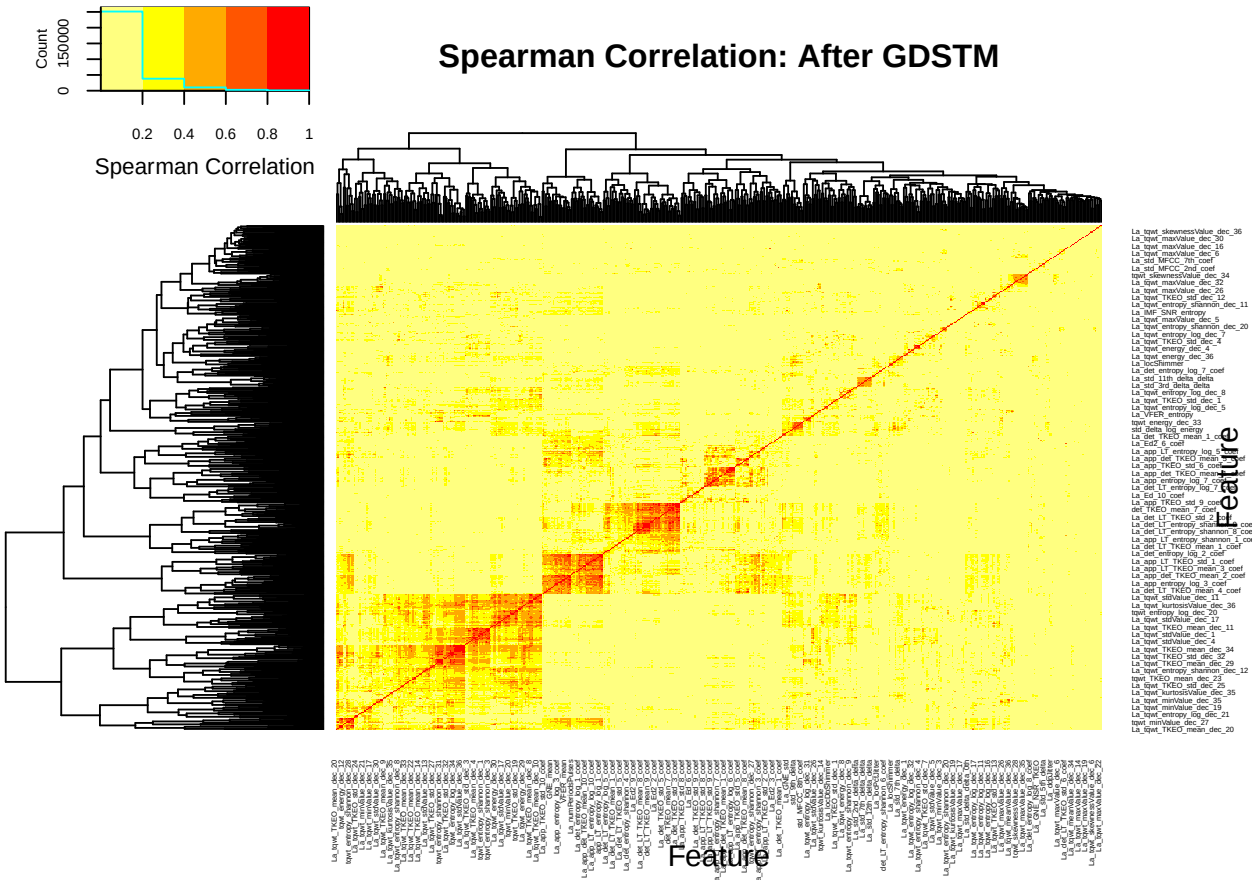
The heat maps.

```
par(cex=0.6,cex.main=0.85,cex.axis=0.7)
cormat <- cor(dataframe[,rownames(demat)],method="spearman")
cormat[is.na(cormat)] <- 0
gplots::heatmap.2(abs(cormat),
                  trace = "none",
#                  scale = "row",
                  mar = c(5,5),
                  col=rev(heat.colors(5)),
                  main = "Spearman Correlation Original",
                  cexRow = 0.35,
                  cexCol = 0.35,
                  key.title=NA,
                  key.xlab="Spearman Correlation",
                  xlab="Feature", ylab="Feature")
```




```
cormat <- cor(DEdataframe[,colnames(demat)],method="spearman")
cormat[is.na(cormat)] <- 0
gplots::heatmap.2(abs(cormat),
                  trace = "none",
#                  scale = "none",
                  mar = c(5,5),
                  col=rev(heat.colors(5)),
```

```
                main = "Spearman Correlation: After GDSTM",
                cexRow = 0.35,
                cexCol = 0.35,
                key.title=NA,
                key.xlab="Spearman Correlation",
                xlab="Feature", ylab="Feature")
```




```
par(op)
```

Univariate Decorrelated

```
univarDe <- uniRankVar(varlistDe,
                paste(outcome,"~1"),
                  outcome,
                DEdataframe,
                  categorizationType = "Raw",
                  type = "LOGIT",
                  rankingTest = "AUC",
                  cateGroups = c(0.1, 0.9),
                  raw.dataFrame = NULL,
                  description = ".",
                  uniType = "Binary")
```

100 : La_std_MFCC_1st_coef 200 : La_app_entropy_shannon_10_coef 300 : La_app_LT_entropy_log_9_coef 400 : La_tqwt_entropy_log_dec_7 500 : La_tqwt_TKEO_std_dec_35

600 : La_tqwt_stdValue_dec_27 700 : tqwt_skewnessValue_dec_19

```
pander::pander(univarDe$orderframe[1:20,univariate_columns])
```

	caseMean	caseStd	controlMean	controlStd	controlKS	PROCAUC	WilcoxRes.p	FRes.p
std_delta_log_energy	4.20e-02	2.76e-02	2.43e-02	1.23e-02	1.73e-01	0.794	5.93e-11	2.89e-15
La_tqwt_entropy_log_dec_33	2.32e+02	6.61e+01	3.72e+02	5.55e-01	0.792	9.17e-16	0.00e+00	2.53e+02
std_9th_delta	3.94e-02	1.01e-02	3.08e-02	5.80e-03	1.17e-01	0.764	7.85e-09	9.93e-12
mean_MFCC_2nd_coef	1.65e+00	1.37e+00	1.27e-01	1.71e+00	9.59e-01	0.753	5.17e-11	5.16e-14
La_tqwt_kurtosisValue_dec_33	2.46e+00	3.33e+00	-3.33e-01	4.52e+00	9.49e-03	0.749	3.03e-10	1.10e-11
tqwt_minValue_dec_13	1.60e-01	1.26e-01	-2.92e-01	1.68e-01	6.80e-01	0.746	1.11e-12	8.76e-11
La_std_delta_delta_log_energy	3.48e-03	3.09e-03	1.84e-03	1.64e-03	8.73e-02	0.744	1.99e-07	2.28e-06
La_apq11Shimmer	1.38e-02	1.45e-02	4.49e-03	9.78e-03	3.25e-02	0.731	4.41e-07	6.24e-08
tqwt_kurtosisValue_dec_20	2.55e+00	7.90e-01	2.09e+00	4.00e-01	2.44e-01	0.727	5.86e-07	6.25e-09
La_std_6th_delta	9.37e-03	7.37e-03	5.06e-03	3.64e-03	7.46e-01	0.726	2.39e-07	3.34e-05
tqwt_energy_dec_26	7.22e-02	8.33e-02	2.92e-02	5.56e-02	1.34e-05	0.726	9.12e-05	5.30e-06
tqwt_energy_dec_27	5.24e-02	9.45e-02	1.30e-02	3.57e-02	7.68e-08	0.725	3.58e-03	1.52e-04
La_tqwt_entropy_shannon_dec_33	-5.89e-01	1.63e+00	6.74e-01	3.68e+00	3.36e-06	0.720	7.00e-07	4.49e-06
tqwt_energy_dec_12	3.68e-03	7.60e-03	1.27e-02	1.66e-02	2.80e-03	0.717	4.38e-15	2.09e-09
La_GNE_std	-7.89e-02	6.02e-02	-1.27e-01	6.85e-02	9.30e-01	0.714	6.01e-09	3.99e-09
tqwt_entropy_log_dec_10	5.18e+04	2.63e+05	-2.29e+05	3.92e+04	2.37e-01	0.713	1.87e-06	2.15e-07
rapJitter	7.04e-04	9.87e-04	3.14e-04	3.46e-04	6.25e-03	0.711	4.56e-04	3.73e-06
DFA	7.13e-01	6.33e-02	6.64e-01	6.16e-02	8.65e-01	0.711	4.83e-07	3.82e-08
tqwt_entropy_shannon_dec_17	5.96e+02	4.67e+02	9.44e+02	4.14e+02	2.96e-01	0.709	6.78e-06	1.77e-07
tqwt_energy_dec_28	2.28e-02	5.50e-02	6.13e-03	2.34e-02	6.81e-11	0.709	3.51e-01	5.47e-03

Comparing Decorrelation vs Original

```
pthr <- 0.20/(ncol(dataframe)-1)

topDecorNames <- rownames(univarDe$orderframe[univarDe$orderframe$FRes.p<pthr,])
topDecorNames <- unique(c(topDecorNames,rownames(univarDe$orderframe[1:5,])))
```

```
#topDecorNames <- rownames(univarDe$orderframe[univarDe$orderframe$FRes.p<1.0e-5,])
dc <- getLatentCoefficients(DEdataframe)
### 2a Get only the ones that in the top features
deNames_in_dc <- topDecorNames[topDecorNames %in% names(dc)]
selectedlist <- dc[deNames_in_dc]
theDeFormulas <- selectedlist

rawuniv <- univariate_Wilcoxon(dataframe,outcome,limit=-1)
deuniv <- univariate_Wilcoxon(DEdataframe,outcome,limit=-1)
matsize <- (ncol(dataframe)-1)^2
nocorrelated <- ncol(dataframe) - 1 - ncol(demat)
pander::pander(c(sparse_Fraction=(sum(demat != 0) + nocorrelated)/matsize))
```

sparse_Fraction
0.00243

```
pander::pander(c(raw=length(rawuniv),decor=length(deuniv)))
```

raw	decor
505	382

```
pander::pander(c(Number_Latent=length(dc)))
```

Number_Latent
461

```
pander::pander(c(meanSize=mean(sapply(dc,length))))
```

meanSize
2.35

CV ROC Analysis

```
par(op)
par(mfrow=c(1,2),cex=0.9)
fraction <-0.70
repetitions <- 100

fcout <- round(fraction*nrow(dataframe)/15+1.0)
pander::pander(c(NumberofFeatures=fcout))
```

NumberofFeatures
13

```
cvRaw <- randomCV(dataframe,
                  outcome,
                  fittingFunction= filteredFit,
                  classSamplingType = "Pro",
                  trainFraction = fraction,
                  repetitions = repetitions,
#                  fitmethod=  glm,
                  fitmethod=  KNN_method,
                  filtermethod=mRMR.classic_FRESA,
                  filtermethod.control=list(feature_count= fcout),
#                  family="binomial"
)
```

.....10 Tested: 243 Avg. Selected: 13 Min Tests: 1 Max Tests: 8 Mean Tests: 3.168724 . MAD: 0.2423648 .....20 Tested: 252 Avg. Selected: 13 Min Tests: 1 Max Tests: 12 Mean Tests: 6.111111 . MAD: 0.2426934 .....30 Tested: 252 Avg. Selected: 13 Min Tests: 2 Max Tests: 18 Mean Tests: 9.166667 . MAD: 0.2345002 .....40 Tested: 252 Avg. Selected: 13 Min Tests: 6 Max Tests: 23 Mean Tests: 12.22222 . MAD: 0.2379149 .....50 Tested: 252 Avg. Selected: 13 Min Tests: 8 Max Tests: 25 Mean Tests: 15.27778 . MAD: 0.2384251 .....60 Tested: 252 Avg. Selected: 13 Min Tests: 11 Max Tests: 30 Mean Tests: 18.33333 . MAD: 0.2397353 .....70 Tested: 252 Avg. Selected: 13 Min Tests: 12 Max Tests: 34 Mean Tests: 21.38889 . MAD: 0.2412336 .....80 Tested: 252 Avg. Selected: 13 Min Tests: 14 Max Tests: 38 Mean Tests: 24.44444 . MAD: 0.2411179 .....90 Tested: 252 Avg. Selected: 13 Min Tests: 16 Max Tests: 40 Mean Tests: 27.5 . MAD: 0.2418454 .....100 Tested: 252 Avg. Selected: 13 Min Tests: 19 Max Tests: 45 Mean Tests: 30.55556 . MAD: 0.2408478

```
bpraw <- predictionStats_binary(cvRaw$medianTest,"RAW",cex=0.75)
```

RAW

```
pander::pander(bpraw$CM.analysis$tab)
```

	Outcome +	Outcome -	Total
Test +	182	39	221
Test -	6	25	31
Total	188	64	252

```
pander::pander(bpraw$accc)
```

est	lower	upper
0.821	0.768	0.867

```
pander::pander(bpraw$aucs)
```

est	lower	upper
0.838	0.78	0.896

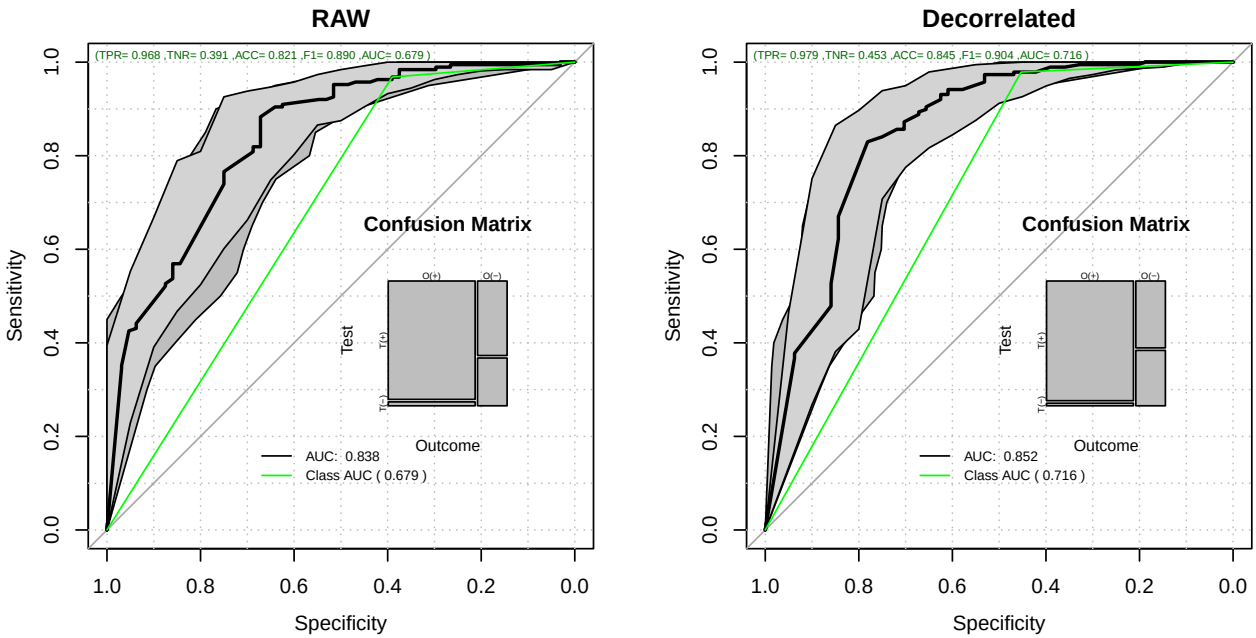
```
pander::pander(bpraw$berror)
```

50%	2.5%	97.5%
0.319	0.26	0.379

```
cvDe <- randomCV(DEdataframe,
                 outcome,
                 fittingFunction= filteredFit,
                 trainSampleSets= cvRaw$trainSamplesSets,
#                 fitmethod=  glm,
                 fitmethod=  KNN_method,
                 filtermethod=mRMR.classic_FRESA,
                 filtermethod.control=list(feature_count= fcout),
#                 family="binomial"
)
```

.....10 Tested: 243 Avg. Selected: 13 Min Tests: 1 Max Tests: 8 Mean Tests: 3.168724 . MAD: 0.2168949 .....20 Tested: 252 Avg. Selected: 13 Min Tests: 1 Max Tests: 12 Mean Tests: 6.111111 . MAD: 0.2094537 .....30 Tested: 252 Avg. Selected: 13 Min Tests: 2 Max Tests: 18 Mean Tests: 9.166667 . MAD: 0.21315 .....40 Tested: 252 Avg. Selected: 13 Min Tests: 6 Max Tests: 23 Mean Tests: 12.22222 . MAD: 0.2139342 .....50 Tested: 252 Avg. Selected: 13 Min Tests: 8 Max Tests: 25 Mean Tests: 15.27778 . MAD: 0.2127976 .....60 Tested: 252 Avg. Selected: 13 Min Tests: 11 Max Tests: 30 Mean Tests: 18.33333 . MAD: 0.2160222 .....70 Tested: 252 Avg. Selected: 13 Min Tests: 12 Max Tests: 34 Mean Tests: 21.38889 . MAD: 0.2194224 .....80 Tested: 252 Avg. Selected: 13 Min Tests: 14 Max Tests: 38 Mean Tests: 24.44444 . MAD: 0.2181603 .....90 Tested: 252 Avg. Selected: 13 Min Tests: 16 Max Tests: 40 Mean Tests: 27.5 . MAD: 0.2194381 .....100 Tested: 252 Avg. Selected: 13 Min Tests: 19 Max Tests: 45 Mean Tests: 30.55556 . MAD: 0.2193976

```
bpDecor <- predictionStats_binary(cvDe$medianTest,"Decorrelated",cex=0.75)
```



Decorrelated

```
par(op)

pander::pander(bpDecor$CM.analysis$tab)
```

	Outcome +	Outcome -	Total
Test +	184	35	219
Test -	4	29	33
Total	188	64	252

```
pander::pander(bpDecor$accc)
```

est	lower	upper
0.845	0.795	0.888

```
pander::pander(bpDecor$aucs)
```

est	lower	upper
0.852	0.791	0.913

```
pander::pander(bpDecor$berror)
```

50%	2.5%	97.5%
0.283	0.219	0.344

```
### Here we compute the probability that the outcome-driven decorrelation ROC is superior to the RAW RO
pander::pander(roc.test(bpDecor$ROC.analysis$roc.predictor,bpraw$ROC.analysis$roc.predictor,alternative
```

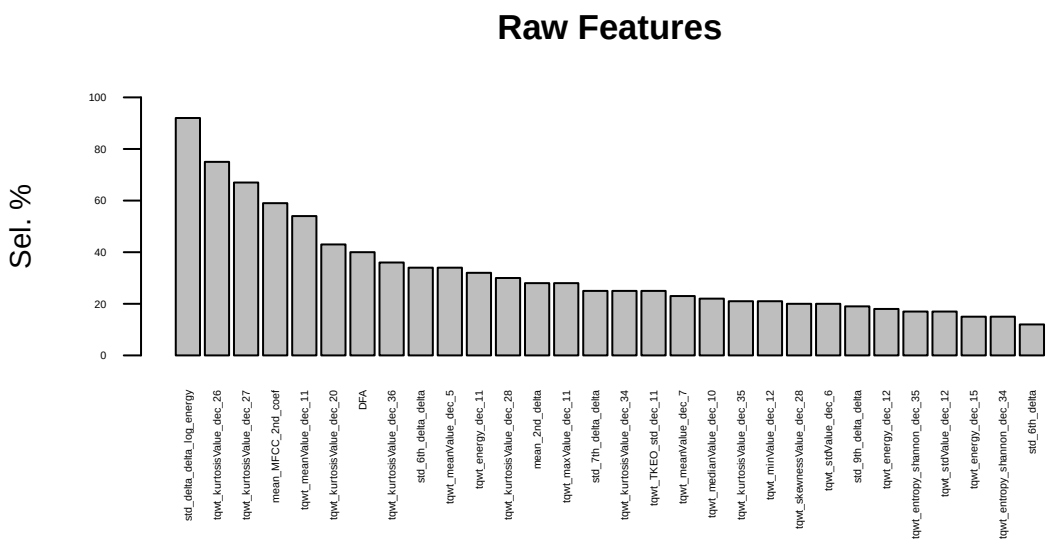
Table 22: DeLong's test for two correlated ROC curves: `bpDecor$ROC.analysis$roc.predictor` and `bpraw$ROC.analysis$roc.predictor`

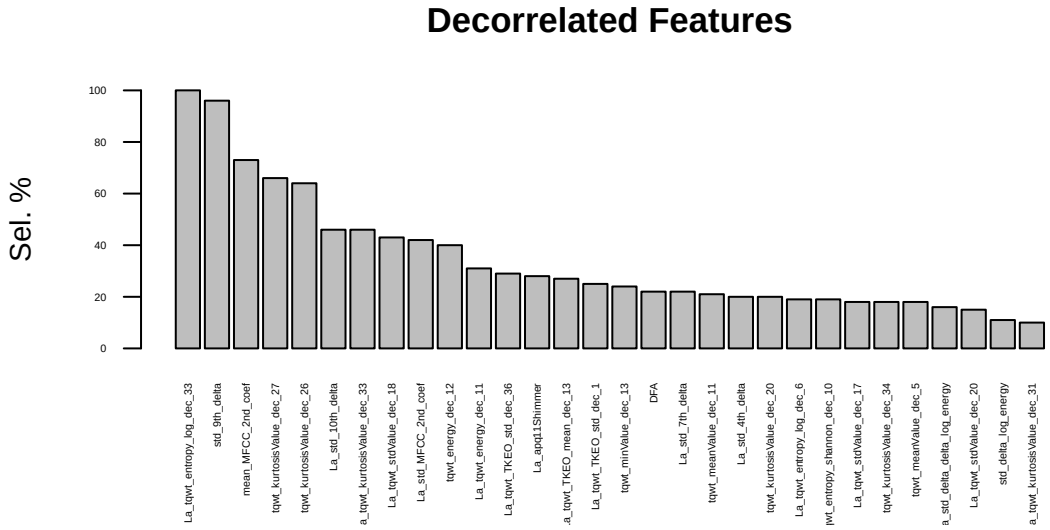
Test statistic	P value	Alternative hypothesis	AUC of roc1	AUC of roc2
0.691	0.245	greater	0.852	0.838

Feature Frequency Plots

```
par(mfrow=c(2,1),cex=0.9,cex.axis=0.8)

rawtopf <- cvRaw$featureFrequency/repetitions
crawtopf <- rawtopf

if (length(rawtopf) > 30)
{
  rawtopf <- rawtopf[1:30]
}
barplot(100*rawtopf,las=2,main="Raw Features",ylim=c(0,100.0),cex.names = 0.35,cex.axis = 0.35,ylab="Se

detopf <- cvDe$featureFrequency/repetitions
cdetopf <- detopf
```

```
names(cdetopf) <- str_remove_all(names(cdetopf),"Ba_")
names(cdetopf) <- str_remove_all(names(cdetopf),"La_")
if (length(detopf) > 30)
{
  detopf <- detopf[1:30]
}

barplot(100*detopf,las=2,main="Decorrelated Features",ylim=c(0,100.0),cex.names = 0.35,cex.axis = 0.35,y
```






```
par(op)
```

Final Table

```
unlistdecorr <- selectedlist
names(unlistdecorr) <- NULL
unlistdecorr <- unique(names(unlist(unlistdecorr)))

finalTableDe <- univarDe$orderframe[deNames_in_dc,univariate_columns]
```

```
finalTableOr <- univar$orderframe[unique(c(topfiveOrg,unlistdecorr,names(crawtopf)[1:2],names(cdetopf)[1

finalTable <- rbind(finalTableOr,finalTableDe)

deFromula <- character(length(theDeFormulas))
names(deFromula) <- names(theDeFormulas)

for (dx in names(deFromula))
{
  coef <- theDeFormulas[[dx]]
  cname <- names(theDeFormulas[[dx]])
  names(cname) <- cname
  for (cf in names(coef))
  {
    if (cf != dx)
    {
      if (coef[cf]>0)
      {
        deFromula[dx] <- paste(deFromula[dx],
                               sprintf("+ %5.3f*%s",coef[cf],cname[cf]))
      }
      else
      {
        deFromula[dx] <- paste(deFromula[dx],
                               sprintf("%5.3f*%s",coef[cf],cname[cf]))
      }
    }
  }
}

orgnamez <- rownames(finalTable)
orgnamez <- str_remove_all(orgnamez,"Ba_")
orgnamez <- str_remove_all(orgnamez,"La_")
finalTable$uAUC <- univar$orderframe[orgnamez,"ROCAUC"]
finalTable$raw_Freq <- crawtopf[orgnamez]
finalTable$La_Freq <- cdetopf[orgnamez]
finalTable$DecorFormula <- deFromula[rownames(finalTable)]
fscores <- attr(DEdataframe,"fscore")
finalTable$fscores <- fscores[rownames(finalTable)]

finalTable <- finalTable[order(-finalTable$ROCAUC),]

pander::pander(finalTable)
```

	caseMean	caseStd	controlMean	controlStd	KSI	AUC	coxHR	p.uAUC	raw_Freq	La_Freq	DecorFormula	fscores
std_delta_delta_log_energy	1.56e-02	8.19e-03	8.83e-03	4.35e-03	1.52e-01	0.798	2.91e-11	4.44e-16	0.798	0.92	0.16	NA	NA
std_delta_log_energy	1.20e-02	2.76e-02	2.43e-02	1.23e-02	1.73e-01	0.794	5.93e-11	2.89e-15	0.794	0.03	0.11	NA	4

	caseMean	caseStd	controlMean	controlStd	KSP	AUC	coxHR	p.u	AUC	raw_Freq	Freq_Fre	DecorFormula	fscores
La__tqwt__entropy__log__dec__33	2.53e+02	1.32e+02	3.61e+01	3.72e+01	5.25e-01	0.792	9.17e-16	0.00e+00	0.644	0.04	1.00	- 0.693 *tqwt__entropy__log__dec__31* + *1.000* tqwt__entropy__log__dec__33	-1
std__9th__delta__delta	1.89e-02	1.69e-03	1.46e-02	2.48e-03	4.48e-01	0.787	1.72e-10	1.26e-13	0.787	0.19	NA	NA	NA
std__8th__delta__delta	1.94e-02	1.73e-03	1.51e-02	2.23e-03	9.08e-01	0.780	1.39e-09	2.39e-12	0.780	0.05	NA	NA	NA
std__7th__delta__delta	2.10e-02	1.62e-03	1.60e-02	2.94e-03	8.30e-01	0.776	4.53e-10	1.26e-12	0.776	0.25	NA	NA	NA
tqwt__entropy__log__dec__12	1.68e+05	3.86e+04	1.32e+05	3.25e+04	3.462e-01	0.770	3.44e-11	3.09e-13	0.770	NA	0.01	NA	NA
std__8th__delta	4.09e-02	1.02e-02	3.20e-02	5.14e-03	9.60e-01	0.767	1.08e-08	1.04e-11	0.767	0.07	0.04	NA	NA
std__9th__delta	3.94e-02	1.01e-02	3.08e-02	5.80e-03	1.17e-01	0.764	7.85e-09	9.93e-12	0.764	0.03	0.96	NA	3
tqwt__entropy__shannon__dec__12	6.15e+04	1.61e+04	2.18e+04	2.52e+03	1.236e-02	0.763	7.98e-17	3.78e-11	0.763	NA	NA	NA	NA
tqwt__stdValue__dec__12	1.81e-02	2.10e-02	4.45e-02	3.45e-02	2.92e-01	0.763	9.69e-16	3.45e-13	0.763	0.17	0.02	NA	NA
std__7th__delta	4.41e-02	1.21e-02	3.41e-02	6.99e-03	7.49e-01	0.760	4.85e-09	1.88e-11	0.760	0.05	0.22	NA	NA
tqwt__entropy__log__dec__11	2.21e+05	4.89e+04	1.86e+05	3.69e+04	3.421e-01	0.754	9.01e-10	3.73e-11	0.754	NA	0.04	NA	NA
tqwt__TKEO__mean__dec__13	5.74e-03	1.91e-02	1.73e-02	2.51e-02	9.85e-04	0.753	1.92e-16	7.27e-07	0.753	NA	0.27	NA	NA
tqwt__minValue__dec__12	9.07e-02	6.74e-02	-1.77e-01	1.08e-01	4.04e-01	0.752	1.48e-13	2.49e-13	0.752	0.21	0.03	NA	NA
std__6th__delta	4.75e-02	1.36e-02	3.66e-02	6.86e-03	3.36e-01	0.749	2.69e-08	2.35e-10	0.749	0.12	0.04	NA	NA
La__tqwt__kurtosisValue__dec__33	2.42e+00	7.03e-01	3.33e-01	3.52e+00	9.049e-03	0.749	3.03e-10	1.10e-11	0.628	NA	0.46	- 0.872 *tqwt__kurtosisValue__dec__32* + *1.000* tqwt__kurtosisValue__dec__33	-1
std__10th__delta	3.89e-02	1.05e-02	3.07e-02	5.57e-03	8.51e-01	0.746	4.51e-08	1.07e-09	0.746	0.01	0.46	NA	NA
tqwt__minValue__dec__13	1.60e-01	1.20e-01	-2.92e-01	1.68e-01	6.80e-01	0.746	1.11e-12	8.76e-11	0.746	NA	0.24	NA	4
La__std__delta__delta__log__energy	3.48e-03	3.09e-03	1.84e-03	1.64e-03	8.73e-02	0.744	1.99e-07	2.28e-06	0.798	0.92	0.16	- 0.288 *std__delta__log__energy* + *1.000* std__delta__delta__log__energy	-1
tqwt__entropy__shannon__dec__11	2.58e+04	6.42e+03	8.76e+03	1.07e+03	2.271e-03	0.744	1.64e-14	7.60e-11	0.744	0.01	0.01	NA	NA
tqwt__TKEO__std__dec__11	4.46e-04	7.61e-04	1.84e-03	2.70e-03	5.42e-04	0.741	5.12e-15	9.27e-12	0.741	0.25	0.08	NA	NA
std__12th__delta	3.46e-02	8.43e-03	2.85e-02	5.98e-03	7.23e-02	0.734	2.74e-07	8.71e-09	0.734	NA	0.04	NA	NA

	caseMean	caseStd	controlMean	controlStd	KSP	AUC	coxHR	p.adj	AUC	raw_Freq	Freq_Fr	DecorFormula	fscores
La__apq11Shimmer	1.38e-02	1.45e-02	4.49e-03	9.78e-03	3.25e-02	0.731	4.41e-07	6.24e-08	0.713	NA	0.28	- 1.278 *apq3Shimmer* + *1.000* apq11Shimmer	-1
tqwt__TKEO_mean_dec_11	2.03e-04	6.23e-04	1.11e-03	1.99e-03	8.06e-05	0.731	2.01e-14	7.40e-09	0.731	0.09	NA	NA	NA
La__std__6th__delta	1.37e-03	7.37e-03	5.06e-03	3.64e-03	7.46e-01	0.726	2.39e-07	3.34e-05	0.749	0.12	0.04	- 0.106 *std__MFCC__6th__coef* + *1.000* std__6th__delta	0
tqwt__TKEO_std_dec_13	1.49e-02	1.25e-02	1.41e-02	3.25e-02	4.85e-02	0.723	1.05e-11	2.23e-07	0.723	NA	NA	NA	NA
tqwt__entropy_log_dec_14	8.08e+04	7.64e+04	6.34e+04	1.80e+04	2.28e-01	0.720	1.10e-06	3.29e-08	0.720	NA	NA	NA	NA
La__tqwt__entropy__shannon__dec__33	5.89e-01	1.60e-01	6.71e-01	3.68e-03	3.36e-06	0.720	7.00e-07	4.49e-06	0.621	0.01	0.04	- 0.725 *tqwt__entropy__shannon__dec__3* + *1.000* tqwt__entropy__shannon__dec__3	0
tqwt__entropy__shannon__dec__12	3.39e-03	9.73e-03	6.62e-02	1.76e-02	6.14e-01	0.718	2.77e-09	6.36e-08	0.718	NA	NA	NA	NA
tqwt__TKEO_mean_dec_17	1.70e-02	2.93e-02	3.74e-02	3.92e-02	2.81e-02	0.717	1.98e-11	5.96e-06	0.717	NA	NA	NA	NA
La__GNE__std	- 7.89e-02	6.02e-02	- 1.27e-01	6.85e-02	9.30e-01	0.714	6.01e-09	3.99e-09	0.574	NA	0.08	- 0.280 *GNE__mean* + *1.000* GNE__std	-1
tqwt__TKEO_mean_dec_7	7.89e-05	1.35e-04	2.74e-04	4.83e-04	1.09e-06	0.713	4.77e-11	1.36e-05	0.713	0.04	NA	NA	NA
apq11Shimmer	5.99e-02	2.83e-02	4.21e-02	2.52e-02	1.21e-01	0.713	7.02e-06	6.42e-08	0.713	NA	0.28	NA	NA
tqwt__entropy_log_dec_10	2.63e+05	5.18e+04	2.29e+05	3.92e+04	2.37e-01	0.713	1.87e-06	2.15e-07	0.713	NA	NA	NA	3
tqwt__entropy__shannon__dec__7	1.56e-01	9.93e-02	3.74e-01	7.26e+00	7.68e-05	0.712	1.39e-09	3.79e-06	0.712	0.08	NA	NA	NA
La__std__4th__delta	1.30e-03	6.70e-03	- 8.40e-04	5.55e-03	2.35e-01	0.708	1.40e-07	2.01e-05	0.679	NA	0.20	- 0.127 *std__MFCC__4th__coef* + *1.000* std__4th__delta	0
La__tqwt__stdValue__dec__20	5.08e-03	2.65e-02	2.08e-02	2.73e-02	7.96e-01	0.708	1.00e-07	6.15e-07	0.607	NA	0.15	+ 1.000 *tqwt__stdValue__dec__20* + *0.387* tqwt__minValue__dec__20	-1
tqwt__entropy__shannon__dec__8	2.45e-01	9.70e-02	5.61e-01	1.74e+01	1.14e-03	0.707	1.08e-10	6.87e-06	0.707	0.01	NA	NA	NA
std__MFCC__8th__coef	1.98e-01	7.30e-02	2.50e-01	4.52e-02	5.49e-01	0.705	6.26e-06	2.88e-07	0.705	0.01	0.03	NA	1
La__std__10th__delta	7.38e-05	4.44e-03	- 3.02e-03	4.24e-03	6.82e-01	0.704	7.65e-08	2.07e-06	0.746	0.01	0.46	- 0.138 *std__MFCC__10th__coef* + *1.000* std__10th__delta	0
tqwt__TKEO_mean_dec_6	1.71e-04	3.31e-04	4.85e-04	9.80e-04	4.47e-06	0.704	3.70e-12	4.69e-05	0.704	NA	NA	NA	NA

	caseMean	caseStd	controlMean	controlStd	controlKSP	ROCAUC	WilcoxRes.p	FRes.p	uAUC	raw_Freq	La_Freq	DecorFormula	fscores
La_tqwt_stdValue_dec_12	9.45e-03	6.50e-03	1.38e-02	7.53e-03	2.10e-01	0.703	1.41e-06	5.17e-08	0.763	0.17	0.02	- 0.000*tqwt_entropy_shannon_dec_12* + *1.000*tqwt_stdValue_dec_12	-1
La_app_LT_entropy_log_2_coef	3.76e+01	2.92e-01	3.74e+01	1.85e-01	3.16e-01	0.702	5.60e-06	1.30e-05	0.647	NA	0.01	- 0.576*app_LT_entropy_log_1_coef* + *1.000*app_LT_entropy_log_2_coef	-1
tqwt_entropy_shannon_dec_10	3.15e+01	1.17e+01	3.27e+01	1.84e+01	7.70e-03	0.701	1.70e-09	2.07e-07	0.701	NA	0.19	NA	6
La_std_MFCC_2nd_coef	7.08e-02	7.17e-02	1.17e-01	7.21e-02	1.33e-01	0.701	1.54e-07	7.54e-06	0.508	NA	0.42	+ 1.000*std_MFCC_2nd_coef* - *6.424*std_2nd_delta	-1
La_app_LT_TKEO_std_6_coef	8.13e+00	2.22e+00	7.46e-02	6.89e+00	5.59e-02	0.701	1.50e-06	1.64e-04	0.685	NA	0.04	+ 0.651*app_entropy_log_1_coef* - *2.238*app_LT_entropy_log_1_coef + 2.761*app_LT_entropy_log_8_coef* - *11.719*app_LT_TKEO_mean_3_co - 3.019*app_LT_TKEO_mean_6_coef* + *1.000*app_LT_TKEO_std_6_coef	-3
tqwt_stdValue_dec_6	3.93e-03	3.86e-03	7.10e-03	7.26e-03	2.39e-02	0.701	1.14e-07	1.37e-05	0.701	0.20	0.05	NA	NA
La_tqwt_minValue_dec_33	8.67e-03	3.58e-02	1.28e-02	5.90e-02	2.59e-03	0.698	6.66e-14	5.84e-05	0.608	NA	0.10	- 0.902*tqwt_minValue_dec_32* + *1.000*tqwt_minValue_dec_33	0
tqwt_entropy_log_dec_6	-6.73e+05	1.48e+05	-5.90e+05	8.41e+04	3.13e-01	0.696	1.35e-05	2.86e-06	0.696	NA	0.19	NA	NA
app_LT_TKEO_mean_3_coef	1.00e+01	1.21e+01	3.18e+00	1.30e+00	5.60e-01	0.690	4.62e-07	3.77e-06	0.690	NA	NA	NA	NA
La_std_7th_delta	1.71e-03	5.22e-03	-1.80e-03	5.30e-03	2.38e-01	0.689	9.55e-07	2.45e-06	0.760	0.05	0.22	- 0.131*std_MFCC_7th_coef* + *1.000*std_7th_delta	0
La_tqwt_entropy_log_dec_31	-8.33e+02	4.83e+02	-1.28e+03	8.06e+02	9.26e-01	0.689	1.25e-07	8.81e-11	0.548	NA	0.04	+ 1.000*tqwt_entropy_log_dec_31* - *1.241*tqwt_entropy_log_dec_34	2
La_app_LT_entropy_log_9_coef	1.04e+01	1.50e-05	1.04e+01	1.09e-05	7.58e-01	0.688	7.71e-06	1.12e-04	0.682	NA	0.02	- 0.001*det_LT_TKEO_mean_9_coef* - *1.000*app_LT_entropy_log_8_coef + 1.000*app_LT_entropy_log_9_coef	-2
app_LT_TKEO_mean_2_coef	3.04e+00	9.35e-01	2.67e+00	4.13e-01	7.30e-01	0.687	5.25e-07	1.66e-05	0.687	0.01	0.01	NA	NA

	caseMean	caseStd	controlMean	controlStd	KSC	AUC	coxHR	p.u	AUC	raw_Freq	Freq_Re	DecorFormula	fscores
La__std__8th__delta	3.40e-03	4.74e-04	4.95e-04	3.88e-03	5.33e-01	0.687	6.26e-06	1.65e-05	0.767	0.07	0.04	- 0.126*std__MFCC__8th__coef* + *1.000*std_8th_delta	0
app__entropy__shannon__coef	1.02e+09	1.85e+09	2.74e+09	1.59e+09	5.08e-01	0.686	5.83e-09	2.22e-07	0.686	0.01	NA	NA	NA
app__entropy__shannon__coef	2.13e+09	3.87e+09	5.71e+09	3.31e+09	5.12e-01	0.686	5.95e-09	2.21e-07	0.686	NA	0.06	NA	NA
La__tqwt__TKEO__std__dec__11	6.69e-05	3.22e-04	2.83e-04	7.06e-04	1.06e-03	0.686	3.55e-13	2.04e-07	0.741	0.25	0.08	- 1.309*tqwt__TKEO__mean__dec__11* + *1.000*tqwt_TKEO__std__dec__11	-1
La__app__LT__entropy__log__4__coef	5.00e-01	2.21e-01	5.04e-01	6.82e-01	8.31e-03	0.686	2.20e-04	1.21e-05	0.654	NA	NA	+ 0.185*app__entropy__log__1__coef* - *0.337*app_entropy__log__2__coef - 0.201*app__LT__entropy__log__1__coef* + *1.000*app_LT__entropy__log__4__coef	-2
La__tqwt__TKEO__mean__dec__8	1.02e-03	9.68e-05	1.43e-04	2.44e-04	1.09e-04	0.685	5.01e-06	1.40e-04	0.704	NA	NA	- 0.000*tqwt__entropy__shannon__dec__8* + *1.000*tqwt_TKEO__mean__dec__8	0
La__tqwt__entropy__shannon__dec__7	5.00e-01	0.00e+00	5.00e-01	1.42e-01	1.89e-02	0.685	7.91e-08	2.15e-04	0.712	0.08	NA	+ 1.000*tqwt__entropy__shannon__dec__7* - *137039.733*tqwt__TKEO__mean__dec_	-1
app__LT__TKEO__std__dec__6	1.62e+02	1.62e+02	5.89e+02	2.38e+04	4.77e-01	0.685	1.48e-06	7.50e-07	0.685	NA	0.04	NA	NA
app__LT__TKEO__mean__dec__6	1.06e+02	1.06e+02	3.91e+02	2.26e+04	4.66e-01	0.684	1.81e-06	5.58e-07	0.684	NA	NA	NA	NA
La__std__12th__delta	1.86e-03	4.45e-03	- 9.07e-04	4.00e-03	7.47e-01	0.683	4.39e-06	1.50e-05	0.734	NA	0.04	- 0.130*std__MFCC__12th__coef* + *1.000*std_12th__delta	0
La__tqwt__stdValue__dec__17	7.00e-01	5.63e-02	7.37e-01	3.76e-02	8.45e-01	0.683	3.54e-05	1.51e-06	0.681	NA	0.18	- 0.929*tqwt__TKEO__mean__dec__17* + *1.000*tqwt_stdValue__dec__17	0
app__LT__entropy__log__8__coef	1.33e+02	1.33e+02	8.08e+02	2.68e+04	3.53e-01	0.682	8.64e-06	1.86e-06	0.682	NA	0.02	NA	34
app__LT__entropy__log__9__coef	1.42e+02	1.42e+02	9.04e+02	2.68e+04	3.53e-01	0.682	8.61e-06	1.86e-06	0.682	NA	0.02	NA	NA

	caseMean	caseStd	controlMean	controlStd	KSP	AUC	coxHR	p.raw	AUC	Freq_Pre	Decor	Formula	fscores
La__app__entropy__log__4__coef	8.14e+01	1.69e+02	1.17e+02	1.21e-01	0.681	1.28e-07	7.70e-06	0.668	NA	0.02	+ 0.213	-1 *app__entropy__log__1__coef* + *1.000* app__entropy__log__4__coef + 0.005 *app__LT__entropy__shannon__1__* - *0.733* app__LT__entropy__log__1__coef - 2.529* app__LT__entropy__log__8__coef	
tqwt__stdValue__dec__37	2.03e-01	1.53e-01	2.85e-01	1.18e-01	6.10e-01	0.681	2.20e-05	3.10e-04	0.681	NA	0.18	NA	NA
app__LT__TKEO__mean__1__coef	8.79e-01	1.44e-01	1.04e+00	1.23e-01	8.21e-01	0.681	9.92e-07	9.84e-05	0.681	0.04	NA	NA	NA
tqwt__entropy__log__7__dec__34	3.29e+03	2.76e+03	7.75e+02	2.66e-01	0.681	4.44e-05	3.86e-06	0.681	0.01	0.10	NA		3
La__tqwt__stdValue__dec__18	4.70e-02	3.59e-02	4.16e-02	7.00e-03	9.79e-02	0.680	1.40e-05	1.58e-05	0.628	NA	0.43	+ 1.000	-1 *tqwt__stdValue__dec__18* + *0.427* tqwt__minValue__dec__18
La__app__LT__TKEO__mean__2__coef	9.87e-01	8.86e-01	8.69e-01	5.57e-02	6.10e-05	0.680	1.20e-06	4.72e-05	0.687	0.01	0.01	- 0.003	-2 *app__LT__entropy__log__1__coef* - *3.057* app__LT__TKEO__mean__1__coe + 1.000* app__LT__TKEO__mean__2__co
La__tqwt__entropy__log__dec__6	8.38e+01	8.25e+01	6.34e+01	9.43e-01	0.679	5.18e-06	3.98e-07	0.696	NA	0.19	- 0.483	-1 *tqwt__entropy__log__dec__2* + *1.000* tqwt__entropy__log__dec__6	
std__4th__delta	5.32e-02	1.81e-02	4.17e-02	7.95e-03	8.94e-01	0.679	4.36e-05	1.38e-06	0.679	NA	0.20	NA	NA
std__MFCC__7th__coef	7.12e-01	8.36e-02	2.73e-01	5.74e-02	5.26e-01	0.679	8.75e-06	6.08e-06	0.679	NA	NA	NA	NA
La__app__entropy__shannon__8__coef	3.59e+01	1.84e+01	3.68e+01	8.69e-01	6.00e-01	0.678	9.96e-07	6.35e-07	0.686	NA	0.06	- 2.076	-1 *app__entropy__shannon__8__coef* + *1.000* app__entropy__shannon__9__coef + 2864300.369* app__LT__entropy__log__
app__det__TKEO__mean__3__coef	6.63e+03	7.24e+03	3.94e+03	1.22e-01	1.55e-01	0.677	2.15e-08	2.88e-06	0.677	0.04	NA	NA	NA
tqwt__TKEO__mean__dec__17	1.11e-01	1.57e-01	1.67e-01	1.12e-01	4.26e-01	0.677	4.59e-06	3.07e-02	0.677	NA	NA	NA	2
La__app__det__TKEO__mean__2__coef	4.02e+00	4.58e+02	6.56e+02	1.09e-03	3.36e-06	0.676	1.11e-05	6.37e-05	0.666	NA	NA	+ 1.000	0 *app__det__TKEO__mean__2__coef* - *0.358* app__det__TKEO__mean__3__coe
tqwt__kurtosisValue__dec__26	5.92e+01	0.73e+01	4.26e+01	1.40e+01	7.62e-06	0.675	1.06e-14	4.27e-11	0.675	0.75	0.64	NA	NA

	caseMean	caseStd	controlMean	controlStd	controlKSP	ROCAUC	WilcoxRes.p	FRes.p	uAUC	raw_Freq	Freq	DecorFormula	fscores
La_app_LT_TKEO_mean_1_coef	[illegible]	[illegible]e-02	[illegible]2.71e+0[illegible]	6.45e-02	9.80e-04	0.673	5.06e-04	2.00e-04	0.681	0.04	NA	- 0.006 *app_entropy_log_1_coef* + *0.021* app_LT_entropy_log_1_coef + 1.000*app_LT_TKEO_mean_1_co	1
std_MFCC_6th_coef	6.12e-01	1.14e-01	2.98e-01	5.83e-02	8.19e-01	0.672	1.08e-04	7.68e-06	0.672	NA	NA	NA	3
app_LT_entropy_shannon_1_coef	-2.20e+04	2.87e+03	-2.39e+04	3.28e+03	3.63e-01	0.672	6.70e-06	1.81e-06	0.672	NA	NA	NA	NA
tqwt_energy_dec_11	1.18e-03	1.10e-03	5.04e-03	1.04e-02	3.63e-06	0.672	8.36e-13	4.30e-10	0.672	0.32	0.31	NA	NA
La_tqwt_entropy_log_dec_32	1.01e+02	[illegible]	[illegible]	2.28e+02	6.95e-01	0.671	1.99e-05	9.76e-07	0.577	NA	NA	- 0.859 *tqwt_entropy_log_dec_31* + *1.000* tqwt_entropy_log_dec_32	-1
La_tqwt_TKEO_std_dec_36	1.40e-03	1.84e-02	-9.37e-03	2.43e-02	1.18e-05	0.669	6.24e-11	6.33e-06	0.637	NA	0.29	- 1.941 *tqwt_TKEO_mean_dec_36* + *1.000* tqwt_TKEO_std_dec_36	-1
app_entropy_log_1_coef	3.36e+0[illegible]	[illegible]	3.14e+0[illegible]	[illegible].57e+01	2.94e-01	0.668	3.06e-05	6.18e-06	0.668	NA	0.02	NA	NA
La_tqwt_TKEO_std_dec_1	6.30e-06	1.83e-05	-1.81e-05	2.95e-05	1.34e-02	0.667	5.77e-08	1.59e-04	0.611	NA	0.25	- 0.000 *tqwt_entropy_shannon_dec_1* + *1.000* tqwt_TKEO_std_dec_1	-1
tqwt_TKEO_mean_dec_36	1.35e-02	4.02e-02	2.[illegible]5e-02	6.11e-02	8.30e-07	0.666	4.68e-10	3.15e-02	0.666	NA	NA	NA	2
app_det_TKEO_mean_1_coef	4.30e+0[illegible]	[illegible]	[illegible]	[illegible].77e+03	8.55e-03	0.666	7.65e-08	3.12e-05	0.666	NA	NA	NA	NA
La_tqwt_TKEO_std_dec_20	4.87e-03	3.16e-02	-7.49e-03	2.33e-02	7.21e-01	0.666	1.39e-07	1.80e-04	0.542	NA	0.05	- 0.709 *tqwt_TKEO_mean_dec_20* + *1.000* tqwt_TKEO_std_dec_20	-1
La_tqwt_stdValue_dec_6	-3.72e-04	2.[illegible]5e-03	8.30e-04	2.43e-03	5.37e-02	0.665	1.42e-06	1.47e-04	0.701	0.20	0.05	+ 1.000 *tqwt_stdValue_dec_6* + *0.114* tqwt_minValue_dec_5	0
std_MFCC_10th_coef	[illegible].81e-01	6.76e-02	2.45e-01	4.89e-02	5.30e-01	0.665	3.32e-04	2.57e-05	0.665	NA	NA	NA	1
La_tqwt_entropy_shannon_dec_14	1.36e+0[illegible]	[illegible]	[illegible]	[illegible].44e+0[illegible]	7.24e-01	0.664	1.25e-04	2.60e-05	0.718	NA	NA	+ 1.000 *tqwt_entropy_shannon_dec_14* - *11956.752* tqwt_TKEO_mean_dec_	0
La_locShimmer	2.87e-03	6.68e-03	-5.43e-04	5.51e-03	8.32e-03	0.664	2.09e-04	6.63e-05	0.663	NA	NA	+ 1.000 *locShimmer* - *1.905* apq3Shimmer	0
La_std_MFCC_3rd_coef	5.32e-02	5.24e-02	8.34e-02	6.18e-02	2.62e-02	0.664	3.74e-06	1.91e-04	0.448	NA	0.08	+ 1.000 *std_MFCC_3rd_coef* - *6.522* std_3rd_delta	-1

	caseMean	caseStd	controlMean	controlStd	KSP	AUC	coxHR	p.u	AUC	raw_Freq	Freq_Fre	Decor	Formula	fscores
locShimmer	7.15e-02	3.71e-02	5.56e-02	3.69e-02	3.38e-02	0.663	2.99e-03	2.15e-04	0.663	NA	NA	NA	NA	NA
La__tqwt__stdValue__dec__24	1.56e-03	1.67e-03	2.46e-03	2.08e-03	2.44e-02	0.660	1.32e-05	2.30e-04	0.624	NA	0.05	- 0.000 *tqwt__entropy__shannon__dec__3* + *1.000* tqwt_stdValue__dec__4	-1	
app__entropy_log__13	1.17e+03	1.50e+03	6.20e+02	7.08e+02	2.53e-01	0.659	8.93e-05	1.86e-05	0.659	NA	0.04	NA	NA	
La__tqwt__entropy_log__dec__12	1.84e+04 5.34e+04	4.20e+04	2.06e+04	7.81e-01	0.659	1.59e-05	1.15e-05	0.770	NA	0.01	+ 1.000 *tqwt__entropy_log__dec__12* - *1.415* tqwt_entropy_log_dec_14	0		
app__entropy_log__2__coef	7.03e+02	2.29e+03	7.22e+02	2.93e+02	2.73e-01	0.658	9.28e-05	1.87e-05	0.658	NA	NA	NA	NA	NA
La__det__LT__entropy_log__2__coef	3.53e+00 4.95e+01	5.14e+01	4.72e+00	1.04e-01	0.657	1.70e-05	2.04e-04	0.618	NA	NA	+ 0.511 *det__entropy__log__1__coef* - *0.989* det_entropy_log_2_coef - 0.518 *det__LT__entropy__log__1__coef* + *1.000* det_LT_entropy_log_2_coef	-2		
app__LT__entropy_log__dec__8	1.56e+03	1.85e+03	4.05e+02	2.67e+03	1.68e-01	0.654	4.86e-04	1.24e-04	0.654	NA	NA	NA	NA	NA
std__MFCC__12__coef	1.72e-01	5.37e-02	2.27e-01	4.99e-02	1.91e-01	0.652	7.72e-04	1.90e-04	0.652	NA	NA	NA	NA	1
La__tqwt__entropy_log__dec__11	1.42e+04 1.05e+04	2.50e+03	1.60e+04	7.44e-01	0.651	2.43e-05	6.14e-05	0.754	NA	0.04	- 0.803 *tqwt__entropy__log__dec__10* + *1.000* tqwt_entropy_log_dec_11	-1		
app__LT__entropy_log__dec__10	1.24e+03	1.98e+03	4.30e+02	2.71e+03	8.99e-02	0.650	8.21e-04	2.61e-04	0.650	NA	NA	NA	NA	7
tqwt__minValue__dec__5	3.25e-02 3.78e-02	- 5.52e-02	5.37e-02	8.11e-04	0.648	6.83e-06	2.47e-03	0.648	NA	NA	NA	NA	5	
app__LT__entropy_log__2__coef	2.88e+02	1.26e+02	2.85e+02	2.78e+03	8.10e-02	0.647	1.19e-03	3.92e-04	0.647	NA	0.01	NA	NA	
std__3rd__delta	5.74e-02	2.19e-02	4.58e-02	9.83e-03	8.81e-01	0.645	1.35e-03	3.71e-05	0.645	NA	NA	NA	NA	3
tqwt__entropy_log__dec__13	8.44e+03 3.66e+03	3.20e+03	8.47e+03	3.63e-01	0.644	5.04e-04	1.66e-04	0.644	0.04	1.00	NA	NA		
La__tqwt__TKEO__mean__dec__13	6.02e-03 7.35e-04	5.28e-03	3.02e-02	3.78e-03	0.640	3.61e-13	5.44e-09	0.753	NA	0.27	- 0.000 *tqwt__entropy__shannon__dec__12* + *1.000* tqwt_TKEO__mean__dec__13	-1		
tqwt__TKEO__std__dec__36	2.76e-02	5.95e-02	3.20e-02	1.02e-01	4.32e-07	0.637	1.91e-09	1.60e-01	0.637	NA	0.29	NA	NA	
La__tqwt__TKEO__std__dec__14	1.70e-03	6.13e-03	5.01e-03	9.56e-03	9.27e-02	0.634	1.00e-07	1.38e-04	0.723	NA	NA	- 0.772 *tqwt__TKEO__mean__dec__14* + *1.000* tqwt_TKEO__std__dec__14	-1	

	caseMean	caseStd	controlMean	controlStd	KSC	AUC	coxHR	p.u	AUC_raw	Freq	Freq_Free	DecorFormula	fscores
La__tqwt__energy__dec__11	3.41e-03	1.32e-03	3.70e-03	1.67e-03	0.632	1.30e-12	4.40e-07	0.672	0.32	0.31	0.883	- *tqwt__energy__dec__10* + *1.000*tqwt__energy__dec__11	-1
apq3Shimmer	3.60e-02	1.93e-02	2.95e-02	1.92e-02	4.90e-02	0.630	2.56e-02	3.75e-03	0.630	NA	NA	NA	6
std__2nd__delta	6.19e-02	2.09e-02	5.32e-02	1.59e-02	1.06e-01	0.630	1.02e-02	8.66e-04	0.630	NA	NA	NA	2
tqwt__kurtosisValue__dec__33	1.75e-01	1.42e-01	9.33e-01	1.00e+00	1.10e-04	0.628	2.15e-01	7.90e-03	0.628	NA	0.46	NA	NA
tqwt__stdValue__dec__68	2.31e-01	1.66e-01	2.95e-01	1.51e-01	4.47e-01	0.628	7.51e-04	7.29e-03	0.628	NA	0.43	NA	NA
tqwt__energy__dec__10	1.10e-03	1.02e-03	4.21e-03	1.11e-02	1.09e-07	0.626	1.67e-06	1.35e-05	0.626	NA	0.01	NA	2
tqwt__stdValue__dec__54	1.06e-03	3.54e-03	3.93e-03	3.57e-03	4.92e-02	0.624	1.63e-04	6.52e-02	0.624	NA	0.05	NA	NA
tqwt__entropy__shannon__dec__33	1.74e-01	6.16e-01	7.50e-01	3.60e+01	7.15e-14	0.621	9.97e-01	2.95e-01	0.621	0.01	0.04	NA	NA
La__tqwt__entropy__shannon__dec__11	3.15e-01	7.77e+00	1.15e-01	1.68e+01	2.90e-02	0.619	3.11e-09	4.80e-05	0.744	0.01	0.01	- *tqwt__entropy__shannon__dec__10* + *1.000*tqwt__entropy__shannon__dec__1	2
det__LT__entropy__log__2__coef	1.10e+02	7.70e+02	6.37e+01	8.12e+02	1.60e-01	0.618	2.53e-02	1.58e-03	0.618	NA	NA	NA	NA
La__tqwt__kurtosisValue__dec__31	7.18e-01	1.76e+00	3.80e-01	1.32e+01	1.51e-03	0.615	8.54e-07	9.37e-06	0.490	NA	0.10	+ *1.000*tqwt__kurtosisValue__dec__31 - *1.025*tqwt__kurtosisValue__dec__32	-1
GNE__mean	1.06e+00	2.46e-01	1.20e+00	1.67e-01	2.91e-02	0.611	1.21e-04	1.39e-03	0.611	NA	NA	NA	1
tqwt__TKEO_std__dec__14	2.57e-05	3.77e-05	4.15e-05	6.66e-05	1.16e-04	0.611	1.54e-05	1.96e-02	0.611	NA	0.25	NA	NA
tqwt__TKEO_mean__dec__20	6.20e-02	1.03e-01	7.40e-02	6.22e-02	1.90e-01	0.610	3.86e-05	3.38e-01	0.610	NA	NA	NA	NA
tqwt__minValue__dec__33	1.03e-01	8.81e-02	-1.53e-01	2.19e-01	1.26e-04	0.608	1.45e-05	7.25e-04	0.608	NA	0.10	NA	NA
tqwt__entropy__shannon__dec__37	8.84e-01	1.07e+00	8.67e-01	1.32e+01	4.44e-05	0.608	1.00e+00	2.82e-01	0.608	NA	NA	NA	6
tqwt__stdValue__dec__120	1.60e-01	1.12e-01	1.85e-01	8.02e-02	7.22e-01	0.607	1.90e-03	8.21e-02	0.607	NA	0.15	NA	NA
det__LT__entropy__log__2__coef	2.04e+02	1.67e+03	1.19e+02	1.75e+03	1.57e-01	0.603	5.37e-02	1.54e-03	0.603	NA	NA	NA	3
std__MFCC__4__coef	4.92e-01	1.38e-01	3.34e-01	6.58e-02	5.63e-01	0.601	1.48e-02	1.67e-03	0.601	NA	NA	NA	1
tqwt__entropy__log__2__dec__25	1.92e+06	1.57e+06	1.53e+06	1.48e+06	6.54e-01	0.598	2.22e-02	1.82e-02	0.598	NA	NA	NA	4
tqwt__entropy__log__1__dec__32	4.12e+03	1.00e+03	3.81e+03	1.00e+03	3.99e-01	0.577	3.66e-02	2.10e-02	0.577	NA	NA	NA	NA
det__LT__TKEO__mean__9__coef	2.75e-02	1.44e-01	3.57e-02	1.08e-01	8.05e-10	0.576	1.00e+00	2.81e-01	0.576	NA	NA	NA	7

	caseMean	caseStd	controlMean	controlStd	controlKSP	AUC	coxHR	p.u	AUC	raw_Freq	Freq_Fre	Decor	Formula	fscores
GNE__std	2.17e-01	9.70e-02	2.08e-01	1.47e-01	4.23e-02	0.574	3.70e-01	2.28e-01	0.574	NA	0.08	NA		NA
tqwt__minValue__dec__18	3.83e-01	- 6.26e-01	- 7.07e-01	3.16e-01	5.07e-01	0.572	4.11e-02	8.53e-02	0.572	NA	NA	NA		4
La__tqwt__minValue__dec__12	2.06e-02	1.17e-03	- 1.42e-02	4.27e-02	2.05e-02	0.569	4.67e-04	9.51e-05	0.752	0.21	0.03	+ 1.000 *0.558*	*tqwt__minValue__dec__12* - tqwt__minValue__dec__13	0
tqwt__entropy__shannon__dec__32	3.24e+00	5.68e-06	3.06e+00	2.90e+02	2.52e-14	0.562	9.46e-01	1.49e-01	0.562	NA	NA	NA		NA
tqwt__kurtosisValue__dec__32	1.27e+01	5.53e-01	1.25e+01	1.25e+01	3.53e-04	0.559	8.77e-01	1.80e-01	0.559	NA	NA	NA		2
tqwt__minValue__dec__32	1.13e-01	- 1.07e-01	- 1.56e-01	2.26e-01	7.11e-05	0.559	7.42e-04	1.12e-02	0.559	NA	NA	NA		5
tqwt__entropy__log__dec__31	4.91e+03	1.16e+03	4.71e+03	1.19e+03	3.85e-01	0.548	1.18e-01	1.18e-01	0.548	NA	0.04	NA		NA
tqwt__minValue__dec__20	2.72e-01	- 4.26e-01	- 4.40e-01	1.91e-01	9.69e-01	0.544	8.54e-02	3.79e-01	0.544	NA	NA	NA		3
tqwt__TKEO__std__dec__20	4.85e-02	1.11e-02	4.25e-02	3.86e-02	8.33e-02	0.542	9.65e-01	2.85e-01	0.542	NA	0.05	NA		NA
std__MFCC__2nd__coef	4.68e-01	1.55e-01	4.59e-01	1.34e-01	5.43e-01	0.508	6.57e-01	3.40e-01	0.508	NA	0.42	NA		NA
tqwt__kurtosisValue__dec__33	1.36e+01	5.15e-01	1.33e+01	1.79e+01	4.54e-04	0.490	3.95e-02	2.90e-01	0.490	NA	0.10	NA		NA
det__entropy__log__1__coef	1.90e+02	- 5.77e+02	- 6.20e+02	1.48e+02	4.87e-01	0.479	4.89e-01	6.69e-02	0.479	NA	NA	NA		NA
tqwt__entropy__shannon__dec__10	5.24e+00	4.66e-06	5.06e+00	3.30e+01	3.98e-07	0.471	3.27e-04	3.17e-01	0.471	NA	NA	NA		3
det__entropy__log__2__coef	1.08e+02	- 1.52e+02	- 1.76e+02	7.73e+01	7.38e-01	0.468	3.73e-01	6.69e-02	0.468	NA	NA	NA		NA
std__MFCC__3rd__coef	3.28e-01	1.56e-01	3.82e-01	9.15e-02	4.58e-01	0.448	2.31e-01	2.53e-02	0.448	NA	0.08	NA		NA