FDeA and the GDSTM: DARWIN test

Jose Tamez

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# Effect of GDSTM-Based Decorrelation on Feature Discovery: The DARWIN Evaluation

***(In this version we are loading all the results)***

Here we showcase of to use BSWiMS feature selection/modeling function coupled with Goal Driven Sparse Transformation Matrix (GDSTM) as a pre-processing step to decorrelate highly correlated features. The aim is to discover decorrelate features hidden between the highly correlated features.

This demo will use:

* FRESA.CAD::GDSTMDecorrelation(). For Decorrelation of Multidimensional data sets
  + FRESA.CAD::getDerivedCoefficients(). For the extraction of the decorrelated features.
* FRESA.CAD::randomCV() For the cross-validation of the Machine Learning models
* FRESA.CAD::BSWiMS.model(). For the generation of bootstrapped logistic models
  + FRESA.CAD::summary(). For the summary description of the BSWiMS model
* FRESA.CAD::predictionStats\_binary(). For describing the performance of the model
* heatmap.2(). For displaying the correlation matrix
* vioplot::vioplot(). For the display of the z-distribution of significant features.

### Loading the libraries

library("FRESA.CAD")  
library(readxl)  
library(vioplot)  
library(igraph)  
  
op <- par(no.readonly = TRUE)

## Material and Methods

### Signed Log Transform

The function will be used to transform all the continuous features of the data

signedlog <- function(x) { return (sign(x)\*log(abs(x)+1.0e-12))}

## Data: The DARWIN Data-Set

The data to process is described in:

Cilia, Nicole D., Giuseppe De Gregorio, Claudio De Stefano, Francesco Fontanella, Angelo Marcelli, and Antonio Parziale. “Diagnosing Alzheimer’s disease from on-line handwriting: a novel dataset and performance benchmarking.” Engineering Applications of Artificial Intelligence 111 (2022): 104822.

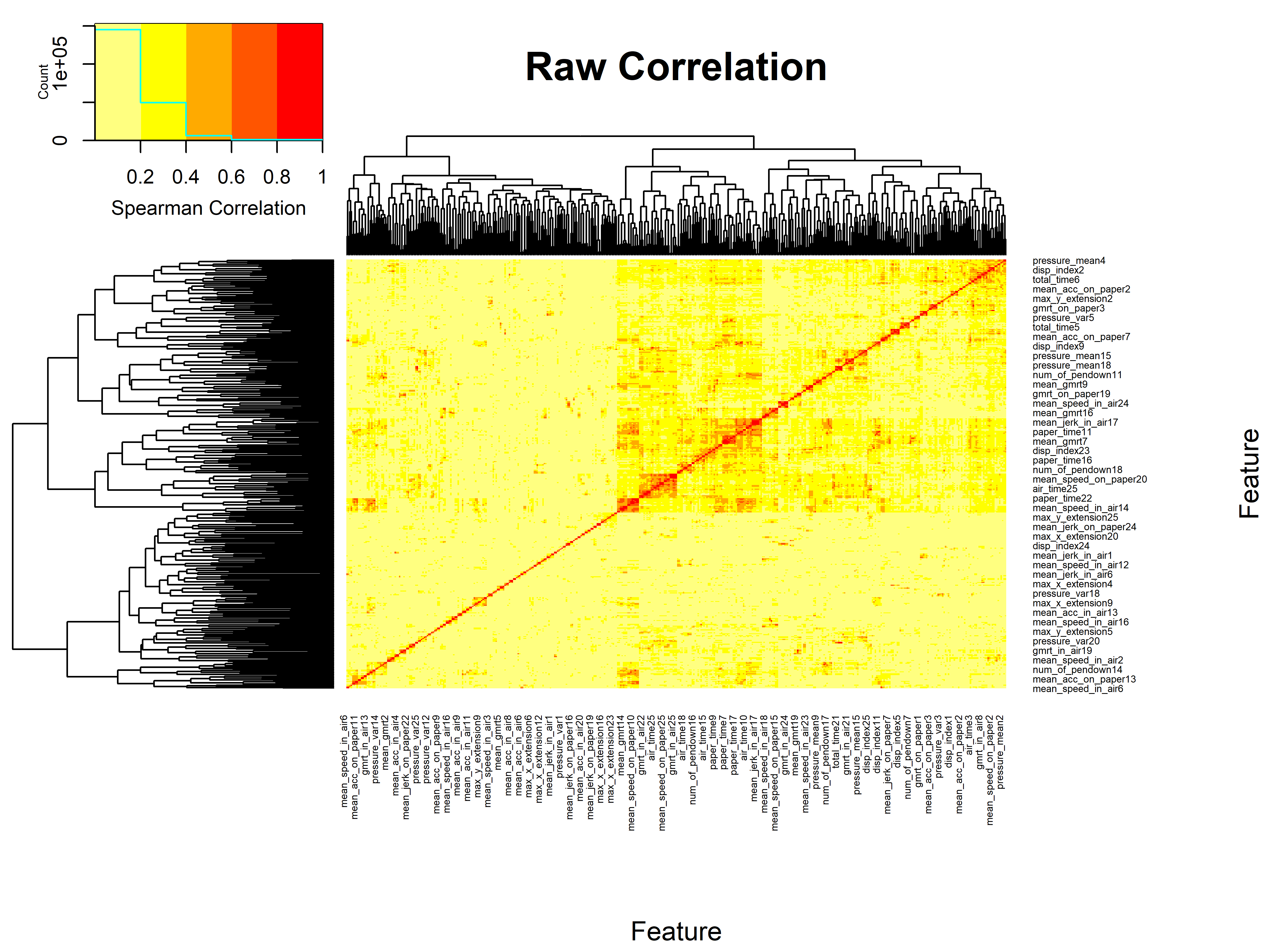
From the DARWIN\_readme.rtf

” *The DARWIN dataset contains handwriting data collected according to the acquisition protocol described in [1], which is composed of 25 handwriting tasks. The protocol  was specifically designed for the early detection of Alzheimer’s disease (AD). The dataset includes data from 174 participants (89 AD patients and 85 healthy people). The file “DARWIN.csv” contains the acquired data. The file consists of one row for each participant plus an additional header row. The first row is the header row, the next 89 rows collect patients data, whereas the remaining 84 rows collect information from healthy people. The file consists of 452 columns. The first column shows participants’ identifiers,whereas the last column shows the class to which each participant belongs.  This value can be equal to  ‘P’ (Patient) or ‘H’ (Healthy). The remaining columns report the features extracted from a specific task. The tasks performed are 25, and for each task 18 features have been extracted. The column will be identified by the name of the features followed by a numeric identifier representing the task the feature is extracted. E.g., the column with the header “total\_time8” collects the values for the “total time” feature extracted from task #8.*”

#### Saving all the generated data  
  
load(file="~/GitHub/FCA/DARWINDemo.RData")  
namecode <- read.csv("~/GitHub/FCA/Data/DARWIN/Darnames.csv")  
  
  
# DARWIN <- read.csv("~/GitHub/FCA/Data/DARWIN/DARWIN.csv")  
# rownames(DARWIN) <- DARWIN$ID  
# DARWIN$ID <- NULL  
# DARWIN$class <- 1\*(DARWIN$class=="P")  
# print(table(DARWIN$class))  
#   
# DARWIN[,1:ncol(DARWIN)] <- sapply(DARWIN,as.numeric)  
#   
# whof <- !(colnames(DARWIN) %in% c("class"));  
# DARWIN[,whof] <- signedlog(DARWIN[,whof])  
#   
# ## The size of training  
#   
# trainFraction=0.65;

## Correlation Matrix of the DARWIN Data

cormat <- cor(DARWIN,method="spearman")  
gplots::heatmap.2(abs(cormat),  
 trace = "none",  
 scale = "none",  
 mar = c(10,10),  
 col=rev(heat.colors(5)),  
 main = "Raw Correlation",  
 cexRow = 0.45,  
 cexCol = 0.45,  
 key.title=NA,  
 key.xlab="Spearman Correlation",  
 xlab="Feature", ylab="Feature")



## Train and test set

# set.seed(2)  
# caseSet <- subset(DARWIN, class == 1)  
# controlSet <- subset(DARWIN, class == 0)  
# caseTrainSize <- nrow(caseSet)\*trainFraction;  
# controlTrainSize <- nrow(controlSet)\*trainFraction;  
# sampleCaseTrain <- sample(nrow(caseSet),caseTrainSize)  
# sampleControlTrain <- sample(nrow(controlSet),controlTrainSize)  
# trainSet <- rbind(caseSet[sampleCaseTrain,], controlSet[sampleControlTrain,])  
# testSet <- rbind(caseSet[-sampleCaseTrain,],controlSet[-sampleControlTrain,])  
# pander::pander(table(trainSet$class))  
# pander::pander(table(testSet$class))

#### Decorrelation: Training and Testing Sets Creation

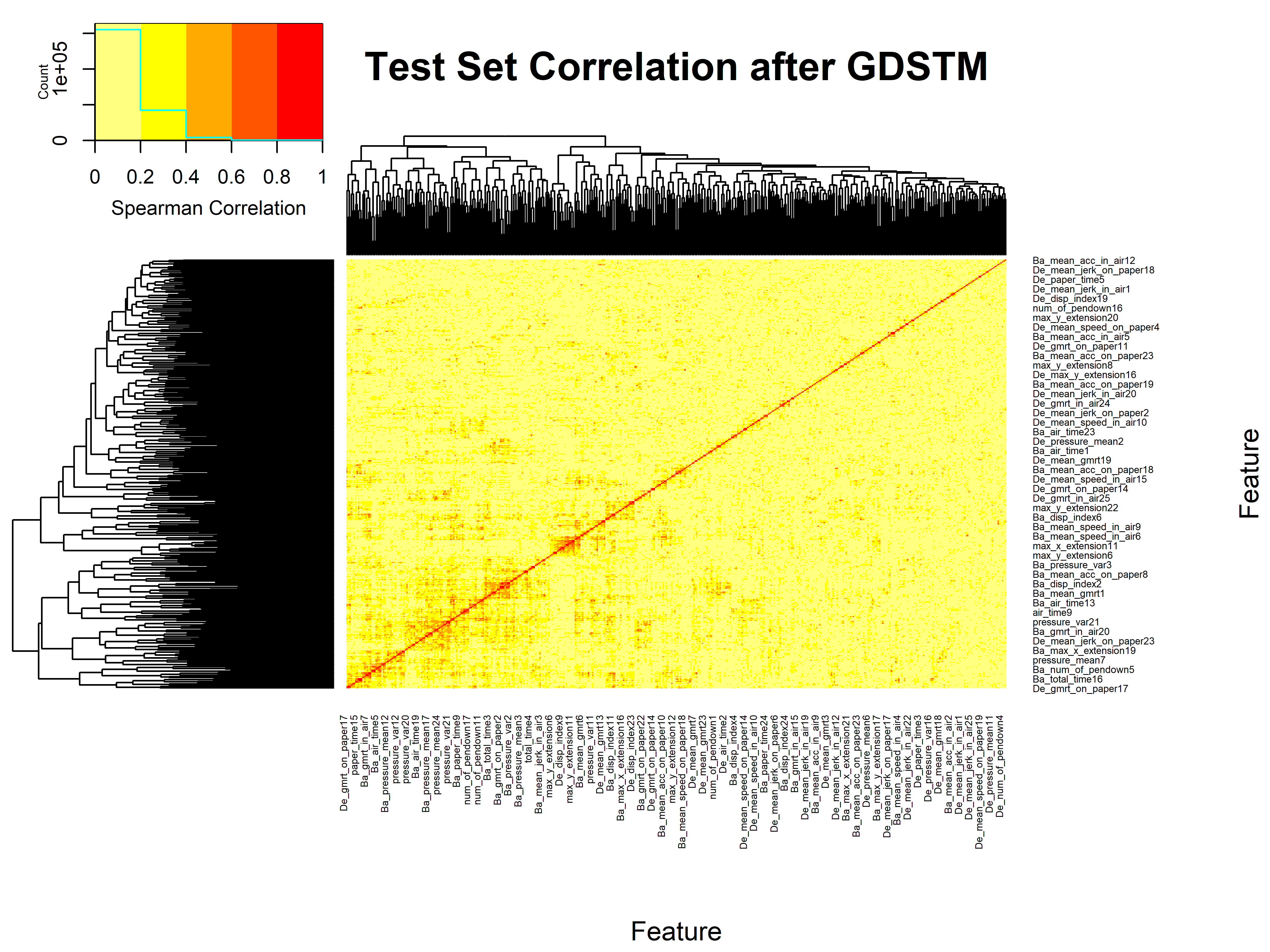
I compute a decorrelated version of the training and testing sets using the *GDSTMDecorrelation()* function of FRESA.CAD. The first decorrelation will be driven by features associated with the outcome. The second decorrelation will find the GDSTM without the outcome restriction.

# ## The GDSTM transformation driven by the Outcome  
# deTrain <- GDSTMDecorrelation(trainSet,Outcome="class",thr=0.8,verbose = TRUE)  
# deTest <- predictDecorrelate(deTrain,testSet)  
#   
# ## The GDSTM transformation without outcome  
# deTrainU <- GDSTMDecorrelation(trainSet,thr=0.8,verbose = TRUE)  
# deTestU <- predictDecorrelate(deTrainU,testSet)

#### Correlation Matrix of the Decorrelated Test Data

The heat map of the testing set.

cormat <- cor(deTest,method="spearman")  
gplots::heatmap.2(abs(cormat),  
 trace = "none",  
 scale = "none",  
 mar = c(10,10),  
 col=rev(heat.colors(5)),  
 main = "Test Set Correlation after GDSTM",  
 cexRow = 0.45,  
 cexCol = 0.45,  
 key.title=NA,  
 key.xlab="Spearman Correlation",  
 xlab="Feature", ylab="Feature")



### Holdout Cross-Validation

Before doing the feature analysis. I’ll explore BSWiMS modeling using the Holdout cross validation method of FRESA.CAD. The purpose of the cross-validation is to observe and estimate the performance gain of decorrelation.

par(op)  
par(mfrow=c(1,3))  
  
## The Raw validation  
# cvBSWiMSRaw <- randomCV(DARWIN,  
# "class",  
# fittingFunction= BSWiMS.model,  
# classSamplingType = "Pro",  
# trainFraction = trainFraction,  
# repetitions = 150  
# )  
  
bpraw <- predictionStats\_binary(cvBSWiMSRaw$medianTest,"BSWiMS RAW",cex=0.60)

BSWiMS RAW

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

|  | Outcome + | Outcome - | Total |
| --- | --- | --- | --- |
| **Test +** | 73 | 12 | 85 |
| **Test -** | 16 | 73 | 89 |
| **Total** | 89 | 85 | 174 |

pander::pander(bpraw$accc)

|  | est | lower | upper |
| --- | --- | --- | --- |
| **5** | 0.8391 | 0.7759 | 0.8903 |

pander::pander(bpraw$aucs)

| est | lower | upper |
| --- | --- | --- |
| 0.9463 | 0.9174 | 0.9753 |

pander::pander(bpraw$berror)

| 50% | 2.5% | 97.5% |
| --- | --- | --- |
| 0.161 | 0.1093 | 0.2183 |

## The validation with Outcome-driven Decorrelation  
# cvBSWiMSDeCor <- randomCV(DARWIN,  
# "class",  
# trainSampleSets= cvBSWiMSRaw$trainSamplesSets,  
# fittingFunction= filteredFit,  
# fitmethod=BSWiMS.model,  
# filtermethod=NULL,  
# DECOR = TRUE,  
# DECOR.control=list(Outcome="class",thr=0.8)  
# )  
  
bpDecor <- predictionStats\_binary(cvBSWiMSDeCor$medianTest,"BSWiMS Outcome-Driven GDSTM",cex=0.60)

BSWiMS Outcome-Driven GDSTM

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

|  | Outcome + | Outcome - | Total |
| --- | --- | --- | --- |
| **Test +** | 79 | 11 | 90 |
| **Test -** | 10 | 74 | 84 |
| **Total** | 89 | 85 | 174 |

pander::pander(bpDecor$accc)

|  | est | lower | upper |
| --- | --- | --- | --- |
| **5** | 0.8793 | 0.8214 | 0.9237 |

pander::pander(bpDecor$aucs)

| est | lower | upper |
| --- | --- | --- |
| 0.9565 | 0.9308 | 0.9823 |

pander::pander(bpDecor$berror)

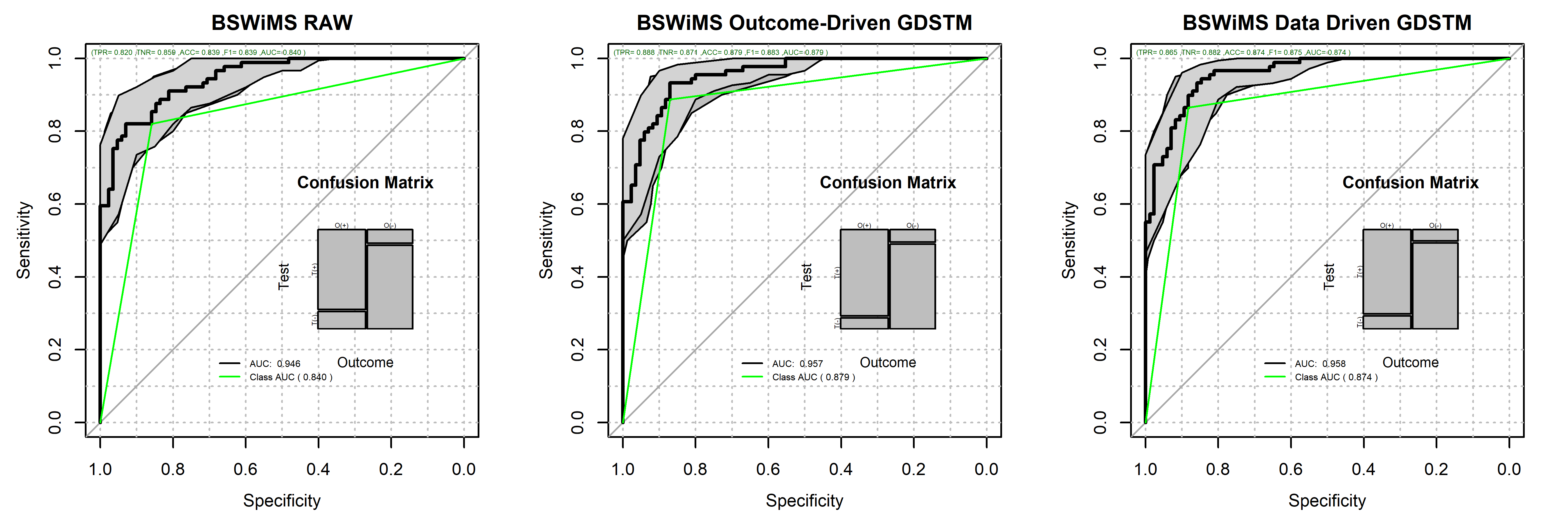
| 50% | 2.5% | 97.5% |
| --- | --- | --- |
| 0.1201 | 0.07471 | 0.1724 |

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

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 |
| --- | --- | --- | --- | --- |
| 1.954 | 0.05074 | two.sided | 0.9565 | 0.9463 |

## The validation of Decorrelation without the outcome restriction  
# cvBSWiMSDeCorU <- randomCV(DARWIN,  
# "class",  
# trainSampleSets= cvBSWiMSRaw$trainSamplesSets,  
# fittingFunction= filteredFit,  
# fitmethod=BSWiMS.model,  
# filtermethod=NULL,  
# DECOR = TRUE,  
# DECOR.control=list(thr=0.8)  
# )  
  
bpDecorU <- predictionStats\_binary(cvBSWiMSDeCorU$medianTest,"BSWiMS Data Driven GDSTM",cex=0.60)

BSWiMS Data Driven GDSTM 

pander::pander(bpDecorU$CM.analysis$tab)

|  | Outcome + | Outcome - | Total |
| --- | --- | --- | --- |
| **Test +** | 77 | 10 | 87 |
| **Test -** | 12 | 75 | 87 |
| **Total** | 89 | 85 | 174 |

pander::pander(bpDecorU$accc)

|  | est | lower | upper |
| --- | --- | --- | --- |
| **5** | 0.8736 | 0.8149 | 0.919 |

pander::pander(bpDecorU$aucs)

| est | lower | upper |
| --- | --- | --- |
| 0.958 | 0.9327 | 0.9832 |

pander::pander(bpDecorU$berror)

| 50% | 2.5% | 97.5% |
| --- | --- | --- |
| 0.1267 | 0.08201 | 0.1786 |

### Here we compute the probability that the unsupervised decorrelation ROC is superior to the RAW ROC.   
pander::pander(roc.test(bpDecorU$ROC.analysis$roc.predictor,bpraw$ROC.analysis$roc.predictor))

DeLong’s test for two correlated ROC curves: bpDecorU$ROC.analysis$roc.predictor and bpraw$ROC.analysis$roc.predictor

| Test statistic | P value | Alternative hypothesis | AUC of roc1 | AUC of roc2 |
| --- | --- | --- | --- | --- |
| 1.783 | 0.07458 | two.sided | 0.958 | 0.9463 |

par(op)

## The Raw Model *vs.* the Decorrelated-Based Model

After demonstrating that decorrelation is able to improve BSWiMS model performance, I’ll focus is showcasing the ability to discover new features associated with the outcome.

First, I’ll compute the BSWiMS models for the original data, and for the decorrelated data-set. The model estimation will be done using the training set and tested on the holdout test set, and repeated 10 times. After that, I’ll compare the statistical difference of both ROC curves.

par(op)  
par(mfrow=c(1,3))  
  
#bm <- BSWiMS.model(class~.,trainSet,NumberofRepeats = 20)  
bpraw <- predictionStats\_binary(cbind(testSet$class,predict(bm,testSet)),"BSWiMS RAW",cex=0.60)

BSWiMS RAW

#bmd <- BSWiMS.model(class~.,deTrain,NumberofRepeats = 20)  
bpdecor <- predictionStats\_binary(cbind(deTest$class,predict(bmd,deTest)),"BSWiMS Outcome-Driven Decor",cex=0.60)

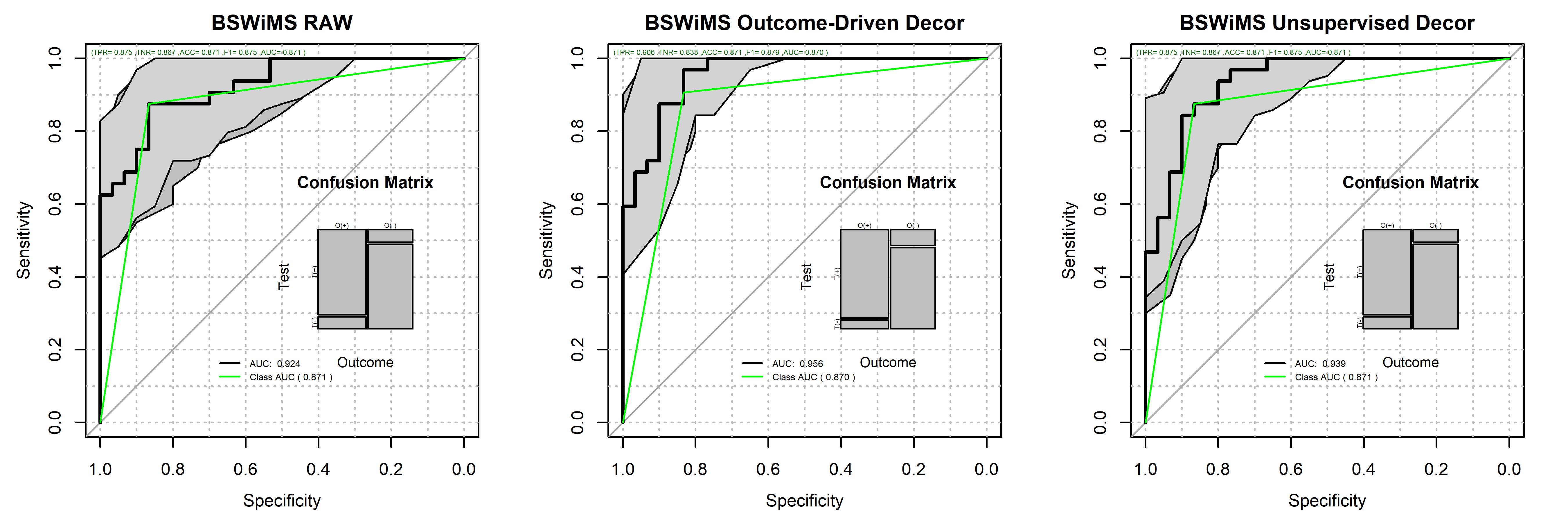
BSWiMS Outcome-Driven Decor

pander::pander(roc.test(bpraw$ROC.analysis$roc.predictor,bpdecor$ROC.analysis$roc.predictor))

DeLong’s test for two correlated ROC curves: bpraw$ROC.analysis$roc.predictor and bpdecor$ROC.analysis$roc.predictor

| Test statistic | P value | Alternative hypothesis | AUC of roc1 | AUC of roc2 |
| --- | --- | --- | --- | --- |
| -1.871 | 0.06141 | two.sided | 0.924 | 0.9563 |

#bmdU <- BSWiMS.model(class~.,deTrainU,NumberofRepeats = 20)  
bpdecorU <- predictionStats\_binary(cbind(deTest$class,predict(bmdU,deTestU)),"BSWiMS Unsupervised Decor",cex=0.60)

BSWiMS Unsupervised Decor 

pander::pander(roc.test(bpraw$ROC.analysis$roc.predictor,bpdecorU$ROC.analysis$roc.predictor))

DeLong’s test for two correlated ROC curves: bpraw$ROC.analysis$roc.predictor and bpdecorU$ROC.analysis$roc.predictor

| Test statistic | P value | Alternative hypothesis | AUC of roc1 | AUC of roc2 |
| --- | --- | --- | --- | --- |
| -0.8455 | 0.3978 | two.sided | 0.924 | 0.9385 |

par(op)

## The feature associations

par(op)  
par(mfrow=c(3,1))  
  
### The raw model  
pander::pander(nrow(bm$bagging$formulaNetwork))

*111*

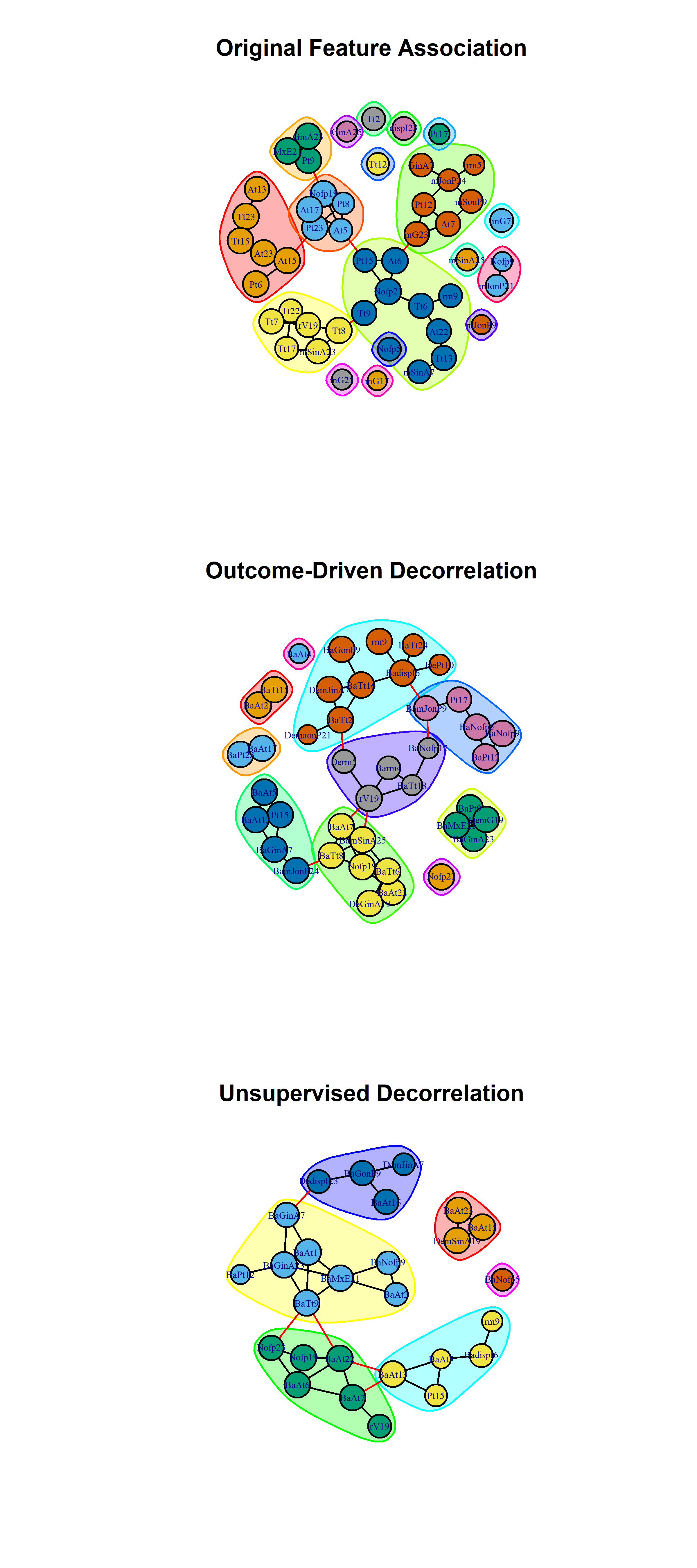
cmax <- apply(bm$bagging$formulaNetwork,2,max)  
cnames <- names(cmax[cmax>=0.75])  
cmax <- cmax[cmax>=0.75]  
adma <- bm$bagging$formulaNetwork[cnames,cnames]  
  
for (cx in c(1:nrow(namecode)))  
{  
 cnames <- str\_replace\_all(cnames,namecode[cx,1],namecode[cx,2])  
}  
cnames <- str\_replace\_all(cnames,"\_","")  
cnames <- str\_replace\_all(cnames,"th","")  
rownames(adma) <- cnames  
colnames(adma) <- cnames  
names(cmax) <- cnames  
adma[adma<0.25] <- 0;  
gr <- graph\_from\_adjacency\_matrix(adma,mode = "undirected",diag = FALSE,weighted=TRUE)  
gr$layout <- layout\_with\_fr  
  
fc <- cluster\_optimal(gr)  
plot(fc, gr,  
 vertex.size=20\*cmax,  
 vertex.label.cex=0.5,  
 vertex.label.dist=0,  
 main="Original Feature Association")  
  
  
  
### The Outcome Driven Model  
  
pander::pander(nrow(bmd$bagging$formulaNetwork))

*104*

cmax <- apply(bmd$bagging$formulaNetwork,2,max)  
cnames <- names(cmax[cmax>=0.75])  
cmax <- cmax[cmax>=0.75]  
adma <- bmd$bagging$formulaNetwork[cnames,cnames]  
  
for (cx in c(1:nrow(namecode)))  
{  
 cnames <- str\_replace\_all(cnames,namecode[cx,1],namecode[cx,2])  
}  
cnames <- str\_replace\_all(cnames,"\_","")  
cnames <- str\_replace\_all(cnames,"th","")  
rownames(adma) <- cnames  
colnames(adma) <- cnames  
names(cmax) <- cnames  
adma[adma<0.25] <- 0;  
gr <- graph\_from\_adjacency\_matrix(adma,mode = "undirected",diag = FALSE,weighted=TRUE)  
gr$layout <- layout\_with\_fr  
  
fc <- cluster\_optimal(gr)  
plot(fc, gr,  
 vertex.size=20\*cmax,  
 vertex.label.cex=0.5,  
 vertex.label.dist=0,  
 main="Outcome-Driven Decorrelation")  
  
  
### The Unsupervised Decorrelation  
  
pander::pander(nrow(bmdU$bagging$formulaNetwork))

*84*

cmax <- apply(bmdU$bagging$formulaNetwork,2,max)  
cnames <- names(cmax[cmax>=0.75])  
cmax <- cmax[cmax>=0.75]  
adma <- bmdU$bagging$formulaNetwork[cnames,cnames]  
  
for (cx in c(1:nrow(namecode)))  
{  
 cnames <- str\_replace\_all(cnames,namecode[cx,1],namecode[cx,2])  
}  
cnames <- str\_replace\_all(cnames,"\_","")  
cnames <- str\_replace\_all(cnames,"th","")  
rownames(adma) <- cnames  
colnames(adma) <- cnames  
names(cmax) <- cnames  
adma[adma<0.25] <- 0;  
gr <- graph\_from\_adjacency\_matrix(adma,mode = "undirected",diag = FALSE,weighted=TRUE)  
gr$layout <- layout\_with\_fr  
  
fc <- cluster\_optimal(gr)  
plot(fc, gr,  
 vertex.size=20\*cmax,  
 vertex.label.cex=0.5,  
 vertex.label.dist=0,  
 main="Unsupervised Decorrelation")



### Feature Analysis of Models

The analysis of the features required to predict the outcome will use the following:

1. Analysis of the BSWiMS bagged model using the summary function.
2. Analysis of the sparse GDSMT
3. Analysis of the univariate association of the model features of both models
4. Report the new features not found by the Original data analysis

par(op)  
par(mfrow=c(1,1))  
## 1 Get the Model Features  
smOriginal <- summary(bm)  
rawnames <- rownames(smOriginal$coefficients)  
  
### From Drived Decorrelation  
smDecor <- summary(bmd)  
decornames <- rownames(smDecor$coefficients)  
  
### From Unsupervised Decorrelation  
smDecorU <- summary(bmdU)  
decornamesU <- rownames(smDecorU$coefficients)  
  
  
  
## 2 Get the decorrelation matrix formulas  
dc <- getDerivedCoefficients(deTrain)  
### 2a Get only the ones that were decorrelated by the decorrelation-based model  
deNames\_in\_dc <- decornames[decornames %in% names(dc)]  
selectedlist <- dc[deNames\_in\_dc]  
pander::pander(selectedlist)

* **De\_gmrt\_in\_air19**:

| * gmrt\_in\_air19 | * mean\_speed\_in\_air19 |
| --- | --- |
| * 1 | * -0.9443 |

* **De\_mean\_gmrt10**:

| * gmrt\_in\_air10 | * mean\_gmrt10 |
| --- | --- |
| * -0.7064 | * 1 |

* **De\_mean\_speed\_on\_paper15**:

| * gmrt\_on\_paper15 | * mean\_speed\_on\_paper15 |
| --- | --- |
| * -1.015 | * 1 |

* **De\_mean\_gmrt19**:

| * gmrt\_on\_paper19 | * mean\_gmrt19 | * mean\_speed\_in\_air19 |
| --- | --- | --- |
| * -0.3984 | * 1 | * -0.6847 |

* **De\_paper\_time20**:

| * disp\_index20 | * paper\_time20 |
| --- | --- |
| * -1.418 | * 1 |

* **De\_mean\_jerk\_in\_air19**:

| * mean\_acc\_in\_air19 | * mean\_jerk\_in\_air19 |
| --- | --- |
| * -1.14 | * 1 |

* **De\_pressure\_mean5**:

| * max\_y\_extension5 | * pressure\_mean5 |
| --- | --- |
| * -0.8889 | * 1 |

* **De\_paper\_time10**:

| * disp\_index10 | * paper\_time10 |
| --- | --- |
| * -1.62 | * 1 |

* **De\_disp\_index17**:

| * disp\_index17 | * max\_y\_extension17 |
| --- | --- |
| * 1 | * -1.396 |

* **De\_num\_of\_pendown21**:

| * air\_time21 | * num\_of\_pendown21 |
| --- | --- |
| * -0.8027 | * 1 |

* **De\_mean\_acc\_on\_paper21**:

| * mean\_acc\_on\_paper21 | * mean\_speed\_on\_paper21 |
| --- | --- |
| * 1 | * 0.61 |

* **De\_mean\_jerk\_in\_air7**:

| * mean\_acc\_in\_air7 | * mean\_jerk\_in\_air7 |
| --- | --- |
| * -1.149 | * 1 |

* **De\_mean\_gmrt23**:

| * gmrt\_in\_air23 | * mean\_gmrt23 |
| --- | --- |
| * -0.8454 | * 1 |

* **De\_paper\_time5**:

| * max\_y\_extension5 | * mean\_speed\_on\_paper5 | * paper\_time5 |
| --- | --- | --- |
| * -1.154 | * 0.9463 | * 1 |

* **De\_mean\_speed\_on\_paper9**:

| * gmrt\_on\_paper9 | * mean\_speed\_on\_paper9 |
| --- | --- |
| * -1.093 | * 1 |

* **De\_max\_y\_extension24**:

| * max\_x\_extension24 | * max\_y\_extension24 |
| --- | --- |
| * -0.9869 | * 1 |

* **De\_disp\_index1**:

| * disp\_index1 | * paper\_time1 |
| --- | --- |
| * 1 | * -0.7383 |

* **De\_paper\_time8**:

| * disp\_index8 | * paper\_time8 |
| --- | --- |
| * -1.382 | * 1 |

* **De\_total\_time10**:

| * air\_time10 | * total\_time10 |
| --- | --- |
| * -0.6317 | * 1 |

* **De\_mean\_acc\_in\_air3**:

| * mean\_acc\_in\_air3 | * mean\_jerk\_in\_air3 |
| --- | --- |
| * 1 | * -0.7989 |

* **De\_mean\_jerk\_on\_paper4**:

| * mean\_acc\_on\_paper4 | * mean\_jerk\_on\_paper4 |
| --- | --- |
| * -0.4571 | * 1 |

* **De\_max\_y\_extension2**:

| * disp\_index2 | * max\_y\_extension2 |
| --- | --- |
| * 0.6877 | * 1 |

* **De\_mean\_speed\_in\_air15**:

| * gmrt\_in\_air15 | * mean\_speed\_in\_air15 |
| --- | --- |
| * -1.03 | * 1 |

names(selectedlist) <- NULL  
### 2b Get the the names of the original features  
  
allDevar <- unique(c(names(unlist(selectedlist)),decornames))  
allDevar <- allDevar[!str\_detect(allDevar,"De\_")]  
allDevar <- str\_remove(allDevar,"Ba\_")  
allDevar <- unique(allDevar)  
  
  
# The analysis of the unsupervised decorrelation  
  
dcU <- getDerivedCoefficients(deTrainU)  
### 2a Get only the ones that were decorrelated by the decorrelation-based model  
deNames\_in\_dcU <- decornamesU[decornamesU %in% names(dcU)]  
selectedlistU <- dcU[deNames\_in\_dcU]  
pander::pander(selectedlistU)

* **De\_air\_time9**:

| * air\_time9 | * total\_time9 |
| --- | --- |
| * 1 | * -1.584 |

* **De\_mean\_gmrt23**:

| * gmrt\_in\_air23 | * mean\_gmrt23 |
| --- | --- |
| * -0.8454 | * 1 |

* **De\_paper\_time10**:

| * disp\_index10 | * paper\_time10 |
| --- | --- |
| * -1.62 | * 1 |

* **De\_pressure\_mean5**:

| * max\_y\_extension5 | * pressure\_mean5 |
| --- | --- |
| * -0.8889 | * 1 |

* **De\_mean\_acc\_on\_paper21**:

| * mean\_acc\_on\_paper21 | * mean\_speed\_on\_paper21 |
| --- | --- |
| * 1 | * 0.61 |

* **De\_mean\_jerk\_on\_paper4**:

| * mean\_acc\_on\_paper4 | * mean\_jerk\_on\_paper4 |
| --- | --- |
| * -0.4571 | * 1 |

* **De\_paper\_time1**:

| * disp\_index1 | * paper\_time1 |
| --- | --- |
| * -1.221 | * 1 |

* **De\_disp\_index17**:

| * disp\_index17 | * max\_y\_extension17 |
| --- | --- |
| * 1 | * -1.396 |

* **De\_mean\_speed\_in\_air19**:

| * gmrt\_in\_air19 | * mean\_speed\_in\_air19 |
| --- | --- |
| * -1.029 | * 1 |

* **De\_mean\_jerk\_in\_air7**:

| * mean\_acc\_in\_air7 | * mean\_jerk\_in\_air7 |
| --- | --- |
| * -1.149 | * 1 |

* **De\_max\_y\_extension24**:

| * max\_x\_extension24 | * max\_y\_extension24 |
| --- | --- |
| * -0.9869 | * 1 |

* **De\_total\_time10**:

| * air\_time10 | * total\_time10 |
| --- | --- |
| * -0.6317 | * 1 |

names(selectedlistU) <- NULL  
### 2b Get the the names of the original features  
  
allDevarU <- unique(c(names(unlist(selectedlistU)),decornamesU))  
allDevarU <- allDevarU[!str\_detect(allDevarU,"De\_")]  
allDevarU <- str\_remove(allDevarU,"Ba\_")  
allDevarU <- unique(allDevarU)  
  
pander::pander(c(length(rawnames),length(decornames),length(decornamesU)))

*88*, *95* and *66*

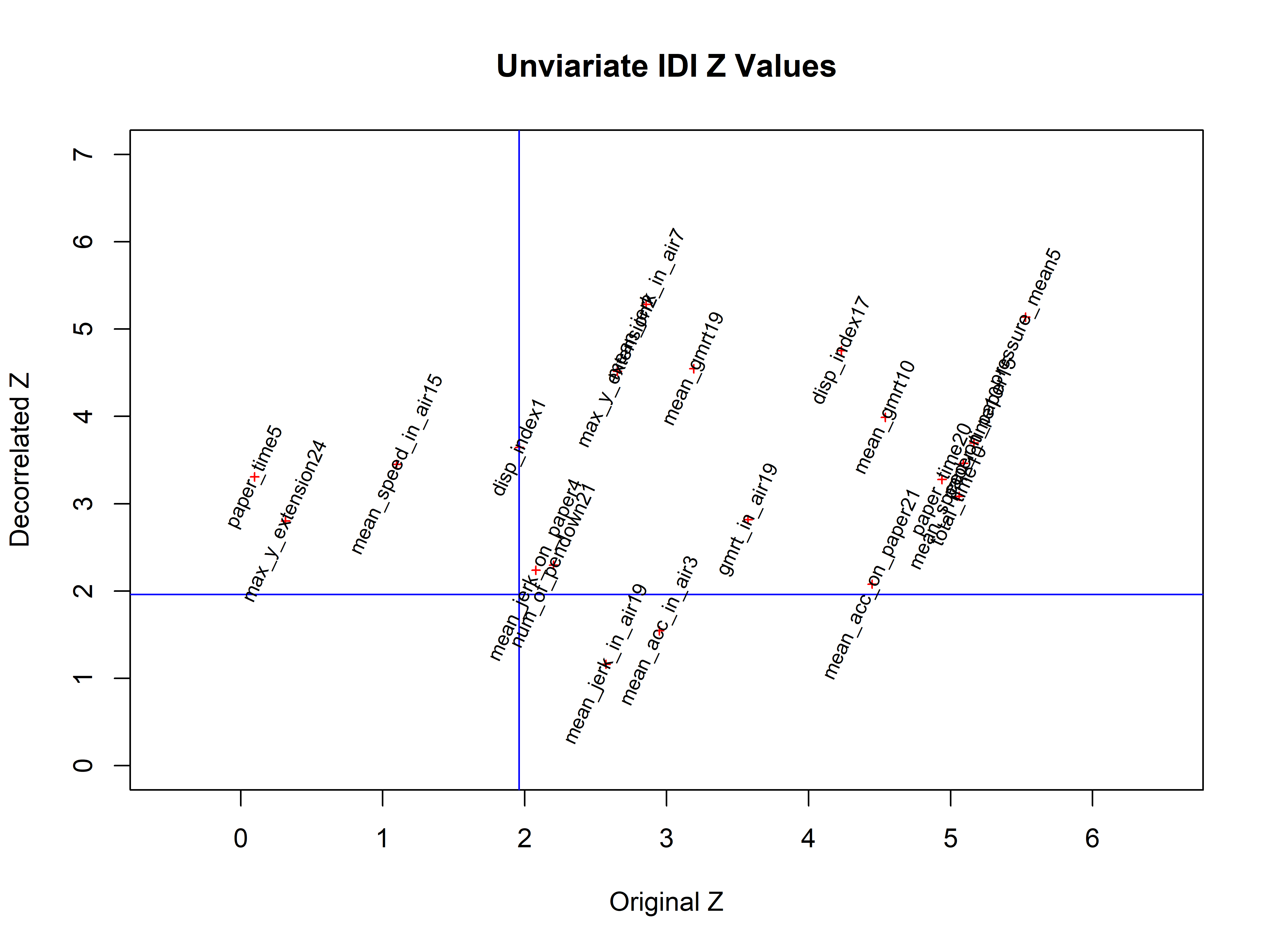
pander::pander(c(length(rawnames),length(allDevar),length(allDevarU)))

*88*, *111* and *73*

### 2c Get only the new feautres not found in the original analysis  
dvar <- allDevar[!(allDevar %in% rawnames)]   
  
### 2d Get the decorrelated variables that have new features  
newvars <- character();  
for (cvar in deNames\_in\_dc)  
{  
 lvar <- dc[cvar]  
 names(lvar) <- NULL  
 lvar <- names(unlist(lvar))  
 if (length(lvar[lvar %in% dvar]) > 0)  
 {  
 newvars <- append(newvars,cvar)  
 }  
}  
  
## 3 Here is the univariate z values of the orignal set  
#pander::pander(bm$univariate[dvar,])  
## 4 Here is the univariate z values of the decorrelated set  
#pander::pander(bmd$univariate[newvars,])  
  
## 4a The scater plot of the decorrelated vs original Univariate values  
  
zvalueNew <- bmd$univariate[newvars,]  
rownames(zvalueNew) <- str\_remove(rownames(zvalueNew),"De\_")  
rownames(zvalueNew) <- str\_remove(rownames(zvalueNew),"Ba\_")  
  
zvaluePrePost <- bm$univariate[rownames(zvalueNew),c(1,3)]  
zvaluePrePost$Name <- NULL  
zvaluePrePost$NewZ <- zvalueNew[rownames(zvaluePrePost),"ZUni"]  
pander::pander(zvaluePrePost)

|  | ZUni | NewZ |
| --- | --- | --- |
| **gmrt\_in\_air19** | 3.573 | 2.818 |
| **mean\_gmrt10** | 4.54 | 3.989 |
| **mean\_speed\_on\_paper15** | 5.091 | 3.461 |
| **mean\_gmrt19** | 3.19 | 4.547 |
| **paper\_time20** | 4.94 | 3.278 |
| **mean\_jerk\_in\_air19** | 2.573 | 1.162 |
| **pressure\_mean5** | 5.529 | 5.136 |
| **paper\_time10** | 5.165 | 3.696 |
| **disp\_index17** | 4.232 | 4.753 |
| **num\_of\_pendown21** | 2.203 | 2.296 |
| **mean\_acc\_on\_paper21** | 4.448 | 2.079 |
| **mean\_jerk\_in\_air7** | 2.856 | 5.283 |
| **paper\_time5** | 0.09634 | 3.308 |
| **max\_y\_extension24** | 0.3149 | 2.802 |
| **disp\_index1** | 1.963 | 3.644 |
| **total\_time10** | 5.061 | 3.085 |
| **mean\_acc\_in\_air3** | 2.948 | 1.545 |
| **mean\_jerk\_on\_paper4** | 2.079 | 2.24 |
| **max\_y\_extension2** | 2.653 | 4.517 |
| **mean\_speed\_in\_air15** | 1.099 | 3.45 |

plot(zvaluePrePost,  
 xlim=c(-0.5,6.5),  
 ylim=c(0,7),  
 xlab="Original Z",  
 ylab="Decorrelated Z",  
 main="Unviariate IDI Z Values",  
 pch=3,cex=0.5,  
 col="red")  
abline(v=1.96,col="blue")  
abline(h=1.96,col="blue")  
text(zvaluePrePost$ZUni,zvaluePrePost$NewZ,rownames(zvaluePrePost),srt=65,cex=0.75)



### The Summary of the Decorrelated-based Model

Here I will print the summary statistics of the Logistic models found by BSWiMS, using the original and transformed dataset. After that, I will show the characteristics of the features not found by the original analysis.

pander::pander(smOriginal$coefficients)

Table continues below

|  | Estimate | lower | OR | upper | u.Accuracy |
| --- | --- | --- | --- | --- | --- |
| **paper\_time9** | 0.2852 | 1.206 | 1.33 | 1.467 | 0.7321 |
| **total\_time23** | 0.1362 | 1.092 | 1.146 | 1.203 | 0.8125 |
| **paper\_time23** | 0.4497 | 1.305 | 1.568 | 1.884 | 0.8214 |
| **air\_time23** | 0.07675 | 1.046 | 1.08 | 1.115 | 0.7946 |
| **total\_time22** | 0.2331 | 1.139 | 1.262 | 1.399 | 0.7143 |
| **gmrt\_in\_air23** | -0.3065 | 0.6416 | 0.736 | 0.8443 | 0.7054 |
| **mean\_speed\_in\_air23** | -0.4239 | 0.5425 | 0.6545 | 0.7897 | 0.7143 |
| **disp\_index6** | 0.1615 | 1.094 | 1.175 | 1.263 | 0.625 |
| **paper\_time10** | 0.01023 | 1.006 | 1.01 | 1.015 | 0.6607 |
| **paper\_time22** | 0.1401 | 1.081 | 1.15 | 1.224 | 0.6786 |
| **total\_time17** | 0.1049 | 1.06 | 1.111 | 1.163 | 0.7411 |
| **mean\_gmrt23** | -0.2085 | 0.737 | 0.8118 | 0.8942 | 0.6875 |
| **air\_time15** | 0.1524 | 1.084 | 1.165 | 1.252 | 0.7589 |
| **paper\_time7** | 0.07688 | 1.042 | 1.08 | 1.119 | 0.6786 |
| **paper\_time6** | 0.1932 | 1.108 | 1.213 | 1.328 | 0.6518 |
| **num\_of\_pendown19** | -0.5925 | 0.418 | 0.5529 | 0.7315 | 0.6429 |
| **paper\_time8** | 0.2539 | 1.142 | 1.289 | 1.455 | 0.6339 |
| **air\_time17** | 0.1196 | 1.065 | 1.127 | 1.193 | 0.7946 |
| **disp\_index8** | 0.04713 | 1.025 | 1.048 | 1.072 | 0.5893 |
| **mean\_speed\_in\_air25** | -0.2423 | 0.699 | 0.7848 | 0.8811 | 0.7143 |
| **total\_time6** | 0.1145 | 1.062 | 1.121 | 1.184 | 0.7321 |
| **max\_x\_extension21** | -0.975 | 0.2344 | 0.3772 | 0.6069 | 0.5804 |
| **pressure\_mean5** | -1.408 | 0.1237 | 0.2447 | 0.4839 | 0.6964 |
| **total\_time7** | 0.08362 | 1.044 | 1.087 | 1.132 | 0.7411 |
| **disp\_index22** | 0.02205 | 1.011 | 1.022 | 1.034 | 0.7054 |
| **air\_time6** | 0.0777 | 1.041 | 1.081 | 1.123 | 0.7321 |
| **total\_time3** | 0.007611 | 1.004 | 1.008 | 1.011 | 0.6786 |
| **mean\_jerk\_on\_paper8** | 0.2254 | 1.121 | 1.253 | 1.4 | 0.5982 |
| **total\_time24** | 0.08237 | 1.042 | 1.086 | 1.132 | 0.6875 |
| **air\_time2** | 0.02345 | 1.012 | 1.024 | 1.036 | 0.6696 |
| **air\_time13** | 0.08605 | 1.044 | 1.09 | 1.138 | 0.6696 |
| **gmrt\_on\_paper9** | -0.05741 | 0.9175 | 0.9442 | 0.9717 | 0.7232 |
| **total\_time16** | 0.04794 | 1.024 | 1.049 | 1.074 | 0.7054 |
| **total\_time9** | 0.1249 | 1.065 | 1.133 | 1.206 | 0.7411 |
| **pressure\_var19** | -0.3243 | 0.614 | 0.723 | 0.8514 | 0.6339 |
| **num\_of\_pendown23** | 0.8626 | 1.528 | 2.369 | 3.673 | 0.6875 |
| **gmrt\_in\_air25** | -0.1438 | 0.8045 | 0.8661 | 0.9324 | 0.6964 |
| **air\_time16** | 0.03607 | 1.018 | 1.037 | 1.056 | 0.7321 |
| **mean\_speed\_in\_air7** | -0.1362 | 0.8137 | 0.8727 | 0.936 | 0.6875 |
| **air\_time8** | 0.04262 | 1.021 | 1.044 | 1.067 | 0.6161 |
| **mean\_gmrt7** | -0.155 | 0.7919 | 0.8564 | 0.9262 | 0.6786 |
| **gmrt\_on\_paper23** | -0.01064 | 0.9839 | 0.9894 | 0.9949 | 0.6875 |
| **gmrt\_in\_air17** | -0.05835 | 0.9153 | 0.9433 | 0.9722 | 0.7411 |
| **paper\_time17** | 0.1204 | 1.059 | 1.128 | 1.201 | 0.7232 |
| **air\_time24** | 0.02439 | 1.012 | 1.025 | 1.038 | 0.6875 |
| **total\_time8** | 0.1982 | 1.099 | 1.219 | 1.353 | 0.7143 |
| **total\_time15** | 0.1069 | 1.051 | 1.113 | 1.178 | 0.7411 |
| **gmrt\_in\_air7** | -0.1855 | 0.7534 | 0.8307 | 0.916 | 0.7143 |
| **mean\_acc\_in\_air25** | -0.01685 | 0.9745 | 0.9833 | 0.9922 | 0.6964 |
| **num\_of\_pendown9** | 0.045 | 1.021 | 1.046 | 1.071 | 0.6607 |
| **mean\_jerk\_in\_air2** | 0.02891 | 1.014 | 1.029 | 1.045 | 0.6875 |
| **mean\_acc\_on\_paper9** | 0.1431 | 1.069 | 1.154 | 1.246 | 0.5982 |
| **air\_time22** | 0.07874 | 1.037 | 1.082 | 1.129 | 0.7321 |
| **mean\_speed\_on\_paper23** | -0.06712 | 0.9019 | 0.9351 | 0.9695 | 0.6696 |
| **total\_time13** | 0.08734 | 1.041 | 1.091 | 1.144 | 0.7232 |
| **total\_time2** | 0.1142 | 1.054 | 1.121 | 1.192 | 0.6875 |
| **mean\_jerk\_on\_paper24** | -0.3589 | 0.5741 | 0.6985 | 0.8497 | 0.6161 |
| **pressure\_mean4** | -0.3409 | 0.59 | 0.7112 | 0.8572 | 0.6696 |
| **total\_time12** | 0.09961 | 1.046 | 1.105 | 1.166 | 0.6964 |
| **num\_of\_pendown5** | 0.05798 | 1.026 | 1.06 | 1.094 | 0.6875 |
| **air\_time7** | 0.04833 | 1.022 | 1.05 | 1.078 | 0.7768 |
| **mean\_jerk\_on\_paper21** | 0.2178 | 1.102 | 1.243 | 1.403 | 0.6518 |
| **num\_of\_pendown15** | 0.05222 | 1.024 | 1.054 | 1.085 | 0.6518 |
| **gmrt\_on\_paper10** | -0.02292 | 0.9647 | 0.9773 | 0.9901 | 0.6696 |
| **paper\_time12** | 0.1332 | 1.059 | 1.143 | 1.232 | 0.7143 |
| **mean\_gmrt17** | -0.09207 | 0.8655 | 0.912 | 0.9611 | 0.75 |
| **mean\_gmrt25** | -0.1317 | 0.8131 | 0.8766 | 0.9449 | 0.6875 |
| **air\_time5** | 0.07812 | 1.034 | 1.081 | 1.131 | 0.7143 |
| **max\_x\_extension6** | 0.1345 | 1.059 | 1.144 | 1.236 | 0.5268 |
| **total\_time18** | 0.06167 | 1.027 | 1.064 | 1.102 | 0.6429 |
| **max\_y\_extension25** | 0.04812 | 1.02 | 1.049 | 1.079 | 0.5625 |
| **pressure\_mean9** | -0.4417 | 0.4968 | 0.6429 | 0.832 | 0.6696 |
| **mean\_acc\_on\_paper24** | -0.06002 | 0.9093 | 0.9417 | 0.9753 | 0.5446 |
| **max\_y\_extension19** | -0.3669 | 0.5593 | 0.6929 | 0.8585 | 0.4821 |
| **disp\_index23** | 0.2185 | 1.093 | 1.244 | 1.416 | 0.7143 |
| **mean\_jerk\_on\_paper9** | 0.2062 | 1.086 | 1.229 | 1.391 | 0.6429 |
| **mean\_jerk\_on\_paper22** | 0.2442 | 1.101 | 1.277 | 1.481 | 0.4643 |
| **paper\_time15** | 0.09106 | 1.037 | 1.095 | 1.157 | 0.6964 |
| **air\_time4** | 0.003129 | 1.001 | 1.003 | 1.005 | 0.6786 |
| **mean\_gmrt1** | -0.03918 | 0.9388 | 0.9616 | 0.9849 | 0.6339 |
| **mean\_gmrt8** | -0.02357 | 0.9627 | 0.9767 | 0.991 | 0.6786 |
| **mean\_jerk\_in\_air21** | 0.03187 | 1.012 | 1.032 | 1.053 | 0.5714 |
| **pressure\_var5** | 0.002675 | 1.001 | 1.003 | 1.004 | 0.7232 |
| **total\_time5** | 0.006931 | 1.003 | 1.007 | 1.011 | 0.6518 |
| **mean\_speed\_on\_paper9** | -0.1072 | 0.8397 | 0.8983 | 0.9609 | 0.7232 |
| **mean\_speed\_on\_paper15** | -0.02752 | 0.9551 | 0.9729 | 0.991 | 0.6518 |
| **total\_time10** | 0.008331 | 1.003 | 1.008 | 1.014 | 0.6429 |
| **total\_time19** | -0.002695 | 0.9952 | 0.9973 | 0.9994 | 0.5 |

Table continues below

|  | r.Accuracy | full.Accuracy | u.AUC | r.AUC |
| --- | --- | --- | --- | --- |
| **paper\_time9** | 0.7848 | 0.8835 | 0.7321 | 0.785 |
| **total\_time23** | 0.746 | 0.8589 | 0.8132 | 0.7463 |
| **paper\_time23** | 0.8277 | 0.8857 | 0.8214 | 0.8278 |
| **air\_time23** | 0.7665 | 0.8545 | 0.7951 | 0.7669 |
| **total\_time22** | 0.8065 | 0.8636 | 0.7145 | 0.807 |
| **gmrt\_in\_air23** | 0.8116 | 0.8665 | 0.7057 | 0.8122 |
| **mean\_speed\_in\_air23** | 0.8289 | 0.8877 | 0.7145 | 0.8294 |
| **disp\_index6** | 0.7692 | 0.842 | 0.6258 | 0.7695 |
| **paper\_time10** | 0.7277 | 0.7723 | 0.6619 | 0.7281 |
| **paper\_time22** | 0.7315 | 0.7802 | 0.6797 | 0.7316 |
| **total\_time17** | 0.7897 | 0.8403 | 0.7418 | 0.7898 |
| **mean\_gmrt23** | 0.7923 | 0.8501 | 0.6876 | 0.7926 |
| **air\_time15** | 0.825 | 0.8719 | 0.7593 | 0.8252 |
| **paper\_time7** | 0.7518 | 0.8143 | 0.6797 | 0.7518 |
| **paper\_time6** | 0.8071 | 0.8585 | 0.6534 | 0.8075 |
| **num\_of\_pendown19** | 0.8647 | 0.9129 | 0.6427 | 0.8649 |
| **paper\_time8** | 0.8351 | 0.895 | 0.634 | 0.8353 |
| **air\_time17** | 0.8379 | 0.8772 | 0.7951 | 0.838 |
| **disp\_index8** | 0.8125 | 0.8929 | 0.5888 | 0.8124 |
| **mean\_speed\_in\_air25** | 0.7936 | 0.8561 | 0.7152 | 0.7941 |
| **total\_time6** | 0.8087 | 0.859 | 0.7327 | 0.809 |
| **max\_x\_extension21** | 0.8406 | 0.8795 | 0.5836 | 0.841 |
| **pressure\_mean5** | 0.7902 | 0.8521 | 0.6995 | 0.7904 |
| **total\_time7** | 0.7975 | 0.8506 | 0.7418 | 0.7974 |
| **disp\_index22** | 0.6964 | 0.7723 | 0.7057 | 0.6974 |
| **air\_time6** | 0.7821 | 0.8446 | 0.7324 | 0.7824 |
| **total\_time3** | 0.7188 | 0.7679 | 0.6781 | 0.7197 |
| **mean\_jerk\_on\_paper8** | 0.8165 | 0.875 | 0.5982 | 0.8165 |
| **total\_time24** | 0.7864 | 0.8482 | 0.6882 | 0.7868 |
| **air\_time2** | 0.7384 | 0.8098 | 0.6694 | 0.7386 |
| **air\_time13** | 0.7961 | 0.8567 | 0.67 | 0.7964 |
| **gmrt\_on\_paper9** | 0.7562 | 0.8107 | 0.7236 | 0.757 |
| **total\_time16** | 0.7569 | 0.8159 | 0.7067 | 0.7573 |
| **total\_time9** | 0.8186 | 0.8647 | 0.7418 | 0.8189 |
| **pressure\_var19** | 0.8285 | 0.883 | 0.6343 | 0.8289 |
| **num\_of\_pendown23** | 0.825 | 0.8777 | 0.6882 | 0.8254 |
| **gmrt\_in\_air25** | 0.7829 | 0.8348 | 0.697 | 0.7833 |
| **air\_time16** | 0.7723 | 0.8289 | 0.733 | 0.7727 |
| **mean\_speed\_in\_air7** | 0.7798 | 0.8398 | 0.6879 | 0.7802 |
| **air\_time8** | 0.8022 | 0.8681 | 0.6164 | 0.8023 |
| **mean\_gmrt7** | 0.7862 | 0.8348 | 0.6794 | 0.7864 |
| **gmrt\_on\_paper23** | 0.6786 | 0.7902 | 0.6876 | 0.6796 |
| **gmrt\_in\_air17** | 0.736 | 0.794 | 0.7415 | 0.7372 |
| **paper\_time17** | 0.7522 | 0.8114 | 0.7242 | 0.7526 |
| **air\_time24** | 0.7893 | 0.8339 | 0.6882 | 0.7901 |
| **total\_time8** | 0.8393 | 0.8942 | 0.7148 | 0.8394 |
| **total\_time15** | 0.8121 | 0.8442 | 0.7415 | 0.8126 |
| **gmrt\_in\_air7** | 0.8244 | 0.8656 | 0.7148 | 0.8247 |
| **mean\_acc\_in\_air25** | 0.7143 | 0.7857 | 0.6973 | 0.715 |
| **num\_of\_pendown9** | 0.7429 | 0.8173 | 0.6609 | 0.7429 |
| **mean\_jerk\_in\_air2** | 0.787 | 0.8393 | 0.6879 | 0.7875 |
| **mean\_acc\_on\_paper9** | 0.8274 | 0.8646 | 0.5986 | 0.8274 |
| **air\_time22** | 0.8059 | 0.851 | 0.7324 | 0.8064 |
| **mean\_speed\_on\_paper23** | 0.7598 | 0.8152 | 0.6703 | 0.7603 |
| **total\_time13** | 0.774 | 0.8266 | 0.7246 | 0.7744 |
| **total\_time2** | 0.7917 | 0.8383 | 0.6876 | 0.7921 |
| **mean\_jerk\_on\_paper24** | 0.8335 | 0.8755 | 0.6155 | 0.8338 |
| **pressure\_mean4** | 0.7602 | 0.7985 | 0.6729 | 0.7601 |
| **total\_time12** | 0.7799 | 0.8319 | 0.6967 | 0.7802 |
| **num\_of\_pendown5** | 0.7872 | 0.8239 | 0.6892 | 0.7875 |
| **air\_time7** | 0.7956 | 0.8492 | 0.7778 | 0.7958 |
| **mean\_jerk\_on\_paper21** | 0.7637 | 0.8093 | 0.6522 | 0.7637 |
| **num\_of\_pendown15** | 0.7693 | 0.8244 | 0.6518 | 0.7695 |
| **gmrt\_on\_paper10** | 0.7812 | 0.8214 | 0.6703 | 0.7815 |
| **paper\_time12** | 0.812 | 0.8562 | 0.7148 | 0.812 |
| **mean\_gmrt17** | 0.7637 | 0.8304 | 0.7499 | 0.7642 |
| **mean\_gmrt25** | 0.7729 | 0.817 | 0.6882 | 0.7734 |
| **air\_time5** | 0.8309 | 0.872 | 0.7161 | 0.831 |
| **max\_x\_extension6** | 0.8223 | 0.858 | 0.5268 | 0.8225 |
| **total\_time18** | 0.7417 | 0.7902 | 0.6437 | 0.7421 |
| **max\_y\_extension25** | 0.7946 | 0.8527 | 0.5612 | 0.7954 |
| **pressure\_mean9** | 0.8115 | 0.8562 | 0.6726 | 0.8117 |
| **mean\_acc\_on\_paper24** | 0.8237 | 0.8705 | 0.5447 | 0.824 |
| **max\_y\_extension19** | 0.817 | 0.8536 | 0.4848 | 0.817 |
| **disp\_index23** | 0.7907 | 0.8299 | 0.7155 | 0.7911 |
| **mean\_jerk\_on\_paper9** | 0.7845 | 0.825 | 0.6434 | 0.7849 |
| **mean\_jerk\_on\_paper22** | 0.7798 | 0.8155 | 0.4628 | 0.7803 |
| **paper\_time15** | 0.7867 | 0.8348 | 0.697 | 0.7869 |
| **air\_time4** | 0.7679 | 0.8036 | 0.6791 | 0.7684 |
| **mean\_gmrt1** | 0.7801 | 0.8103 | 0.6346 | 0.7804 |
| **mean\_gmrt8** | 0.7917 | 0.8214 | 0.6775 | 0.7917 |
| **mean\_jerk\_in\_air21** | 0.8316 | 0.8712 | 0.5716 | 0.8318 |
| **pressure\_var5** | 0.7768 | 0.8036 | 0.7226 | 0.777 |
| **total\_time5** | 0.7723 | 0.7991 | 0.6522 | 0.7725 |
| **mean\_speed\_on\_paper9** | 0.8165 | 0.8542 | 0.7236 | 0.8168 |
| **mean\_speed\_on\_paper15** | 0.7623 | 0.8058 | 0.6522 | 0.7625 |
| **total\_time10** | 0.8348 | 0.8482 | 0.644 | 0.8352 |
| **total\_time19** | 0.7098 | 0.7232 | 0.4947 | 0.7101 |

|  | full.AUC | IDI | NRI | z.IDI | z.NRI | Frequency |
| --- | --- | --- | --- | --- | --- | --- |
| **paper\_time9** | 0.8835 | 0.2247 | 1.212 | 5.576 | 8.526 | 1 |
| **total\_time23** | 0.8592 | 0.1505 | 0.8809 | 5.258 | 5.762 | 1 |
| **paper\_time23** | 0.8859 | 0.1693 | 1.172 | 4.77 | 8.326 | 1 |
| **air\_time23** | 0.8548 | 0.1273 | 0.7896 | 4.706 | 4.668 | 1 |
| **total\_time22** | 0.8636 | 0.1518 | 0.9877 | 4.406 | 6.395 | 0.9 |
| **gmrt\_in\_air23** | 0.8665 | 0.1432 | 0.803 | 4.367 | 4.695 | 1 |
| **mean\_speed\_in\_air23** | 0.8879 | 0.1399 | 0.9855 | 4.365 | 6.33 | 0.95 |
| **disp\_index6** | 0.8422 | 0.1339 | 0.8314 | 4.362 | 4.998 | 0.65 |
| **paper\_time10** | 0.7726 | 0.1471 | 0.7021 | 4.325 | 4.031 | 0.1 |
| **paper\_time22** | 0.7806 | 0.1449 | 0.6984 | 4.31 | 4.018 | 0.65 |
| **total\_time17** | 0.8405 | 0.1302 | 0.8908 | 4.308 | 5.407 | 0.9 |
| **mean\_gmrt23** | 0.8501 | 0.1345 | 0.6945 | 4.184 | 3.984 | 0.95 |
| **air\_time15** | 0.8721 | 0.1403 | 0.9552 | 4.137 | 5.976 | 1 |
| **paper\_time7** | 0.8144 | 0.1297 | 0.8367 | 4.127 | 5.144 | 0.5 |
| **paper\_time6** | 0.8587 | 0.1269 | 0.9411 | 4.096 | 6.171 | 1 |
| **num\_of\_pendown19** | 0.9131 | 0.1181 | 1.109 | 4.073 | 7.463 | 1 |
| **paper\_time8** | 0.8951 | 0.1249 | 1.076 | 4.058 | 7.098 | 0.85 |
| **air\_time17** | 0.8774 | 0.1174 | 1.077 | 4.058 | 6.907 | 1 |
| **disp\_index8** | 0.893 | 0.1251 | 0.9828 | 4.052 | 6.126 | 0.1 |
| **mean\_speed\_in\_air25** | 0.856 | 0.1193 | 0.9654 | 4.046 | 6.051 | 0.85 |
| **total\_time6** | 0.859 | 0.1233 | 1.04 | 4.023 | 6.562 | 0.95 |
| **max\_x\_extension21** | 0.8796 | 0.1179 | 1.226 | 4.001 | 8.782 | 1 |
| **pressure\_mean5** | 0.8524 | 0.12 | 0.8538 | 3.999 | 5.359 | 0.8 |
| **total\_time7** | 0.8506 | 0.09981 | 0.7727 | 3.958 | 4.778 | 0.95 |
| **disp\_index22** | 0.7726 | 0.1178 | 0.8405 | 3.951 | 4.915 | 0.1 |
| **air\_time6** | 0.8448 | 0.1131 | 0.9214 | 3.946 | 5.526 | 1 |
| **total\_time3** | 0.7681 | 0.125 | 0.6223 | 3.913 | 3.543 | 0.1 |
| **mean\_jerk\_on\_paper8** | 0.875 | 0.1093 | 0.9542 | 3.906 | 5.865 | 0.45 |
| **total\_time24** | 0.8485 | 0.107 | 0.802 | 3.884 | 4.688 | 0.65 |
| **air\_time2** | 0.81 | 0.1108 | 0.6918 | 3.865 | 3.928 | 0.5 |
| **air\_time13** | 0.8569 | 0.1143 | 0.6866 | 3.864 | 3.943 | 0.95 |
| **gmrt\_on\_paper9** | 0.8108 | 0.1155 | 0.7356 | 3.856 | 4.267 | 0.5 |
| **total\_time16** | 0.8159 | 0.1177 | 0.8056 | 3.851 | 4.763 | 0.65 |
| **total\_time9** | 0.8649 | 0.1174 | 0.8819 | 3.845 | 5.591 | 0.95 |
| **pressure\_var19** | 0.8829 | 0.1141 | 1.016 | 3.842 | 6.542 | 0.95 |
| **num\_of\_pendown23** | 0.8778 | 0.1075 | 0.9543 | 3.811 | 5.891 | 1 |
| **gmrt\_in\_air25** | 0.8348 | 0.1032 | 0.763 | 3.795 | 4.39 | 0.8 |
| **air\_time16** | 0.8289 | 0.1099 | 0.8395 | 3.792 | 4.967 | 0.6 |
| **mean\_speed\_in\_air7** | 0.84 | 0.1113 | 0.7269 | 3.787 | 4.206 | 0.9 |
| **air\_time8** | 0.868 | 0.1056 | 0.8363 | 3.773 | 4.968 | 0.65 |
| **mean\_gmrt7** | 0.835 | 0.1151 | 0.7242 | 3.761 | 4.353 | 0.9 |
| **gmrt\_on\_paper23** | 0.7902 | 0.1061 | 0.6067 | 3.749 | 3.369 | 0.1 |
| **gmrt\_in\_air17** | 0.7947 | 0.1104 | 0.815 | 3.726 | 4.781 | 0.7 |
| **paper\_time17** | 0.8118 | 0.1104 | 0.8475 | 3.716 | 5.071 | 0.8 |
| **air\_time24** | 0.8342 | 0.09186 | 0.7608 | 3.698 | 4.39 | 0.25 |
| **total\_time8** | 0.8943 | 0.1095 | 1.095 | 3.688 | 7.099 | 1 |
| **total\_time15** | 0.8445 | 0.1323 | 0.6651 | 3.68 | 3.867 | 1 |
| **gmrt\_in\_air7** | 0.8656 | 0.11 | 0.865 | 3.665 | 5.313 | 0.9 |
| **mean\_acc\_in\_air25** | 0.7859 | 0.102 | 0.7432 | 3.663 | 4.318 | 0.15 |
| **num\_of\_pendown9** | 0.8176 | 0.1076 | 0.7782 | 3.659 | 4.547 | 0.75 |
| **mean\_jerk\_in\_air2** | 0.8395 | 0.1055 | 0.8504 | 3.653 | 5.066 | 0.35 |
| **mean\_acc\_on\_paper9** | 0.8647 | 0.1019 | 0.8165 | 3.644 | 4.873 | 0.3 |
| **air\_time22** | 0.8512 | 0.1026 | 0.7645 | 3.619 | 4.457 | 0.95 |
| **mean\_speed\_on\_paper23** | 0.8153 | 0.1053 | 0.5804 | 3.607 | 3.226 | 0.5 |
| **total\_time13** | 0.8269 | 0.1071 | 0.6746 | 3.604 | 3.894 | 0.95 |
| **total\_time2** | 0.8384 | 0.1019 | 0.839 | 3.593 | 5.082 | 0.9 |
| **mean\_jerk\_on\_paper24** | 0.8755 | 0.09567 | 0.8547 | 3.567 | 5.171 | 0.85 |
| **pressure\_mean4** | 0.7989 | 0.1028 | 0.7005 | 3.561 | 4.269 | 0.35 |
| **total\_time12** | 0.8322 | 0.101 | 0.7352 | 3.553 | 4.277 | 0.85 |
| **num\_of\_pendown5** | 0.8243 | 0.09886 | 0.743 | 3.532 | 4.339 | 0.9 |
| **air\_time7** | 0.8493 | 0.07534 | 0.7553 | 3.519 | 4.441 | 0.95 |
| **mean\_jerk\_on\_paper21** | 0.8097 | 0.09733 | 0.6824 | 3.491 | 3.882 | 0.85 |
| **num\_of\_pendown15** | 0.8243 | 0.09467 | 0.708 | 3.452 | 4.103 | 0.3 |
| **gmrt\_on\_paper10** | 0.8216 | 0.09375 | 0.7086 | 3.442 | 4.045 | 0.2 |
| **paper\_time12** | 0.8563 | 0.09272 | 0.7598 | 3.431 | 4.444 | 0.9 |
| **mean\_gmrt17** | 0.8304 | 0.08923 | 0.7364 | 3.429 | 4.268 | 0.75 |
| **mean\_gmrt25** | 0.8171 | 0.08938 | 0.6498 | 3.409 | 3.675 | 0.8 |
| **air\_time5** | 0.8722 | 0.09228 | 1.006 | 3.4 | 6.359 | 0.9 |
| **max\_x\_extension6** | 0.858 | 0.09056 | 0.8209 | 3.384 | 4.853 | 0.5 |
| **total\_time18** | 0.7906 | 0.0793 | 0.627 | 3.382 | 4.301 | 0.7 |
| **max\_y\_extension25** | 0.853 | 0.0837 | 0.7295 | 3.356 | 4.18 | 0.1 |
| **pressure\_mean9** | 0.8565 | 0.0853 | 0.8139 | 3.348 | 5.037 | 0.9 |
| **mean\_acc\_on\_paper24** | 0.8704 | 0.07826 | 0.7478 | 3.345 | 4.299 | 0.2 |
| **max\_y\_extension19** | 0.8537 | 0.08624 | 0.6305 | 3.339 | 3.802 | 0.5 |
| **disp\_index23** | 0.83 | 0.09111 | 0.6997 | 3.295 | 4.047 | 0.9 |
| **mean\_jerk\_on\_paper9** | 0.8253 | 0.07657 | 0.6606 | 3.247 | 3.733 | 0.75 |
| **mean\_jerk\_on\_paper22** | 0.8156 | 0.07981 | 0.7832 | 3.22 | 5.299 | 0.3 |
| **paper\_time15** | 0.8349 | 0.08101 | 0.6592 | 3.209 | 3.746 | 0.9 |
| **air\_time4** | 0.8037 | 0.07636 | 0.7164 | 3.204 | 4.07 | 0.1 |
| **mean\_gmrt1** | 0.8106 | 0.0779 | 0.6656 | 3.201 | 3.809 | 0.4 |
| **mean\_gmrt8** | 0.8216 | 0.08544 | 0.8194 | 3.183 | 4.77 | 0.3 |
| **mean\_jerk\_in\_air21** | 0.8712 | 0.07755 | 0.956 | 3.172 | 5.793 | 0.35 |
| **pressure\_var5** | 0.8037 | 0.05497 | 1.035 | 3.152 | 6.413 | 0.1 |
| **total\_time5** | 0.7991 | 0.05692 | 0.6651 | 3.147 | 3.779 | 0.1 |
| **mean\_speed\_on\_paper9** | 0.8543 | 0.08006 | 0.693 | 3.09 | 3.997 | 0.9 |
| **mean\_speed\_on\_paper15** | 0.8061 | 0.07666 | 0.5624 | 2.907 | 3.115 | 0.4 |
| **total\_time10** | 0.8485 | 0.06666 | 0.4896 | 2.88 | 2.755 | 0.1 |
| **total\_time19** | 0.7238 | 0.0512 | 0.4147 | 2.434 | 2.528 | 0.1 |

pander::pander(smDecor$coefficients)

Table continues below

|  | Estimate | lower | OR | upper |
| --- | --- | --- | --- | --- |
| **Ba\_paper\_time23** | 0.5422 | 1.449 | 1.72 | 2.041 |
| **Ba\_paper\_time9** | 0.3824 | 1.287 | 1.466 | 1.669 |
| **Ba\_air\_time22** | 0.3176 | 1.22 | 1.374 | 1.547 |
| **Ba\_disp\_index6** | 0.3674 | 1.254 | 1.444 | 1.663 |
| **num\_of\_pendown19** | -0.8163 | 0.3179 | 0.4421 | 0.6147 |
| **Ba\_total\_time6** | 0.2897 | 1.186 | 1.336 | 1.505 |
| **Ba\_mean\_speed\_in\_air25** | -0.6359 | 0.4048 | 0.5295 | 0.6925 |
| **De\_gmrt\_in\_air19** | 3.291 | 6.577 | 26.88 | 109.9 |
| **Ba\_max\_x\_extension21** | -1.269 | 0.1621 | 0.2811 | 0.4877 |
| **Ba\_air\_time23** | 0.06401 | 1.037 | 1.066 | 1.097 |
| **De\_mean\_gmrt10** | -0.05051 | 0.9301 | 0.9507 | 0.9718 |
| **pressure\_var19** | -0.3721 | 0.5855 | 0.6893 | 0.8115 |
| **Ba\_air\_time11** | 0.005499 | 1.003 | 1.006 | 1.008 |
| **Ba\_max\_y\_extension19** | -1.293 | 0.1516 | 0.2745 | 0.4969 |
| **Ba\_mean\_speed\_in\_air19** | -0.138 | 0.817 | 0.8711 | 0.9288 |
| **Ba\_num\_of\_pendown15** | 0.333 | 1.193 | 1.395 | 1.631 |
| **Ba\_air\_time17** | 0.09992 | 1.054 | 1.105 | 1.159 |
| **Ba\_mean\_speed\_on\_paper11** | -0.1573 | 0.7927 | 0.8544 | 0.921 |
| **De\_mean\_speed\_on\_paper15** | -0.07273 | 0.8978 | 0.9299 | 0.963 |
| **Ba\_total\_time15** | 0.1061 | 1.056 | 1.112 | 1.171 |
| **Ba\_total\_time8** | 0.2115 | 1.115 | 1.236 | 1.369 |
| **Ba\_total\_time2** | 0.1721 | 1.094 | 1.188 | 1.29 |
| **De\_mean\_gmrt19** | 2.099 | 2.952 | 8.157 | 22.54 |
| **Ba\_gmrt\_in\_air23** | -0.453 | 0.5098 | 0.6357 | 0.7927 |
| **Ba\_gmrt\_in\_air7** | -0.2054 | 0.7368 | 0.8143 | 0.9 |
| **De\_paper\_time20** | 0.04499 | 1.023 | 1.046 | 1.07 |
| **De\_mean\_jerk\_in\_air19** | 1.652 | 2.305 | 5.218 | 11.81 |
| **Ba\_pressure\_mean8** | -0.1576 | 0.7902 | 0.8542 | 0.9233 |
| **Ba\_air\_time13** | 0.09559 | 1.049 | 1.1 | 1.154 |
| **Ba\_total\_time24** | 0.1091 | 1.056 | 1.115 | 1.178 |
| **Ba\_gmrt\_on\_paper22** | -0.0568 | 0.9181 | 0.9448 | 0.9723 |
| **Ba\_air\_time7** | 0.08238 | 1.042 | 1.086 | 1.132 |
| **Ba\_pressure\_mean4** | -1.641 | 0.08393 | 0.1938 | 0.4477 |
| **Ba\_paper\_time12** | 0.1963 | 1.1 | 1.217 | 1.346 |
| **air\_time9** | 0.004716 | 1.002 | 1.005 | 1.007 |
| **Ba\_mean\_jerk\_on\_paper21** | 0.2842 | 1.148 | 1.329 | 1.538 |
| **Ba\_gmrt\_on\_paper9** | -0.1153 | 0.8399 | 0.8911 | 0.9453 |
| **Ba\_air\_time5** | 0.0756 | 1.036 | 1.079 | 1.122 |
| **De\_disp\_index22** | 0.1901 | 1.093 | 1.209 | 1.338 |
| **Ba\_gmrt\_on\_paper7** | -0.04825 | 0.9288 | 0.9529 | 0.9776 |
| **Ba\_pressure\_mean15** | -0.0623 | 0.9091 | 0.9396 | 0.9711 |
| **Ba\_disp\_index15** | 0.02972 | 1.014 | 1.03 | 1.047 |
| **Ba\_num\_of\_pendown5** | 0.081 | 1.038 | 1.084 | 1.132 |
| **Ba\_total\_time16** | 0.09208 | 1.044 | 1.096 | 1.152 |
| **De\_pressure\_mean5** | -0.3339 | 0.5984 | 0.7161 | 0.857 |
| **De\_paper\_time10** | 0.3142 | 1.157 | 1.369 | 1.62 |
| **De\_disp\_index17** | 0.1695 | 1.081 | 1.185 | 1.298 |
| **pressure\_mean9** | -0.9741 | 0.2233 | 0.3775 | 0.6383 |
| **Ba\_total\_time3** | 0.07141 | 1.034 | 1.074 | 1.116 |
| **De\_num\_of\_pendown21** | -0.0798 | 0.8841 | 0.9233 | 0.9643 |
| **Ba\_mean\_acc\_in\_air17** | -0.005735 | 0.9912 | 0.9943 | 0.9974 |
| **De\_gmrt\_on\_paper17** | -0.08361 | 0.8792 | 0.9198 | 0.9623 |
| **Ba\_air\_time4** | 0.04583 | 1.021 | 1.047 | 1.073 |
| **Ba\_pressure\_mean18** | -0.0394 | 0.9409 | 0.9614 | 0.9823 |
| **paper\_time17** | 0.1644 | 1.078 | 1.179 | 1.289 |
| **De\_mean\_acc\_on\_paper21** | 0.3651 | 1.18 | 1.441 | 1.759 |
| **Ba\_mean\_jerk\_on\_paper24** | -0.3645 | 0.5685 | 0.6945 | 0.8484 |
| **pressure\_mean7** | -0.2479 | 0.6812 | 0.7805 | 0.8941 |
| **pressure\_var5** | 0.01926 | 1.009 | 1.019 | 1.03 |
| **De\_mean\_jerk\_in\_air7** | 0.9707 | 1.543 | 2.64 | 4.518 |
| **paper\_time15** | 0.1872 | 1.087 | 1.206 | 1.338 |
| **Ba\_mean\_gmrt1** | -0.05159 | 0.923 | 0.9497 | 0.9772 |
| **Ba\_gmrt\_on\_paper15** | -0.007561 | 0.9883 | 0.9925 | 0.9967 |
| **paper\_time13** | 0.05602 | 1.025 | 1.058 | 1.091 |
| **num\_of\_pendown23** | 0.7083 | 1.369 | 2.031 | 3.013 |
| **De\_mean\_gmrt23** | 0.4167 | 1.2 | 1.517 | 1.917 |
| **Ba\_total\_time18** | 0.09423 | 1.043 | 1.099 | 1.157 |
| **Ba\_mean\_jerk\_on\_paper9** | 0.4464 | 1.215 | 1.563 | 2.011 |
| **Ba\_num\_of\_pendown9** | 0.05957 | 1.026 | 1.061 | 1.098 |
| **max\_x\_extension6** | 0.09468 | 1.041 | 1.099 | 1.161 |
| **Ba\_mean\_acc\_on\_paper3** | 0.03162 | 1.013 | 1.032 | 1.051 |
| **Ba\_pressure\_var4** | 0.01003 | 1.004 | 1.01 | 1.016 |
| **De\_paper\_time5** | -0.05128 | 0.9218 | 0.95 | 0.9791 |
| **De\_mean\_speed\_on\_paper9** | -0.1072 | 0.843 | 0.8983 | 0.9574 |
| **Ba\_paper\_time24** | 0.05026 | 1.021 | 1.052 | 1.084 |
| **Ba\_disp\_index8** | 0.0106 | 1.004 | 1.011 | 1.017 |
| **De\_max\_y\_extension24** | -0.2644 | 0.6564 | 0.7677 | 0.8978 |
| **Ba\_mean\_gmrt6** | -0.02883 | 0.9549 | 0.9716 | 0.9885 |
| **Ba\_mean\_gmrt14** | -0.01994 | 0.9686 | 0.9803 | 0.9921 |
| **Ba\_mean\_acc\_in\_air2** | 0.02282 | 1.009 | 1.023 | 1.037 |
| **De\_disp\_index1** | -0.0208 | 0.9672 | 0.9794 | 0.9918 |
| **pressure\_mean1** | -0.0855 | 0.8718 | 0.9181 | 0.9668 |
| **paper\_time2** | 0.02438 | 1.01 | 1.025 | 1.04 |
| **Ba\_pressure\_mean12** | -0.05945 | 0.9088 | 0.9423 | 0.977 |
| **De\_paper\_time8** | 0.03033 | 1.012 | 1.031 | 1.05 |
| **De\_total\_time10** | 0.1607 | 1.064 | 1.174 | 1.297 |
| **Ba\_air\_time19** | -0.0173 | 0.9724 | 0.9828 | 0.9934 |
| **Ba\_mean\_speed\_on\_paper18** | -0.005655 | 0.9908 | 0.9944 | 0.9979 |
| **De\_mean\_acc\_in\_air3** | -0.06765 | 0.8954 | 0.9346 | 0.9755 |
| **De\_mean\_jerk\_on\_paper4** | 0.1016 | 1.036 | 1.107 | 1.182 |
| **disp\_index7** | 0.02221 | 1.008 | 1.022 | 1.037 |
| **De\_max\_y\_extension2** | 0.01219 | 1.004 | 1.012 | 1.021 |
| **air\_time12** | 0.004983 | 1.002 | 1.005 | 1.008 |
| **Ba\_mean\_speed\_on\_paper2** | -0.0223 | 0.9629 | 0.9779 | 0.9932 |
| **De\_mean\_speed\_in\_air15** | 0.08299 | 1.025 | 1.087 | 1.151 |

Table continues below

|  | u.Accuracy | r.Accuracy | full.Accuracy |
| --- | --- | --- | --- |
| **Ba\_paper\_time23** | 0.8214 | 0.7924 | 0.8871 |
| **Ba\_paper\_time9** | 0.7321 | 0.8228 | 0.9094 |
| **Ba\_air\_time22** | 0.7321 | 0.8424 | 0.9067 |
| **Ba\_disp\_index6** | 0.625 | 0.7665 | 0.8446 |
| **num\_of\_pendown19** | 0.6429 | 0.8384 | 0.9009 |
| **Ba\_total\_time6** | 0.7321 | 0.8232 | 0.9036 |
| **Ba\_mean\_speed\_in\_air25** | 0.7143 | 0.8455 | 0.8942 |
| **De\_gmrt\_in\_air19** | 0.5714 | 0.8263 | 0.8987 |
| **Ba\_max\_x\_extension21** | 0.5804 | 0.8629 | 0.9027 |
| **Ba\_air\_time23** | 0.7946 | 0.7455 | 0.8415 |
| **De\_mean\_gmrt10** | 0.625 | 0.8125 | 0.8616 |
| **pressure\_var19** | 0.6339 | 0.8156 | 0.8781 |
| **Ba\_air\_time11** | 0.6875 | 0.7054 | 0.7723 |
| **Ba\_max\_y\_extension19** | 0.4821 | 0.8195 | 0.875 |
| **Ba\_mean\_speed\_in\_air19** | 0.6786 | 0.7451 | 0.8222 |
| **Ba\_num\_of\_pendown15** | 0.6518 | 0.7974 | 0.8488 |
| **Ba\_air\_time17** | 0.7946 | 0.8366 | 0.8763 |
| **Ba\_mean\_speed\_on\_paper11** | 0.6696 | 0.7761 | 0.8304 |
| **De\_mean\_speed\_on\_paper15** | 0.625 | 0.753 | 0.7946 |
| **Ba\_total\_time15** | 0.7411 | 0.7978 | 0.8429 |
| **Ba\_total\_time8** | 0.7143 | 0.8268 | 0.8875 |
| **Ba\_total\_time2** | 0.6875 | 0.7982 | 0.8585 |
| **De\_mean\_gmrt19** | 0.6339 | 0.8647 | 0.9085 |
| **Ba\_gmrt\_in\_air23** | 0.7054 | 0.8661 | 0.9125 |
| **Ba\_gmrt\_in\_air7** | 0.7143 | 0.7915 | 0.8442 |
| **De\_paper\_time20** | 0.625 | 0.7321 | 0.7812 |
| **De\_mean\_jerk\_in\_air19** | 0.6071 | 0.8326 | 0.8728 |
| **Ba\_pressure\_mean8** | 0.6786 | 0.7381 | 0.7991 |
| **Ba\_air\_time13** | 0.6696 | 0.7647 | 0.8281 |
| **Ba\_total\_time24** | 0.6875 | 0.7652 | 0.8178 |
| **Ba\_gmrt\_on\_paper22** | 0.6607 | 0.721 | 0.7801 |
| **Ba\_air\_time7** | 0.7768 | 0.8098 | 0.8616 |
| **Ba\_pressure\_mean4** | 0.6696 | 0.7867 | 0.8388 |
| **Ba\_paper\_time12** | 0.7143 | 0.8098 | 0.8411 |
| **air\_time9** | 0.6161 | 0.6964 | 0.7798 |
| **Ba\_mean\_jerk\_on\_paper21** | 0.6518 | 0.7774 | 0.8246 |
| **Ba\_gmrt\_on\_paper9** | 0.7232 | 0.7607 | 0.8138 |
| **Ba\_air\_time5** | 0.7143 | 0.8067 | 0.8513 |
| **De\_disp\_index22** | 0.7054 | 0.7723 | 0.8099 |
| **Ba\_gmrt\_on\_paper7** | 0.6429 | 0.7378 | 0.7865 |
| **Ba\_pressure\_mean15** | 0.5982 | 0.775 | 0.8089 |
| **Ba\_disp\_index15** | 0.6429 | 0.7321 | 0.7902 |
| **Ba\_num\_of\_pendown5** | 0.6875 | 0.7821 | 0.8147 |
| **Ba\_total\_time16** | 0.7054 | 0.7929 | 0.8259 |
| **De\_pressure\_mean5** | 0.6875 | 0.8026 | 0.8457 |
| **De\_paper\_time10** | 0.625 | 0.798 | 0.8488 |
| **De\_disp\_index17** | 0.7232 | 0.7545 | 0.7991 |
| **pressure\_mean9** | 0.6696 | 0.8433 | 0.8795 |
| **Ba\_total\_time3** | 0.6786 | 0.7526 | 0.7997 |
| **De\_num\_of\_pendown21** | 0.5893 | 0.7792 | 0.8182 |
| **Ba\_mean\_acc\_in\_air17** | 0.6875 | 0.7098 | 0.7812 |
| **De\_gmrt\_on\_paper17** | 0.6429 | 0.7366 | 0.7872 |
| **Ba\_air\_time4** | 0.6786 | 0.7827 | 0.8315 |
| **Ba\_pressure\_mean18** | 0.625 | 0.7589 | 0.8036 |
| **paper\_time17** | 0.7232 | 0.7867 | 0.8186 |
| **De\_mean\_acc\_on\_paper21** | 0.625 | 0.7976 | 0.8429 |
| **Ba\_mean\_jerk\_on\_paper24** | 0.6161 | 0.804 | 0.8549 |
| **pressure\_mean7** | 0.6875 | 0.7634 | 0.8107 |
| **pressure\_var5** | 0.7232 | 0.756 | 0.7887 |
| **De\_mean\_jerk\_in\_air7** | 0.6964 | 0.7902 | 0.8241 |
| **paper\_time15** | 0.6964 | 0.8089 | 0.842 |
| **Ba\_mean\_gmrt1** | 0.6339 | 0.7482 | 0.8009 |
| **Ba\_gmrt\_on\_paper15** | 0.6339 | 0.7232 | 0.7411 |
| **paper\_time13** | 0.6786 | 0.7384 | 0.7786 |
| **num\_of\_pendown23** | 0.6875 | 0.8138 | 0.8491 |
| **De\_mean\_gmrt23** | 0.4821 | 0.84 | 0.8929 |
| **Ba\_total\_time18** | 0.6429 | 0.769 | 0.8231 |
| **Ba\_mean\_jerk\_on\_paper9** | 0.6429 | 0.8012 | 0.8416 |
| **Ba\_num\_of\_pendown9** | 0.6607 | 0.7746 | 0.8165 |
| **max\_x\_extension6** | 0.5268 | 0.7798 | 0.8214 |
| **Ba\_mean\_acc\_on\_paper3** | 0.625 | 0.7366 | 0.7969 |
| **Ba\_pressure\_var4** | 0.6786 | 0.7545 | 0.7946 |
| **De\_paper\_time5** | 0.6429 | 0.7679 | 0.8013 |
| **De\_mean\_speed\_on\_paper9** | 0.4911 | 0.7991 | 0.8616 |
| **Ba\_paper\_time24** | 0.6696 | 0.7708 | 0.8155 |
| **Ba\_disp\_index8** | 0.5893 | 0.7143 | 0.7812 |
| **De\_max\_y\_extension24** | 0.5446 | 0.8103 | 0.8438 |
| **Ba\_mean\_gmrt6** | 0.6161 | 0.7768 | 0.8259 |
| **Ba\_mean\_gmrt14** | 0.6964 | 0.7768 | 0.8095 |
| **Ba\_mean\_acc\_in\_air2** | 0.6786 | 0.744 | 0.7946 |
| **De\_disp\_index1** | 0.6339 | 0.7054 | 0.7545 |
| **pressure\_mean1** | 0.6161 | 0.8013 | 0.8438 |
| **paper\_time2** | 0.6696 | 0.7455 | 0.7872 |
| **Ba\_pressure\_mean12** | 0.6696 | 0.8147 | 0.8371 |
| **De\_paper\_time8** | 0.6786 | 0.7768 | 0.8095 |
| **De\_total\_time10** | 0.5982 | 0.8406 | 0.8814 |
| **Ba\_air\_time19** | 0.4821 | 0.7985 | 0.8457 |
| **Ba\_mean\_speed\_on\_paper18** | 0.6696 | 0.7321 | 0.7545 |
| **De\_mean\_acc\_in\_air3** | 0.5982 | 0.7812 | 0.8214 |
| **De\_mean\_jerk\_on\_paper4** | 0.6429 | 0.8393 | 0.8571 |
| **disp\_index7** | 0.6607 | 0.7708 | 0.8065 |
| **De\_max\_y\_extension2** | 0.7321 | 0.7679 | 0.7768 |
| **air\_time12** | 0.625 | 0.7902 | 0.8348 |
| **Ba\_mean\_speed\_on\_paper2** | 0.6429 | 0.7857 | 0.8214 |
| **De\_mean\_speed\_in\_air15** | 0.6339 | 0.7917 | 0.8095 |

Table continues below

|  | u.AUC | r.AUC | full.AUC | IDI | NRI |
| --- | --- | --- | --- | --- | --- |
| **Ba\_paper\_time23** | 0.8214 | 0.7928 | 0.8868 | 0.2463 | 1.105 |
| **Ba\_paper\_time9** | 0.7321 | 0.8224 | 0.9093 | 0.2195 | 1.318 |
| **Ba\_air\_time22** | 0.7324 | 0.8428 | 0.907 | 0.1969 | 1.234 |
| **Ba\_disp\_index6** | 0.6258 | 0.7671 | 0.845 | 0.173 | 0.9892 |
| **num\_of\_pendown19** | 0.6427 | 0.8382 | 0.901 | 0.1652 | 1.189 |
| **Ba\_total\_time6** | 0.7327 | 0.8235 | 0.9038 | 0.1585 | 1.17 |
| **Ba\_mean\_speed\_in\_air25** | 0.7152 | 0.8458 | 0.8942 | 0.153 | 1.178 |
| **De\_gmrt\_in\_air19** | 0.5719 | 0.8266 | 0.8989 | 0.1477 | 0.9342 |
| **Ba\_max\_x\_extension21** | 0.5836 | 0.8629 | 0.9026 | 0.1397 | 1.315 |
| **Ba\_air\_time23** | 0.7951 | 0.7459 | 0.8418 | 0.1177 | 0.7024 |
| **De\_mean\_gmrt10** | 0.6246 | 0.8131 | 0.862 | 0.1407 | 0.7665 |
| **pressure\_var19** | 0.6343 | 0.816 | 0.8783 | 0.1393 | 0.9979 |
| **Ba\_air\_time11** | 0.6882 | 0.7075 | 0.7728 | 0.127 | 0.8944 |
| **Ba\_max\_y\_extension19** | 0.4848 | 0.8196 | 0.8753 | 0.1299 | 1.095 |
| **Ba\_mean\_speed\_in\_air19** | 0.6772 | 0.7458 | 0.8223 | 0.1324 | 0.8319 |
| **Ba\_num\_of\_pendown15** | 0.6518 | 0.7978 | 0.849 | 0.1343 | 0.8626 |
| **Ba\_air\_time17** | 0.7951 | 0.837 | 0.8762 | 0.1225 | 0.9469 |
| **Ba\_mean\_speed\_on\_paper11** | 0.6703 | 0.7764 | 0.8305 | 0.1282 | 0.7591 |
| **De\_mean\_speed\_on\_paper15** | 0.6262 | 0.7538 | 0.7951 | 0.1137 | 0.9342 |
| **Ba\_total\_time15** | 0.7415 | 0.7982 | 0.8431 | 0.1487 | 0.7541 |
| **Ba\_total\_time8** | 0.7148 | 0.827 | 0.8874 | 0.1218 | 1.113 |
| **Ba\_total\_time2** | 0.6876 | 0.7983 | 0.8585 | 0.1212 | 0.8182 |
| **De\_mean\_gmrt19** | 0.6337 | 0.8648 | 0.9084 | 0.1132 | 0.9835 |
| **Ba\_gmrt\_in\_air23** | 0.7057 | 0.8666 | 0.9124 | 0.1281 | 1.125 |
| **Ba\_gmrt\_in\_air7** | 0.7148 | 0.7918 | 0.8442 | 0.127 | 0.8111 |
| **De\_paper\_time20** | 0.6258 | 0.7327 | 0.7817 | 0.1111 | 0.7359 |
| **De\_mean\_jerk\_in\_air19** | 0.6057 | 0.8325 | 0.8729 | 0.115 | 0.8825 |
| **Ba\_pressure\_mean8** | 0.682 | 0.738 | 0.7994 | 0.121 | 0.8141 |
| **Ba\_air\_time13** | 0.67 | 0.7647 | 0.8282 | 0.1221 | 0.7936 |
| **Ba\_total\_time24** | 0.6882 | 0.7657 | 0.8179 | 0.1123 | 0.8139 |
| **Ba\_gmrt\_on\_paper22** | 0.6609 | 0.7212 | 0.7802 | 0.1148 | 0.6981 |
| **Ba\_air\_time7** | 0.7778 | 0.8101 | 0.8617 | 0.09692 | 0.903 |
| **Ba\_pressure\_mean4** | 0.6729 | 0.787 | 0.8392 | 0.1095 | 0.7643 |
| **Ba\_paper\_time12** | 0.7148 | 0.81 | 0.8413 | 0.1144 | 0.9036 |
| **air\_time9** | 0.6155 | 0.6969 | 0.7799 | 0.1085 | 0.6082 |
| **Ba\_mean\_jerk\_on\_paper21** | 0.6522 | 0.7778 | 0.8248 | 0.1132 | 0.8221 |
| **Ba\_gmrt\_on\_paper9** | 0.7236 | 0.7611 | 0.814 | 0.1113 | 0.8114 |
| **Ba\_air\_time5** | 0.7161 | 0.807 | 0.8515 | 0.1069 | 0.9561 |
| **De\_disp\_index22** | 0.7057 | 0.7727 | 0.8101 | 0.1014 | 0.8174 |
| **Ba\_gmrt\_on\_paper7** | 0.6437 | 0.7382 | 0.7869 | 0.1046 | 0.5886 |
| **Ba\_pressure\_mean15** | 0.6002 | 0.7754 | 0.8092 | 0.109 | 0.5568 |
| **Ba\_disp\_index15** | 0.6434 | 0.7325 | 0.7902 | 0.1022 | 0.7678 |
| **Ba\_num\_of\_pendown5** | 0.6892 | 0.7827 | 0.8152 | 0.109 | 0.7393 |
| **Ba\_total\_time16** | 0.7067 | 0.7932 | 0.826 | 0.1074 | 0.8418 |
| **De\_pressure\_mean5** | 0.6911 | 0.8026 | 0.8458 | 0.09483 | 0.8392 |
| **De\_paper\_time10** | 0.6258 | 0.7984 | 0.8492 | 0.1006 | 0.8017 |
| **De\_disp\_index17** | 0.7233 | 0.7548 | 0.7993 | 0.09973 | 0.8246 |
| **pressure\_mean9** | 0.6726 | 0.8436 | 0.8797 | 0.09683 | 0.8567 |
| **Ba\_total\_time3** | 0.6781 | 0.7535 | 0.8 | 0.1062 | 0.6925 |
| **De\_num\_of\_pendown21** | 0.5901 | 0.7796 | 0.8182 | 0.1017 | 0.8019 |
| **Ba\_mean\_acc\_in\_air17** | 0.6879 | 0.7108 | 0.7817 | 0.09852 | 0.7164 |
| **De\_gmrt\_on\_paper17** | 0.644 | 0.7367 | 0.7874 | 0.1025 | 0.5457 |
| **Ba\_air\_time4** | 0.6791 | 0.7833 | 0.8317 | 0.09865 | 0.79 |
| **Ba\_pressure\_mean18** | 0.6268 | 0.759 | 0.8037 | 0.1058 | 0.793 |
| **paper\_time17** | 0.7242 | 0.7871 | 0.8189 | 0.1026 | 0.782 |
| **De\_mean\_acc\_on\_paper21** | 0.6242 | 0.798 | 0.8428 | 0.09088 | 0.848 |
| **Ba\_mean\_jerk\_on\_paper24** | 0.6155 | 0.8044 | 0.855 | 0.09037 | 0.7724 |
| **pressure\_mean7** | 0.6901 | 0.7637 | 0.8115 | 0.09883 | 0.7589 |
| **pressure\_var5** | 0.7226 | 0.7564 | 0.789 | 0.0738 | 0.8629 |
| **De\_mean\_jerk\_in\_air7** | 0.6944 | 0.7904 | 0.8242 | 0.09823 | 0.7462 |
| **paper\_time15** | 0.697 | 0.8092 | 0.842 | 0.1014 | 0.88 |
| **Ba\_mean\_gmrt1** | 0.6346 | 0.7482 | 0.8011 | 0.09375 | 0.639 |
| **Ba\_gmrt\_on\_paper15** | 0.6343 | 0.725 | 0.7415 | 0.09883 | 0.6255 |
| **paper\_time13** | 0.6794 | 0.7385 | 0.7789 | 0.1028 | 0.6912 |
| **num\_of\_pendown23** | 0.6882 | 0.8145 | 0.8494 | 0.09594 | 0.8579 |
| **De\_mean\_gmrt23** | 0.4813 | 0.8402 | 0.8925 | 0.0764 | 0.5653 |
| **Ba\_total\_time18** | 0.6437 | 0.7695 | 0.8237 | 0.08951 | 0.737 |
| **Ba\_mean\_jerk\_on\_paper9** | 0.6434 | 0.8013 | 0.8418 | 0.09008 | 0.775 |
| **Ba\_num\_of\_pendown9** | 0.6609 | 0.7748 | 0.8169 | 0.09156 | 0.704 |
| **max\_x\_extension6** | 0.5268 | 0.7801 | 0.8217 | 0.09444 | 0.7104 |
| **Ba\_mean\_acc\_on\_paper3** | 0.6246 | 0.7372 | 0.7972 | 0.09016 | 0.8292 |
| **Ba\_pressure\_var4** | 0.6785 | 0.7547 | 0.7946 | 0.08676 | 0.6691 |
| **De\_paper\_time5** | 0.6453 | 0.7683 | 0.8016 | 0.08291 | 0.5828 |
| **De\_mean\_speed\_on\_paper9** | 0.493 | 0.7991 | 0.8615 | 0.08057 | 0.8144 |
| **Ba\_paper\_time24** | 0.6691 | 0.7715 | 0.8157 | 0.08028 | 0.862 |
| **Ba\_disp\_index8** | 0.5888 | 0.7152 | 0.7813 | 0.08278 | 0.4989 |
| **De\_max\_y\_extension24** | 0.544 | 0.8107 | 0.8439 | 0.08698 | 0.7963 |
| **Ba\_mean\_gmrt6** | 0.6171 | 0.777 | 0.8261 | 0.08258 | 0.6102 |
| **Ba\_mean\_gmrt14** | 0.6967 | 0.7772 | 0.8096 | 0.08725 | 0.7268 |
| **Ba\_mean\_acc\_in\_air2** | 0.6801 | 0.7448 | 0.7951 | 0.08573 | 0.832 |
| **De\_disp\_index1** | 0.6349 | 0.7077 | 0.7557 | 0.07958 | 0.5962 |
| **pressure\_mean1** | 0.6174 | 0.8016 | 0.8439 | 0.08662 | 0.719 |
| **paper\_time2** | 0.6694 | 0.7456 | 0.7872 | 0.08825 | 0.5889 |
| **Ba\_pressure\_mean12** | 0.6719 | 0.8145 | 0.8371 | 0.06865 | 0.7072 |
| **De\_paper\_time8** | 0.6797 | 0.777 | 0.8099 | 0.07984 | 0.7207 |
| **De\_total\_time10** | 0.5989 | 0.8406 | 0.8816 | 0.07716 | 0.8321 |
| **Ba\_air\_time19** | 0.4772 | 0.7986 | 0.8458 | 0.07975 | 0.5314 |
| **Ba\_mean\_speed\_on\_paper18** | 0.6691 | 0.7329 | 0.7549 | 0.08219 | 0.5892 |
| **De\_mean\_acc\_in\_air3** | 0.597 | 0.7819 | 0.8215 | 0.07683 | 0.7458 |
| **De\_mean\_jerk\_on\_paper4** | 0.6421 | 0.8397 | 0.8571 | 0.06982 | 0.7477 |
| **disp\_index7** | 0.6612 | 0.7712 | 0.8071 | 0.0735 | 0.5965 |
| **De\_max\_y\_extension2** | 0.7314 | 0.7679 | 0.7769 | 0.06514 | 0.8211 |
| **air\_time12** | 0.6249 | 0.7902 | 0.8356 | 0.05558 | 0.3391 |
| **Ba\_mean\_speed\_on\_paper2** | 0.6421 | 0.7863 | 0.8218 | 0.06776 | 0.5963 |
| **De\_mean\_speed\_in\_air15** | 0.6327 | 0.7923 | 0.81 | 0.0615 | 0.7456 |

|  | z.IDI | z.NRI | Frequency |
| --- | --- | --- | --- |
| **Ba\_paper\_time23** | 6.077 | 7.266 | 1 |
| **Ba\_paper\_time9** | 5.705 | 9.667 | 1 |
| **Ba\_air\_time22** | 5.186 | 8.636 | 1 |
| **Ba\_disp\_index6** | 5.002 | 6.462 | 1 |
| **num\_of\_pendown19** | 4.757 | 8.297 | 1 |
| **Ba\_total\_time6** | 4.721 | 8.083 | 1 |
| **Ba\_mean\_speed\_in\_air25** | 4.557 | 8.114 | 1 |
| **De\_gmrt\_in\_air19** | 4.485 | 5.932 | 1 |
| **Ba\_max\_x\_extension21** | 4.481 | 10.07 | 1 |
| **Ba\_air\_time23** | 4.455 | 4.1 | 1 |
| **De\_mean\_gmrt10** | 4.411 | 4.431 | 0.1 |
| **pressure\_var19** | 4.351 | 6.384 | 1 |
| **Ba\_air\_time11** | 4.203 | 5.317 | 0.1 |
| **Ba\_max\_y\_extension19** | 4.199 | 7.283 | 0.7 |
| **Ba\_mean\_speed\_in\_air19** | 4.172 | 4.939 | 0.55 |
| **Ba\_num\_of\_pendown15** | 4.138 | 5.258 | 0.8 |
| **Ba\_air\_time17** | 4.087 | 5.828 | 1 |
| **Ba\_mean\_speed\_on\_paper11** | 4.068 | 4.425 | 0.7 |
| **De\_mean\_speed\_on\_paper15** | 4.054 | 5.715 | 0.15 |
| **Ba\_total\_time15** | 4.04 | 4.346 | 1 |
| **Ba\_total\_time8** | 4.016 | 7.305 | 1 |
| **Ba\_total\_time2** | 4.007 | 4.93 | 1 |
| **De\_mean\_gmrt19** | 4.002 | 6.05 | 1 |
| **Ba\_gmrt\_in\_air23** | 3.984 | 7.267 | 1 |
| **Ba\_gmrt\_in\_air7** | 3.983 | 4.778 | 1 |
| **De\_paper\_time20** | 3.954 | 4.236 | 0.1 |
| **De\_mean\_jerk\_in\_air19** | 3.954 | 5.226 | 0.2 |
| **Ba\_pressure\_mean8** | 3.925 | 5.037 | 0.3 |
| **Ba\_air\_time13** | 3.896 | 4.764 | 1 |
| **Ba\_total\_time24** | 3.852 | 4.778 | 0.85 |
| **Ba\_gmrt\_on\_paper22** | 3.838 | 4.005 | 0.4 |
| **Ba\_air\_time7** | 3.808 | 5.526 | 1 |
| **Ba\_pressure\_mean4** | 3.805 | 4.662 | 0.9 |
| **Ba\_paper\_time12** | 3.783 | 5.536 | 1 |
| **air\_time9** | 3.767 | 3.384 | 0.15 |
| **Ba\_mean\_jerk\_on\_paper21** | 3.762 | 4.997 | 0.7 |
| **Ba\_gmrt\_on\_paper9** | 3.756 | 4.731 | 1 |
| **Ba\_air\_time5** | 3.69 | 5.951 | 1 |
| **De\_disp\_index22** | 3.663 | 4.788 | 0.7 |
| **Ba\_gmrt\_on\_paper7** | 3.66 | 3.291 | 0.55 |
| **Ba\_pressure\_mean15** | 3.659 | 3.152 | 0.25 |
| **Ba\_disp\_index15** | 3.651 | 4.421 | 0.1 |
| **Ba\_num\_of\_pendown5** | 3.63 | 4.326 | 1 |
| **Ba\_total\_time16** | 3.627 | 5.104 | 1 |
| **De\_pressure\_mean5** | 3.624 | 5.419 | 0.9 |
| **De\_paper\_time10** | 3.623 | 4.925 | 0.8 |
| **De\_disp\_index17** | 3.618 | 4.852 | 0.5 |
| **pressure\_mean9** | 3.604 | 5.522 | 1 |
| **Ba\_total\_time3** | 3.592 | 3.952 | 0.7 |
| **De\_num\_of\_pendown21** | 3.581 | 4.738 | 0.55 |
| **Ba\_mean\_acc\_in\_air17** | 3.578 | 4.07 | 0.1 |
| **De\_gmrt\_on\_paper17** | 3.573 | 3.08 | 0.6 |
| **Ba\_air\_time4** | 3.561 | 4.681 | 0.75 |
| **Ba\_pressure\_mean18** | 3.556 | 4.713 | 0.1 |
| **paper\_time17** | 3.554 | 4.677 | 0.95 |
| **De\_mean\_acc\_on\_paper21** | 3.552 | 5.093 | 0.75 |
| **Ba\_mean\_jerk\_on\_paper24** | 3.551 | 4.489 | 1 |
| **pressure\_mean7** | 3.541 | 4.571 | 0.5 |
| **pressure\_var5** | 3.517 | 5.096 | 0.45 |
| **De\_mean\_jerk\_in\_air7** | 3.514 | 4.473 | 1 |
| **paper\_time15** | 3.51 | 5.327 | 1 |
| **Ba\_mean\_gmrt1** | 3.503 | 3.591 | 0.5 |
| **Ba\_gmrt\_on\_paper15** | 3.502 | 3.498 | 0.1 |
| **paper\_time13** | 3.498 | 3.946 | 0.5 |
| **num\_of\_pendown23** | 3.492 | 5.199 | 1 |
| **De\_mean\_gmrt23** | 3.484 | 3.153 | 0.65 |
| **Ba\_total\_time18** | 3.479 | 4.76 | 0.8 |
| **Ba\_mean\_jerk\_on\_paper9** | 3.456 | 4.503 | 0.95 |
| **Ba\_num\_of\_pendown9** | 3.392 | 4.049 | 1 |
| **max\_x\_extension6** | 3.371 | 4.087 | 0.45 |
| **Ba\_mean\_acc\_on\_paper3** | 3.364 | 4.893 | 0.2 |
| **Ba\_pressure\_var4** | 3.342 | 3.766 | 0.2 |
| **De\_paper\_time5** | 3.323 | 3.466 | 0.2 |
| **De\_mean\_speed\_on\_paper9** | 3.301 | 5.03 | 0.1 |
| **Ba\_paper\_time24** | 3.279 | 5.309 | 0.3 |
| **Ba\_disp\_index8** | 3.274 | 2.755 | 0.1 |
| **De\_max\_y\_extension24** | 3.27 | 5.608 | 0.2 |
| **Ba\_mean\_gmrt6** | 3.262 | 3.421 | 0.2 |
| **Ba\_mean\_gmrt14** | 3.262 | 4.146 | 0.15 |
| **Ba\_mean\_acc\_in\_air2** | 3.25 | 4.909 | 0.3 |
| **De\_disp\_index1** | 3.241 | 3.382 | 0.1 |
| **pressure\_mean1** | 3.239 | 4.163 | 0.2 |
| **paper\_time2** | 3.238 | 3.278 | 0.3 |
| **Ba\_pressure\_mean12** | 3.21 | 4.276 | 0.2 |
| **De\_paper\_time8** | 3.186 | 4.19 | 0.15 |
| **De\_total\_time10** | 3.173 | 4.926 | 0.35 |
| **Ba\_air\_time19** | 3.134 | 3.163 | 0.35 |
| **Ba\_mean\_speed\_on\_paper18** | 3.125 | 3.269 | 0.1 |
| **De\_mean\_acc\_in\_air3** | 3.069 | 4.309 | 0.1 |
| **De\_mean\_jerk\_on\_paper4** | 3.011 | 4.286 | 0.1 |
| **disp\_index7** | 2.986 | 3.381 | 0.15 |
| **De\_max\_y\_extension2** | 2.891 | 4.784 | 0.1 |
| **air\_time12** | 2.831 | 1.832 | 0.1 |
| **Ba\_mean\_speed\_on\_paper2** | 2.827 | 3.316 | 0.2 |
| **De\_mean\_speed\_in\_air15** | 2.798 | 4.299 | 0.15 |

pander::pander(smDecorU$coefficients)

Table continues below

|  | Estimate | lower | OR | upper |
| --- | --- | --- | --- | --- |
| **De\_air\_time9** | -0.08355 | 0.8896 | 0.9198 | 0.9511 |
| **Ba\_air\_time6** | 0.2397 | 1.153 | 1.271 | 1.401 |
| **Ba\_air\_time23** | 0.1642 | 1.1 | 1.178 | 1.262 |
| **disp\_index9** | 0.2485 | 1.155 | 1.282 | 1.423 |
| **Ba\_air\_time22** | 0.3018 | 1.188 | 1.352 | 1.54 |
| **Ba\_air\_time15** | 0.1852 | 1.106 | 1.203 | 1.309 |
| **num\_of\_pendown19** | -0.8348 | 0.2979 | 0.4339 | 0.6321 |
| **Ba\_disp\_index6** | 0.4624 | 1.289 | 1.588 | 1.956 |
| **Ba\_air\_time2** | 0.1121 | 1.062 | 1.119 | 1.178 |
| **Ba\_gmrt\_on\_paper23** | -0.3969 | 0.562 | 0.6724 | 0.8046 |
| **Ba\_gmrt\_in\_air23** | -0.339 | 0.6073 | 0.7125 | 0.8358 |
| **Ba\_pressure\_mean18** | -0.1651 | 0.7837 | 0.8478 | 0.9172 |
| **Ba\_num\_of\_pendown9** | 0.1718 | 1.097 | 1.187 | 1.285 |
| **Ba\_total\_time9** | 0.227 | 1.127 | 1.255 | 1.398 |
| **num\_of\_pendown23** | 1.337 | 2.001 | 3.807 | 7.243 |
| **De\_mean\_gmrt23** | 0.469 | 1.273 | 1.598 | 2.008 |
| **Ba\_air\_time24** | 0.02057 | 1.01 | 1.021 | 1.031 |
| **Ba\_max\_x\_extension21** | -1.997 | 0.05069 | 0.1357 | 0.3634 |
| **max\_y\_extension25** | 0.3574 | 1.195 | 1.43 | 1.71 |
| **pressure\_var19** | -0.4296 | 0.5258 | 0.6507 | 0.8054 |
| **Ba\_gmrt\_on\_paper15** | -0.01959 | 0.9709 | 0.9806 | 0.9904 |
| **Ba\_max\_y\_extension19** | -0.5965 | 0.408 | 0.5507 | 0.7434 |
| **De\_paper\_time10** | 0.4226 | 1.23 | 1.526 | 1.893 |
| **Ba\_air\_time5** | 0.09951 | 1.049 | 1.105 | 1.163 |
| **Ba\_air\_time13** | 0.1185 | 1.058 | 1.126 | 1.198 |
| **Ba\_paper\_time12** | 0.2359 | 1.118 | 1.266 | 1.433 |
| **Ba\_air\_time8** | 0.03432 | 1.017 | 1.035 | 1.054 |
| **Ba\_num\_of\_pendown15** | 0.2959 | 1.152 | 1.344 | 1.569 |
| **paper\_time15** | 0.2293 | 1.114 | 1.258 | 1.419 |
| **Ba\_air\_time16** | 0.08546 | 1.042 | 1.089 | 1.139 |
| **Ba\_gmrt\_on\_paper1** | -0.06499 | 0.905 | 0.9371 | 0.9703 |
| **Ba\_num\_of\_pendown5** | 0.09918 | 1.047 | 1.104 | 1.165 |
| **pressure\_mean9** | -0.8461 | 0.2722 | 0.4291 | 0.6762 |
| **Ba\_air\_time7** | 0.09654 | 1.046 | 1.101 | 1.159 |
| **Ba\_air\_time18** | 0.03983 | 1.018 | 1.041 | 1.063 |
| **Ba\_gmrt\_on\_paper9** | -0.1288 | 0.8201 | 0.8792 | 0.9425 |
| **De\_pressure\_mean5** | -0.3175 | 0.6133 | 0.728 | 0.8641 |
| **De\_mean\_acc\_on\_paper21** | 0.2737 | 1.133 | 1.315 | 1.526 |
| **De\_mean\_jerk\_on\_paper4** | 0.3043 | 1.147 | 1.356 | 1.603 |
| **Ba\_mean\_speed\_on\_paper11** | -0.1561 | 0.7857 | 0.8554 | 0.9313 |
| **Ba\_air\_time4** | 0.02367 | 1.011 | 1.024 | 1.037 |
| **De\_paper\_time1** | 0.7243 | 1.389 | 2.063 | 3.065 |
| **Ba\_mean\_jerk\_on\_paper9** | 0.4252 | 1.211 | 1.53 | 1.933 |
| **Ba\_pressure\_mean4** | -1.343 | 0.1248 | 0.2609 | 0.5455 |
| **Ba\_mean\_jerk\_on\_paper21** | 0.2295 | 1.109 | 1.258 | 1.427 |
| **De\_disp\_index23** | 0.3946 | 1.193 | 1.484 | 1.845 |
| **Ba\_air\_time17** | 0.1222 | 1.056 | 1.13 | 1.209 |
| **Ba\_gmrt\_in\_air7** | -0.2225 | 0.7073 | 0.8006 | 0.9061 |
| **paper\_time17** | 0.176 | 1.08 | 1.192 | 1.317 |
| **De\_disp\_index17** | 0.3303 | 1.155 | 1.391 | 1.676 |
| **Ba\_mean\_acc\_in\_air2** | 0.03413 | 1.015 | 1.035 | 1.055 |
| **De\_mean\_speed\_in\_air19** | -2.777 | 0.01291 | 0.06224 | 0.3001 |
| **Ba\_paper\_time24** | 0.04968 | 1.021 | 1.051 | 1.082 |
| **Ba\_mean\_acc\_in\_air25** | -0.1597 | 0.7772 | 0.8524 | 0.9349 |
| **De\_mean\_jerk\_in\_air7** | 1.054 | 1.546 | 2.869 | 5.326 |
| **Ba\_gmrt\_on\_paper7** | -0.06088 | 0.908 | 0.9409 | 0.9751 |
| **Ba\_mean\_speed\_in\_air6** | -0.02871 | 0.9551 | 0.9717 | 0.9886 |
| **Ba\_paper\_time3** | 0.04587 | 1.019 | 1.047 | 1.076 |
| **De\_max\_y\_extension24** | -0.2312 | 0.6904 | 0.7936 | 0.9121 |
| **paper\_time2** | 0.02488 | 1.01 | 1.025 | 1.04 |
| **De\_total\_time10** | 0.2517 | 1.103 | 1.286 | 1.5 |
| **De\_disp\_index22** | 0.2246 | 1.092 | 1.252 | 1.435 |
| **Ba\_mean\_acc\_in\_air21** | 0.01663 | 1.006 | 1.017 | 1.027 |
| **Ba\_mean\_acc\_on\_paper24** | -0.1053 | 0.8417 | 0.9 | 0.9624 |
| **De\_gmrt\_on\_paper17** | -0.02106 | 0.9656 | 0.9792 | 0.9929 |
| **pressure\_var5** | 0.01786 | 1.006 | 1.018 | 1.03 |

Table continues below

|  | u.Accuracy | r.Accuracy | full.Accuracy |
| --- | --- | --- | --- |
| **De\_air\_time9** | 0.6071 | 0.8125 | 0.878 |
| **Ba\_air\_time6** | 0.7321 | 0.7996 | 0.871 |
| **Ba\_air\_time23** | 0.7946 | 0.8036 | 0.8728 |
| **disp\_index9** | 0.6607 | 0.7813 | 0.8366 |
| **Ba\_air\_time22** | 0.7321 | 0.8085 | 0.8719 |
| **Ba\_air\_time15** | 0.7589 | 0.8348 | 0.8759 |
| **num\_of\_pendown19** | 0.6429 | 0.8268 | 0.8812 |
| **Ba\_disp\_index6** | 0.625 | 0.7956 | 0.8442 |
| **Ba\_air\_time2** | 0.6696 | 0.7743 | 0.8388 |
| **Ba\_gmrt\_on\_paper23** | 0.6875 | 0.7761 | 0.8345 |
| **Ba\_gmrt\_in\_air23** | 0.7054 | 0.8129 | 0.8705 |
| **Ba\_pressure\_mean18** | 0.625 | 0.8393 | 0.8705 |
| **Ba\_num\_of\_pendown9** | 0.6607 | 0.7728 | 0.8348 |
| **Ba\_total\_time9** | 0.7411 | 0.8134 | 0.871 |
| **num\_of\_pendown23** | 0.6875 | 0.8073 | 0.8698 |
| **De\_mean\_gmrt23** | 0.4821 | 0.8054 | 0.8732 |
| **Ba\_air\_time24** | 0.6875 | 0.7619 | 0.8155 |
| **Ba\_max\_x\_extension21** | 0.5804 | 0.8321 | 0.8674 |
| **max\_y\_extension25** | 0.5625 | 0.8125 | 0.8728 |
| **pressure\_var19** | 0.6339 | 0.8244 | 0.878 |
| **Ba\_gmrt\_on\_paper15** | 0.6339 | 0.6726 | 0.744 |
| **Ba\_max\_y\_extension19** | 0.4821 | 0.8393 | 0.8862 |
| **De\_paper\_time10** | 0.625 | 0.7919 | 0.8359 |
| **Ba\_air\_time5** | 0.7143 | 0.8065 | 0.8482 |
| **Ba\_air\_time13** | 0.6696 | 0.7786 | 0.8281 |
| **Ba\_paper\_time12** | 0.7143 | 0.8101 | 0.8583 |
| **Ba\_air\_time8** | 0.6161 | 0.814 | 0.8557 |
| **Ba\_num\_of\_pendown15** | 0.6518 | 0.7917 | 0.8385 |
| **paper\_time15** | 0.6964 | 0.7962 | 0.844 |
| **Ba\_air\_time16** | 0.7321 | 0.781 | 0.828 |
| **Ba\_gmrt\_on\_paper1** | 0.6607 | 0.8363 | 0.8661 |
| **Ba\_num\_of\_pendown5** | 0.6875 | 0.7773 | 0.8172 |
| **pressure\_mean9** | 0.6696 | 0.8075 | 0.856 |
| **Ba\_air\_time7** | 0.7768 | 0.7777 | 0.8335 |
| **Ba\_air\_time18** | 0.6696 | 0.8423 | 0.8929 |
| **Ba\_gmrt\_on\_paper9** | 0.7232 | 0.7627 | 0.8022 |
| **De\_pressure\_mean5** | 0.6875 | 0.7768 | 0.8296 |
| **De\_mean\_acc\_on\_paper21** | 0.625 | 0.7879 | 0.8237 |
| **De\_mean\_jerk\_on\_paper4** | 0.6429 | 0.8006 | 0.8512 |
| **Ba\_mean\_speed\_on\_paper11** | 0.6696 | 0.8016 | 0.8512 |
| **Ba\_air\_time4** | 0.6786 | 0.8107 | 0.8429 |
| **De\_paper\_time1** | 0.6518 | 0.8022 | 0.8482 |
| **Ba\_mean\_jerk\_on\_paper9** | 0.6429 | 0.793 | 0.832 |
| **Ba\_pressure\_mean4** | 0.6696 | 0.8105 | 0.8532 |
| **Ba\_mean\_jerk\_on\_paper21** | 0.6518 | 0.767 | 0.8205 |
| **De\_disp\_index23** | 0.7143 | 0.7718 | 0.8204 |
| **Ba\_air\_time17** | 0.7946 | 0.8259 | 0.8679 |
| **Ba\_gmrt\_in\_air7** | 0.7143 | 0.7998 | 0.8383 |
| **paper\_time17** | 0.7232 | 0.7887 | 0.8266 |
| **De\_disp\_index17** | 0.7232 | 0.787 | 0.8291 |
| **Ba\_mean\_acc\_in\_air2** | 0.6786 | 0.7656 | 0.8259 |
| **De\_mean\_speed\_in\_air19** | 0.5446 | 0.8536 | 0.8786 |
| **Ba\_paper\_time24** | 0.6696 | 0.8482 | 0.8705 |
| **Ba\_mean\_acc\_in\_air25** | 0.6964 | 0.8155 | 0.8497 |
| **De\_mean\_jerk\_in\_air7** | 0.6964 | 0.7857 | 0.8288 |
| **Ba\_gmrt\_on\_paper7** | 0.6429 | 0.7757 | 0.8092 |
| **Ba\_mean\_speed\_in\_air6** | 0.5714 | 0.7902 | 0.8616 |
| **Ba\_paper\_time3** | 0.6429 | 0.8527 | 0.8884 |
| **De\_max\_y\_extension24** | 0.5446 | 0.8304 | 0.8601 |
| **paper\_time2** | 0.6696 | 0.7649 | 0.8125 |
| **De\_total\_time10** | 0.5982 | 0.8631 | 0.8884 |
| **De\_disp\_index22** | 0.7054 | 0.7927 | 0.8254 |
| **Ba\_mean\_acc\_in\_air21** | 0.5625 | 0.8571 | 0.875 |
| **Ba\_mean\_acc\_on\_paper24** | 0.5446 | 0.7827 | 0.8452 |
| **De\_gmrt\_on\_paper17** | 0.6429 | 0.7679 | 0.7902 |
| **pressure\_var5** | 0.7232 | 0.7875 | 0.8143 |

Table continues below

|  | u.AUC | r.AUC | full.AUC | IDI | NRI |
| --- | --- | --- | --- | --- | --- |
| **De\_air\_time9** | 0.608 | 0.813 | 0.8781 | 0.1675 | 1.198 |
| **Ba\_air\_time6** | 0.7324 | 0.7999 | 0.8711 | 0.1553 | 1.063 |
| **Ba\_air\_time23** | 0.7951 | 0.804 | 0.873 | 0.1369 | 0.8565 |
| **disp\_index9** | 0.66 | 0.7819 | 0.8369 | 0.1561 | 0.945 |
| **Ba\_air\_time22** | 0.7324 | 0.8089 | 0.872 | 0.1526 | 1.047 |
| **Ba\_air\_time15** | 0.7593 | 0.8352 | 0.8761 | 0.1522 | 0.9945 |
| **num\_of\_pendown19** | 0.6427 | 0.8269 | 0.8813 | 0.1358 | 1.044 |
| **Ba\_disp\_index6** | 0.6258 | 0.7962 | 0.8446 | 0.1348 | 0.9506 |
| **Ba\_air\_time2** | 0.6694 | 0.7747 | 0.8389 | 0.1316 | 0.8186 |
| **Ba\_gmrt\_on\_paper23** | 0.6876 | 0.7768 | 0.8349 | 0.1343 | 0.8131 |
| **Ba\_gmrt\_in\_air23** | 0.7057 | 0.8134 | 0.8704 | 0.124 | 0.8207 |
| **Ba\_pressure\_mean18** | 0.6268 | 0.8396 | 0.8709 | 0.1303 | 0.8284 |
| **Ba\_num\_of\_pendown9** | 0.6609 | 0.7731 | 0.8351 | 0.1286 | 0.8649 |
| **Ba\_total\_time9** | 0.7418 | 0.8137 | 0.8711 | 0.1331 | 0.9746 |
| **num\_of\_pendown23** | 0.6882 | 0.8076 | 0.8699 | 0.1162 | 0.94 |
| **De\_mean\_gmrt23** | 0.4813 | 0.8054 | 0.8733 | 0.1129 | 1.031 |
| **Ba\_air\_time24** | 0.6882 | 0.763 | 0.8159 | 0.1068 | 0.7043 |
| **Ba\_max\_x\_extension21** | 0.5836 | 0.8325 | 0.8675 | 0.1152 | 1.098 |
| **max\_y\_extension25** | 0.5612 | 0.813 | 0.8731 | 0.1087 | 0.8561 |
| **pressure\_var19** | 0.6343 | 0.8248 | 0.8781 | 0.1135 | 0.9811 |
| **Ba\_gmrt\_on\_paper15** | 0.6343 | 0.67 | 0.7444 | 0.1162 | 0.6437 |
| **Ba\_max\_y\_extension19** | 0.4848 | 0.8392 | 0.8863 | 0.1026 | 1.021 |
| **De\_paper\_time10** | 0.6258 | 0.7923 | 0.8365 | 0.1139 | 0.9195 |
| **Ba\_air\_time5** | 0.7161 | 0.8069 | 0.8484 | 0.1114 | 1.015 |
| **Ba\_air\_time13** | 0.67 | 0.779 | 0.8285 | 0.1146 | 0.7567 |
| **Ba\_paper\_time12** | 0.7148 | 0.8106 | 0.8586 | 0.1068 | 0.8951 |
| **Ba\_air\_time8** | 0.6164 | 0.8141 | 0.8558 | 0.1019 | 0.8091 |
| **Ba\_num\_of\_pendown15** | 0.6518 | 0.7921 | 0.8387 | 0.1093 | 0.7638 |
| **paper\_time15** | 0.697 | 0.7966 | 0.844 | 0.1092 | 0.8236 |
| **Ba\_air\_time16** | 0.733 | 0.7813 | 0.8281 | 0.1046 | 0.8533 |
| **Ba\_gmrt\_on\_paper1** | 0.6603 | 0.8363 | 0.8661 | 0.1022 | 0.8814 |
| **Ba\_num\_of\_pendown5** | 0.6892 | 0.7777 | 0.8175 | 0.1066 | 0.7402 |
| **pressure\_mean9** | 0.6726 | 0.8077 | 0.8563 | 0.09847 | 0.856 |
| **Ba\_air\_time7** | 0.7778 | 0.7779 | 0.8339 | 0.09011 | 0.8055 |
| **Ba\_air\_time18** | 0.6697 | 0.8425 | 0.893 | 0.0911 | 0.8652 |
| **Ba\_gmrt\_on\_paper9** | 0.7236 | 0.763 | 0.8024 | 0.1028 | 0.7826 |
| **De\_pressure\_mean5** | 0.6911 | 0.7773 | 0.8301 | 0.09951 | 0.8174 |
| **De\_mean\_acc\_on\_paper21** | 0.6242 | 0.7881 | 0.8237 | 0.09343 | 0.8912 |
| **De\_mean\_jerk\_on\_paper4** | 0.6421 | 0.8006 | 0.8511 | 0.09415 | 1.011 |
| **Ba\_mean\_speed\_on\_paper11** | 0.6703 | 0.8018 | 0.8513 | 0.1013 | 0.7631 |
| **Ba\_air\_time4** | 0.6791 | 0.811 | 0.843 | 0.09621 | 0.7661 |
| **De\_paper\_time1** | 0.6525 | 0.8024 | 0.8483 | 0.09731 | 0.7607 |
| **Ba\_mean\_jerk\_on\_paper9** | 0.6434 | 0.7931 | 0.832 | 0.09783 | 0.8148 |
| **Ba\_pressure\_mean4** | 0.6729 | 0.8106 | 0.8533 | 0.09293 | 0.7517 |
| **Ba\_mean\_jerk\_on\_paper21** | 0.6522 | 0.7672 | 0.8207 | 0.0947 | 0.5936 |
| **De\_disp\_index23** | 0.7155 | 0.7722 | 0.8206 | 0.1036 | 0.7377 |
| **Ba\_air\_time17** | 0.7951 | 0.8257 | 0.8677 | 0.08903 | 0.8012 |
| **Ba\_gmrt\_in\_air7** | 0.7148 | 0.8002 | 0.8384 | 0.09979 | 0.6952 |
| **paper\_time17** | 0.7242 | 0.7891 | 0.8269 | 0.1017 | 0.8113 |
| **De\_disp\_index17** | 0.7233 | 0.7877 | 0.8293 | 0.09108 | 0.7784 |
| **Ba\_mean\_acc\_in\_air2** | 0.6801 | 0.7661 | 0.8264 | 0.09168 | 0.9411 |
| **De\_mean\_speed\_in\_air19** | 0.545 | 0.8541 | 0.8788 | 0.09776 | 0.6597 |
| **Ba\_paper\_time24** | 0.6691 | 0.8488 | 0.8707 | 0.08665 | 1.107 |
| **Ba\_mean\_acc\_in\_air25** | 0.6973 | 0.8158 | 0.8499 | 0.09489 | 0.8796 |
| **De\_mean\_jerk\_in\_air7** | 0.6944 | 0.7861 | 0.8288 | 0.08971 | 0.7173 |
| **Ba\_gmrt\_on\_paper7** | 0.6437 | 0.7761 | 0.8095 | 0.08713 | 0.585 |
| **Ba\_mean\_speed\_in\_air6** | 0.571 | 0.7907 | 0.8618 | 0.08665 | 0.7853 |
| **Ba\_paper\_time3** | 0.6427 | 0.853 | 0.8883 | 0.07832 | 0.8587 |
| **De\_max\_y\_extension24** | 0.544 | 0.8307 | 0.8601 | 0.09095 | 0.9182 |
| **paper\_time2** | 0.6694 | 0.7658 | 0.813 | 0.08468 | 0.7018 |
| **De\_total\_time10** | 0.5989 | 0.8633 | 0.8884 | 0.08177 | 0.7294 |
| **De\_disp\_index22** | 0.7057 | 0.7935 | 0.8257 | 0.08358 | 0.7615 |
| **Ba\_mean\_acc\_in\_air21** | 0.5632 | 0.8571 | 0.875 | 0.07215 | 0.8242 |
| **Ba\_mean\_acc\_on\_paper24** | 0.5447 | 0.7835 | 0.8452 | 0.06275 | 0.6097 |
| **De\_gmrt\_on\_paper17** | 0.644 | 0.7681 | 0.7907 | 0.07045 | 0.593 |
| **pressure\_var5** | 0.7226 | 0.7878 | 0.8147 | 0.046 | 0.9683 |

|  | z.IDI | z.NRI | Frequency |
| --- | --- | --- | --- |
| **De\_air\_time9** | 4.858 | 8.002 | 0.15 |
| **Ba\_air\_time6** | 4.745 | 6.796 | 1 |
| **Ba\_air\_time23** | 4.616 | 5.07 | 1 |
| **disp\_index9** | 4.608 | 5.754 | 0.5 |
| **Ba\_air\_time22** | 4.486 | 6.991 | 1 |
| **Ba\_air\_time15** | 4.306 | 6.136 | 1 |
| **num\_of\_pendown19** | 4.274 | 6.699 | 1 |
| **Ba\_disp\_index6** | 4.266 | 5.93 | 0.9 |
| **Ba\_air\_time2** | 4.165 | 4.82 | 0.9 |
| **Ba\_gmrt\_on\_paper23** | 4.149 | 4.918 | 0.65 |
| **Ba\_gmrt\_in\_air23** | 4.136 | 4.93 | 1 |
| **Ba\_pressure\_mean18** | 4.086 | 5.009 | 0.2 |
| **Ba\_num\_of\_pendown9** | 4.059 | 5.284 | 0.9 |
| **Ba\_total\_time9** | 4.005 | 6.142 | 1 |
| **num\_of\_pendown23** | 3.985 | 5.731 | 0.95 |
| **De\_mean\_gmrt23** | 3.984 | 6.525 | 0.25 |
| **Ba\_air\_time24** | 3.944 | 4.001 | 0.15 |
| **Ba\_max\_x\_extension21** | 3.886 | 7.448 | 1 |
| **max\_y\_extension25** | 3.882 | 5.076 | 0.2 |
| **pressure\_var19** | 3.868 | 6.258 | 0.9 |
| **Ba\_gmrt\_on\_paper15** | 3.864 | 3.618 | 0.15 |
| **Ba\_max\_y\_extension19** | 3.826 | 7.027 | 0.2 |
| **De\_paper\_time10** | 3.82 | 5.738 | 0.65 |
| **Ba\_air\_time5** | 3.786 | 6.455 | 0.75 |
| **Ba\_air\_time13** | 3.726 | 4.513 | 1 |
| **Ba\_paper\_time12** | 3.702 | 5.438 | 0.75 |
| **Ba\_air\_time8** | 3.694 | 4.737 | 0.3 |
| **Ba\_num\_of\_pendown15** | 3.687 | 4.565 | 0.6 |
| **paper\_time15** | 3.687 | 4.858 | 0.85 |
| **Ba\_air\_time16** | 3.667 | 5.068 | 0.95 |
| **Ba\_gmrt\_on\_paper1** | 3.658 | 5.205 | 0.15 |
| **Ba\_num\_of\_pendown5** | 3.632 | 4.324 | 0.85 |
| **pressure\_mean9** | 3.626 | 5.41 | 0.8 |
| **Ba\_air\_time7** | 3.611 | 4.788 | 1 |
| **Ba\_air\_time18** | 3.601 | 5.227 | 0.15 |
| **Ba\_gmrt\_on\_paper9** | 3.584 | 4.518 | 0.95 |
| **De\_pressure\_mean5** | 3.575 | 5.322 | 0.6 |
| **De\_mean\_acc\_on\_paper21** | 3.559 | 5.283 | 0.4 |
| **De\_mean\_jerk\_on\_paper4** | 3.558 | 6.216 | 0.15 |
| **Ba\_mean\_speed\_on\_paper11** | 3.557 | 4.486 | 0.45 |
| **Ba\_air\_time4** | 3.55 | 4.439 | 0.25 |
| **De\_paper\_time1** | 3.547 | 4.458 | 0.65 |
| **Ba\_mean\_jerk\_on\_paper9** | 3.543 | 4.784 | 0.55 |
| **Ba\_pressure\_mean4** | 3.529 | 4.58 | 0.45 |
| **Ba\_mean\_jerk\_on\_paper21** | 3.516 | 3.37 | 0.5 |
| **De\_disp\_index23** | 3.508 | 4.251 | 0.9 |
| **Ba\_air\_time17** | 3.506 | 4.781 | 1 |
| **Ba\_gmrt\_in\_air7** | 3.471 | 3.966 | 0.95 |
| **paper\_time17** | 3.454 | 4.824 | 0.6 |
| **De\_disp\_index17** | 3.441 | 4.738 | 0.35 |
| **Ba\_mean\_acc\_in\_air2** | 3.427 | 5.726 | 0.2 |
| **De\_mean\_speed\_in\_air19** | 3.385 | 3.81 | 1 |
| **Ba\_paper\_time24** | 3.383 | 7.045 | 0.1 |
| **Ba\_mean\_acc\_in\_air25** | 3.352 | 5.542 | 0.3 |
| **De\_mean\_jerk\_in\_air7** | 3.311 | 4.217 | 0.85 |
| **Ba\_gmrt\_on\_paper7** | 3.301 | 3.28 | 0.4 |
| **Ba\_mean\_speed\_in\_air6** | 3.268 | 4.552 | 0.1 |
| **Ba\_paper\_time3** | 3.265 | 5.142 | 0.1 |
| **De\_max\_y\_extension24** | 3.25 | 5.704 | 0.15 |
| **paper\_time2** | 3.238 | 4.038 | 0.15 |
| **De\_total\_time10** | 3.201 | 4.193 | 0.3 |
| **De\_disp\_index22** | 3.189 | 4.392 | 0.45 |
| **Ba\_mean\_acc\_in\_air21** | 3.153 | 4.808 | 0.15 |
| **Ba\_mean\_acc\_on\_paper24** | 3.08 | 3.415 | 0.3 |
| **De\_gmrt\_on\_paper17** | 2.938 | 3.31 | 0.1 |
| **pressure\_var5** | 2.929 | 6.008 | 0.25 |

## Let focus on the new features  
  
decorCoeff <- smDecor$coefficients[newvars,];  
ncoef <- dc[newvars]  
cnames <- lapply(ncoef,names)  
names(cnames) <- NULL;  
decorCoeff$Elements <- lapply(cnames,paste,collapse="+")  
pander::pander(decorCoeff)

Table continues below

|  | Estimate | lower | OR | upper |
| --- | --- | --- | --- | --- |
| **De\_gmrt\_in\_air19** | 3.291 | 6.577 | 26.88 | 109.9 |
| **De\_mean\_gmrt10** | -0.05051 | 0.9301 | 0.9507 | 0.9718 |
| **De\_mean\_speed\_on\_paper15** | -0.07273 | 0.8978 | 0.9299 | 0.963 |
| **De\_mean\_gmrt19** | 2.099 | 2.952 | 8.157 | 22.54 |
| **De\_paper\_time20** | 0.04499 | 1.023 | 1.046 | 1.07 |
| **De\_mean\_jerk\_in\_air19** | 1.652 | 2.305 | 5.218 | 11.81 |
| **De\_pressure\_mean5** | -0.3339 | 0.5984 | 0.7161 | 0.857 |
| **De\_paper\_time10** | 0.3142 | 1.157 | 1.369 | 1.62 |
| **De\_disp\_index17** | 0.1695 | 1.081 | 1.185 | 1.298 |
| **De\_num\_of\_pendown21** | -0.0798 | 0.8841 | 0.9233 | 0.9643 |
| **De\_mean\_acc\_on\_paper21** | 0.3651 | 1.18 | 1.441 | 1.759 |
| **De\_mean\_jerk\_in\_air7** | 0.9707 | 1.543 | 2.64 | 4.518 |
| **De\_paper\_time5** | -0.05128 | 0.9218 | 0.95 | 0.9791 |
| **De\_max\_y\_extension24** | -0.2644 | 0.6564 | 0.7677 | 0.8978 |
| **De\_disp\_index1** | -0.0208 | 0.9672 | 0.9794 | 0.9918 |
| **De\_total\_time10** | 0.1607 | 1.064 | 1.174 | 1.297 |
| **De\_mean\_acc\_in\_air3** | -0.06765 | 0.8954 | 0.9346 | 0.9755 |
| **De\_mean\_jerk\_on\_paper4** | 0.1016 | 1.036 | 1.107 | 1.182 |
| **De\_max\_y\_extension2** | 0.01219 | 1.004 | 1.012 | 1.021 |
| **De\_mean\_speed\_in\_air15** | 0.08299 | 1.025 | 1.087 | 1.151 |

Table continues below

|  | u.Accuracy | r.Accuracy | full.Accuracy |
| --- | --- | --- | --- |
| **De\_gmrt\_in\_air19** | 0.5714 | 0.8263 | 0.8987 |
| **De\_mean\_gmrt10** | 0.625 | 0.8125 | 0.8616 |
| **De\_mean\_speed\_on\_paper15** | 0.625 | 0.753 | 0.7946 |
| **De\_mean\_gmrt19** | 0.6339 | 0.8647 | 0.9085 |
| **De\_paper\_time20** | 0.625 | 0.7321 | 0.7812 |
| **De\_mean\_jerk\_in\_air19** | 0.6071 | 0.8326 | 0.8728 |
| **De\_pressure\_mean5** | 0.6875 | 0.8026 | 0.8457 |
| **De\_paper\_time10** | 0.625 | 0.798 | 0.8488 |
| **De\_disp\_index17** | 0.7232 | 0.7545 | 0.7991 |
| **De\_num\_of\_pendown21** | 0.5893 | 0.7792 | 0.8182 |
| **De\_mean\_acc\_on\_paper21** | 0.625 | 0.7976 | 0.8429 |
| **De\_mean\_jerk\_in\_air7** | 0.6964 | 0.7902 | 0.8241 |
| **De\_paper\_time5** | 0.6429 | 0.7679 | 0.8013 |
| **De\_max\_y\_extension24** | 0.5446 | 0.8103 | 0.8438 |
| **De\_disp\_index1** | 0.6339 | 0.7054 | 0.7545 |
| **De\_total\_time10** | 0.5982 | 0.8406 | 0.8814 |
| **De\_mean\_acc\_in\_air3** | 0.5982 | 0.7812 | 0.8214 |
| **De\_mean\_jerk\_on\_paper4** | 0.6429 | 0.8393 | 0.8571 |
| **De\_max\_y\_extension2** | 0.7321 | 0.7679 | 0.7768 |
| **De\_mean\_speed\_in\_air15** | 0.6339 | 0.7917 | 0.8095 |

Table continues below

|  | u.AUC | r.AUC | full.AUC | IDI | NRI |
| --- | --- | --- | --- | --- | --- |
| **De\_gmrt\_in\_air19** | 0.5719 | 0.8266 | 0.8989 | 0.1477 | 0.9342 |
| **De\_mean\_gmrt10** | 0.6246 | 0.8131 | 0.862 | 0.1407 | 0.7665 |
| **De\_mean\_speed\_on\_paper15** | 0.6262 | 0.7538 | 0.7951 | 0.1137 | 0.9342 |
| **De\_mean\_gmrt19** | 0.6337 | 0.8648 | 0.9084 | 0.1132 | 0.9835 |
| **De\_paper\_time20** | 0.6258 | 0.7327 | 0.7817 | 0.1111 | 0.7359 |
| **De\_mean\_jerk\_in\_air19** | 0.6057 | 0.8325 | 0.8729 | 0.115 | 0.8825 |
| **De\_pressure\_mean5** | 0.6911 | 0.8026 | 0.8458 | 0.09483 | 0.8392 |
| **De\_paper\_time10** | 0.6258 | 0.7984 | 0.8492 | 0.1006 | 0.8017 |
| **De\_disp\_index17** | 0.7233 | 0.7548 | 0.7993 | 0.09973 | 0.8246 |
| **De\_num\_of\_pendown21** | 0.5901 | 0.7796 | 0.8182 | 0.1017 | 0.8019 |
| **De\_mean\_acc\_on\_paper21** | 0.6242 | 0.798 | 0.8428 | 0.09088 | 0.848 |
| **De\_mean\_jerk\_in\_air7** | 0.6944 | 0.7904 | 0.8242 | 0.09823 | 0.7462 |
| **De\_paper\_time5** | 0.6453 | 0.7683 | 0.8016 | 0.08291 | 0.5828 |
| **De\_max\_y\_extension24** | 0.544 | 0.8107 | 0.8439 | 0.08698 | 0.7963 |
| **De\_disp\_index1** | 0.6349 | 0.7077 | 0.7557 | 0.07958 | 0.5962 |
| **De\_total\_time10** | 0.5989 | 0.8406 | 0.8816 | 0.07716 | 0.8321 |
| **De\_mean\_acc\_in\_air3** | 0.597 | 0.7819 | 0.8215 | 0.07683 | 0.7458 |
| **De\_mean\_jerk\_on\_paper4** | 0.6421 | 0.8397 | 0.8571 | 0.06982 | 0.7477 |
| **De\_max\_y\_extension2** | 0.7314 | 0.7679 | 0.7769 | 0.06514 | 0.8211 |
| **De\_mean\_speed\_in\_air15** | 0.6327 | 0.7923 | 0.81 | 0.0615 | 0.7456 |

Table continues below

|  | z.IDI | z.NRI | Frequency |
| --- | --- | --- | --- |
| **De\_gmrt\_in\_air19** | 4.485 | 5.932 | 1 |
| **De\_mean\_gmrt10** | 4.411 | 4.431 | 0.1 |
| **De\_mean\_speed\_on\_paper15** | 4.054 | 5.715 | 0.15 |
| **De\_mean\_gmrt19** | 4.002 | 6.05 | 1 |
| **De\_paper\_time20** | 3.954 | 4.236 | 0.1 |
| **De\_mean\_jerk\_in\_air19** | 3.954 | 5.226 | 0.2 |
| **De\_pressure\_mean5** | 3.624 | 5.419 | 0.9 |
| **De\_paper\_time10** | 3.623 | 4.925 | 0.8 |
| **De\_disp\_index17** | 3.618 | 4.852 | 0.5 |
| **De\_num\_of\_pendown21** | 3.581 | 4.738 | 0.55 |
| **De\_mean\_acc\_on\_paper21** | 3.552 | 5.093 | 0.75 |
| **De\_mean\_jerk\_in\_air7** | 3.514 | 4.473 | 1 |
| **De\_paper\_time5** | 3.323 | 3.466 | 0.2 |
| **De\_max\_y\_extension24** | 3.27 | 5.608 | 0.2 |
| **De\_disp\_index1** | 3.241 | 3.382 | 0.1 |
| **De\_total\_time10** | 3.173 | 4.926 | 0.35 |
| **De\_mean\_acc\_in\_air3** | 3.069 | 4.309 | 0.1 |
| **De\_mean\_jerk\_on\_paper4** | 3.011 | 4.286 | 0.1 |
| **De\_max\_y\_extension2** | 2.891 | 4.784 | 0.1 |
| **De\_mean\_speed\_in\_air15** | 2.798 | 4.299 | 0.15 |

|  | Elements |
| --- | --- |
| **De\_gmrt\_in\_air19** | gmrt\_in\_air19+mean\_speed\_in\_air19 |
| **De\_mean\_gmrt10** | gmrt\_in\_air10+mean\_gmrt10 |
| **De\_mean\_speed\_on\_paper15** | gmrt\_on\_paper15+mean\_speed\_on\_paper15 |
| **De\_mean\_gmrt19** | gmrt\_on\_paper19+mean\_gmrt19+mean\_speed\_in\_air19 |
| **De\_paper\_time20** | disp\_index20+paper\_time20 |
| **De\_mean\_jerk\_in\_air19** | mean\_acc\_in\_air19+mean\_jerk\_in\_air19 |
| **De\_pressure\_mean5** | max\_y\_extension5+pressure\_mean5 |
| **De\_paper\_time10** | disp\_index10+paper\_time10 |
| **De\_disp\_index17** | disp\_index17+max\_y\_extension17 |
| **De\_num\_of\_pendown21** | air\_time21+num\_of\_pendown21 |
| **De\_mean\_acc\_on\_paper21** | mean\_acc\_on\_paper21+mean\_speed\_on\_paper21 |
| **De\_mean\_jerk\_in\_air7** | mean\_acc\_in\_air7+mean\_jerk\_in\_air7 |
| **De\_paper\_time5** | max\_y\_extension5+mean\_speed\_on\_paper5+paper\_time5 |
| **De\_max\_y\_extension24** | max\_x\_extension24+max\_y\_extension24 |
| **De\_disp\_index1** | disp\_index1+paper\_time1 |
| **De\_total\_time10** | air\_time10+total\_time10 |
| **De\_mean\_acc\_in\_air3** | mean\_acc\_in\_air3+mean\_jerk\_in\_air3 |
| **De\_mean\_jerk\_on\_paper4** | mean\_acc\_on\_paper4+mean\_jerk\_on\_paper4 |
| **De\_max\_y\_extension2** | disp\_index2+max\_y\_extension2 |
| **De\_mean\_speed\_in\_air15** | gmrt\_in\_air15+mean\_speed\_in\_air15 |

## Differences Between Unsupervised vs Outcome-Drive Decorrelation

In this section I will show the differences in unaltered basis vectors between the Outcome driven Transformation vs the unsupervised decorrelated transformation

par(op)  
par(mfrow=c(1,1))  
  
# name\_in <- c("acc","air","extension","gmrt","index","jerk","max","mean","num","paper","pendown","pressure","speed","time","total","var")  
# name\_out <- c("a","A","E","G","I","J","M","m","N","P","p","r","S","t","T","V")  
# for (nx in c(1:length(name\_in)))  
# {  
# cnames <- str\_replace\_all(cnames,name\_in[nx],name\_out[nx])  
# }  
  
  
smDecorU <- summary(bmdU)  
decornamesU <- rownames(smDecorU$coefficients)  
  
get\_De\_names <- decornames[!str\_detect(decornames,"De\_")]  
get\_De\_namesU <- decornamesU[!str\_detect(decornamesU,"De\_")]  
  
unn <- bmd$univariate[,3]  
names(unn) <- rownames(bmd$univariate)  
pander::pander(as.matrix(unn[get\_De\_names]))

|  |  |
| --- | --- |
| **Ba\_paper\_time23** | 8.313 |
| **Ba\_paper\_time9** | 7.468 |
| **Ba\_air\_time22** | 6.203 |
| **Ba\_disp\_index6** | 4.419 |
| **num\_of\_pendown19** | 4.133 |
| **Ba\_total\_time6** | 6.213 |
| **Ba\_mean\_speed\_in\_air25** | 5.872 |
| **Ba\_max\_x\_extension21** | 2.802 |
| **Ba\_air\_time23** | 9.329 |
| **pressure\_var19** | 2.944 |
| **Ba\_air\_time11** | 4.037 |
| **Ba\_max\_y\_extension19** | 3.217 |
| **Ba\_mean\_speed\_in\_air19** | 4.197 |
| **Ba\_num\_of\_pendown15** | 4.724 |
| **Ba\_air\_time17** | 7.299 |
| **Ba\_mean\_speed\_on\_paper11** | 4.915 |
| **Ba\_total\_time15** | 8.7 |
| **Ba\_total\_time8** | 5.24 |
| **Ba\_total\_time2** | 5.814 |
| **Ba\_gmrt\_in\_air23** | 6.021 |
| **Ba\_gmrt\_in\_air7** | 6.216 |
| **Ba\_pressure\_mean8** | 4.453 |
| **Ba\_air\_time13** | 5.664 |
| **Ba\_total\_time24** | 4.457 |
| **Ba\_gmrt\_on\_paper22** | 4.571 |
| **Ba\_air\_time7** | 6.777 |
| **Ba\_pressure\_mean4** | 4.99 |
| **Ba\_paper\_time12** | 5.589 |
| **air\_time9** | 3.947 |
| **Ba\_mean\_jerk\_on\_paper21** | 4.542 |
| **Ba\_gmrt\_on\_paper9** | 5.818 |
| **Ba\_air\_time5** | 5.222 |
| **Ba\_gmrt\_on\_paper7** | 5.149 |
| **Ba\_pressure\_mean15** | 4.312 |
| **Ba\_disp\_index15** | 4.132 |
| **Ba\_num\_of\_pendown5** | 5.206 |
| **Ba\_total\_time16** | 5.948 |
| **pressure\_mean9** | 4.414 |
| **Ba\_total\_time3** | 4.965 |
| **Ba\_mean\_acc\_in\_air17** | 4.777 |
| **Ba\_air\_time4** | 4.184 |
| **Ba\_pressure\_mean18** | 4.012 |
| **paper\_time17** | 5.956 |
| **Ba\_mean\_jerk\_on\_paper24** | 3.319 |
| **pressure\_mean7** | 4.387 |
| **pressure\_var5** | 4.074 |
| **paper\_time15** | 5.902 |
| **Ba\_mean\_gmrt1** | 4.115 |
| **Ba\_gmrt\_on\_paper15** | 4.145 |
| **paper\_time13** | 4.826 |
| **num\_of\_pendown23** | 4.825 |
| **Ba\_total\_time18** | 5.472 |
| **Ba\_mean\_jerk\_on\_paper9** | 3.297 |
| **Ba\_num\_of\_pendown9** | 4.889 |
| **max\_x\_extension6** | 1.908 |
| **Ba\_mean\_acc\_on\_paper3** | 3.675 |
| **Ba\_pressure\_var4** | 4.192 |
| **Ba\_paper\_time24** | 3.723 |
| **Ba\_disp\_index8** | 3.309 |
| **Ba\_mean\_gmrt6** | 3.669 |
| **Ba\_mean\_gmrt14** | 4.598 |
| **Ba\_mean\_acc\_in\_air2** | 3.74 |
| **pressure\_mean1** | 3.734 |
| **paper\_time2** | 4.729 |
| **Ba\_pressure\_mean12** | 3.847 |
| **Ba\_air\_time19** | 1.256 |
| **Ba\_mean\_speed\_on\_paper18** | 4.166 |
| **disp\_index7** | 4.445 |
| **air\_time12** | 3.952 |
| **Ba\_mean\_speed\_on\_paper2** | 4.309 |

pander::pander(summary(unn[get\_De\_names]))

| Min. | 1st Qu. | Median | Mean | 3rd Qu. | Max. |
| --- | --- | --- | --- | --- | --- |
| 1.256 | 4.046 | 4.5 | 4.795 | 5.56 | 9.329 |

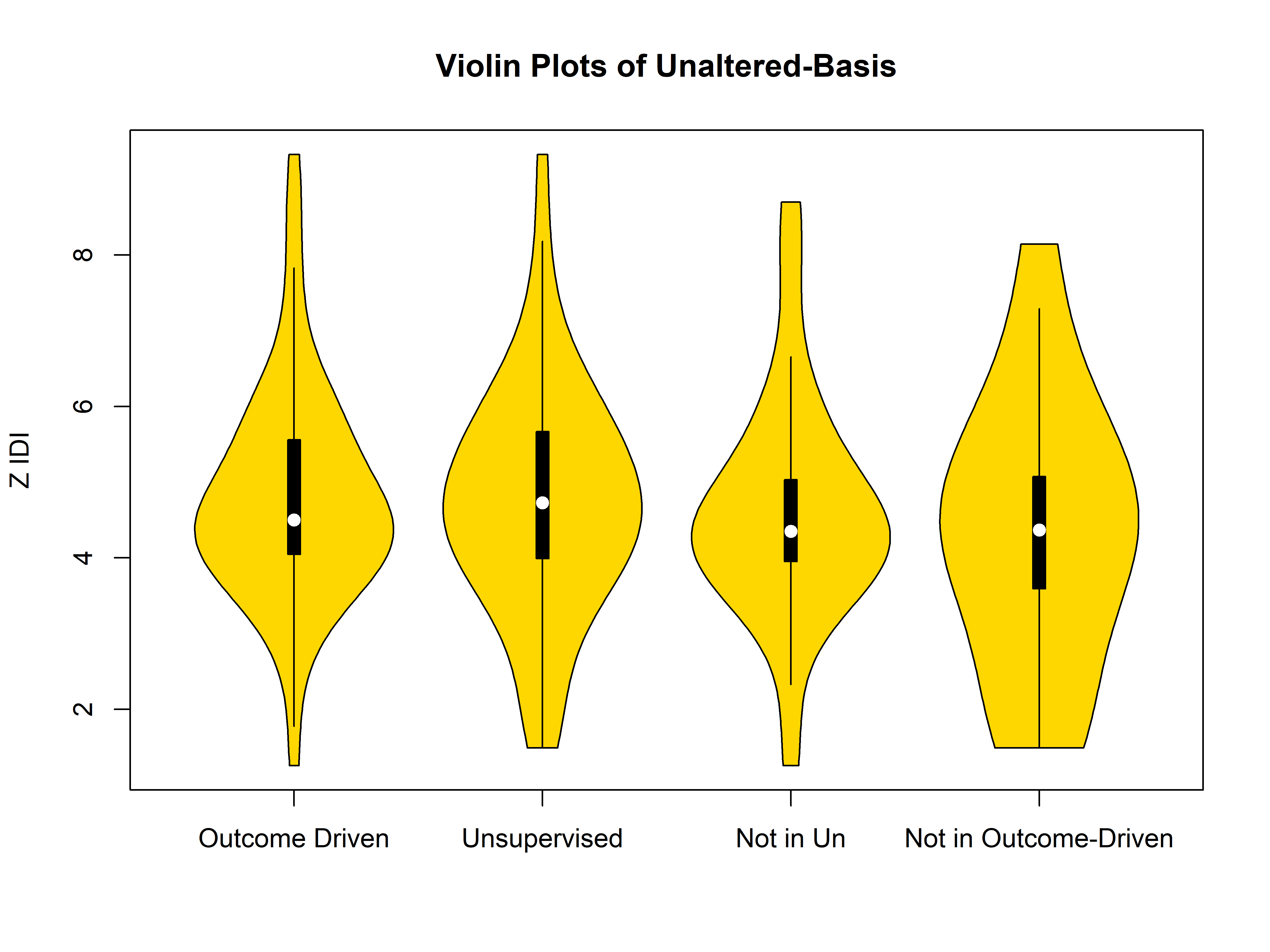
unnU <- bmdU$univariate[,3]  
names(unnU) <- rownames(bmdU$univariate)  
pander::pander(as.matrix(unnU[get\_De\_namesU]))

|  |  |
| --- | --- |
| **Ba\_air\_time6** | 5.863 |
| **Ba\_air\_time23** | 9.329 |
| **disp\_index9** | 4.369 |
| **Ba\_air\_time22** | 6.203 |
| **Ba\_air\_time15** | 8.146 |
| **num\_of\_pendown19** | 4.133 |
| **Ba\_disp\_index6** | 4.419 |
| **Ba\_air\_time2** | 5.073 |
| **Ba\_gmrt\_on\_paper23** | 5 |
| **Ba\_gmrt\_in\_air23** | 6.021 |
| **Ba\_pressure\_mean18** | 4.012 |
| **Ba\_num\_of\_pendown9** | 4.889 |
| **Ba\_total\_time9** | 6.834 |
| **num\_of\_pendown23** | 4.825 |
| **Ba\_air\_time24** | 3.968 |
| **Ba\_max\_x\_extension21** | 2.802 |
| **max\_y\_extension25** | 1.924 |
| **pressure\_var19** | 2.944 |
| **Ba\_gmrt\_on\_paper15** | 4.145 |
| **Ba\_max\_y\_extension19** | 3.217 |
| **Ba\_air\_time5** | 5.222 |
| **Ba\_air\_time13** | 5.664 |
| **Ba\_paper\_time12** | 5.589 |
| **Ba\_air\_time8** | 3.729 |
| **Ba\_num\_of\_pendown15** | 4.724 |
| **paper\_time15** | 5.902 |
| **Ba\_air\_time16** | 5.669 |
| **Ba\_gmrt\_on\_paper1** | 3.593 |
| **Ba\_num\_of\_pendown5** | 5.206 |
| **pressure\_mean9** | 4.414 |
| **Ba\_air\_time7** | 6.777 |
| **Ba\_air\_time18** | 4.429 |
| **Ba\_gmrt\_on\_paper9** | 5.818 |
| **Ba\_mean\_speed\_on\_paper11** | 4.915 |
| **Ba\_air\_time4** | 4.184 |
| **Ba\_mean\_jerk\_on\_paper9** | 3.297 |
| **Ba\_pressure\_mean4** | 4.99 |
| **Ba\_mean\_jerk\_on\_paper21** | 4.542 |
| **Ba\_air\_time17** | 7.299 |
| **Ba\_gmrt\_in\_air7** | 6.216 |
| **paper\_time17** | 5.956 |
| **Ba\_mean\_acc\_in\_air2** | 3.74 |
| **Ba\_paper\_time24** | 3.723 |
| **Ba\_mean\_acc\_in\_air25** | 5.006 |
| **Ba\_gmrt\_on\_paper7** | 5.149 |
| **Ba\_mean\_speed\_in\_air6** | 2.134 |
| **Ba\_paper\_time3** | 4.056 |
| **paper\_time2** | 4.729 |
| **Ba\_mean\_acc\_in\_air21** | 1.489 |
| **Ba\_mean\_acc\_on\_paper24** | 1.957 |
| **pressure\_var5** | 4.074 |

pander::pander(summary(unnU[get\_De\_namesU]))

| Min. | 1st Qu. | Median | Mean | 3rd Qu. | Max. |
| --- | --- | --- | --- | --- | --- |
| 1.489 | 3.99 | 4.729 | 4.751 | 5.666 | 9.329 |

#boxplot(unn[get\_De\_names],unnU[get\_De\_namesU],xlab=c("Method"),ylab="Z",main="Z Values of Basis Features")  
  
x1 <- unn[get\_De\_names]  
x2 <- unnU[get\_De\_namesU]  
X3 <- x1[!(get\_De\_names %in% get\_De\_namesU)]  
X4 <- x2[!(get\_De\_namesU %in% get\_De\_names)]  
vioplot(x1, x2, X3,X4, names=c("Outcome Driven", "Unsupervised","Not in Un","Not in Outcome-Driven"),ylab="Z IDI",  
 col="gold")  
title("Violin Plots of Unaltered-Basis")



sameFeatures <- get\_De\_names[get\_De\_names %in% get\_De\_namesU]  
pander::pander(as.matrix(unn[sameFeatures]))

|  |  |
| --- | --- |
| **Ba\_air\_time22** | 6.203 |
| **Ba\_disp\_index6** | 4.419 |
| **num\_of\_pendown19** | 4.133 |
| **Ba\_max\_x\_extension21** | 2.802 |
| **Ba\_air\_time23** | 9.329 |
| **pressure\_var19** | 2.944 |
| **Ba\_max\_y\_extension19** | 3.217 |
| **Ba\_num\_of\_pendown15** | 4.724 |
| **Ba\_air\_time17** | 7.299 |
| **Ba\_mean\_speed\_on\_paper11** | 4.915 |
| **Ba\_gmrt\_in\_air23** | 6.021 |
| **Ba\_gmrt\_in\_air7** | 6.216 |
| **Ba\_air\_time13** | 5.664 |
| **Ba\_air\_time7** | 6.777 |
| **Ba\_pressure\_mean4** | 4.99 |
| **Ba\_paper\_time12** | 5.589 |
| **Ba\_mean\_jerk\_on\_paper21** | 4.542 |
| **Ba\_gmrt\_on\_paper9** | 5.818 |
| **Ba\_air\_time5** | 5.222 |
| **Ba\_gmrt\_on\_paper7** | 5.149 |
| **Ba\_num\_of\_pendown5** | 5.206 |
| **pressure\_mean9** | 4.414 |
| **Ba\_air\_time4** | 4.184 |
| **Ba\_pressure\_mean18** | 4.012 |
| **paper\_time17** | 5.956 |
| **pressure\_var5** | 4.074 |
| **paper\_time15** | 5.902 |
| **Ba\_gmrt\_on\_paper15** | 4.145 |
| **num\_of\_pendown23** | 4.825 |
| **Ba\_mean\_jerk\_on\_paper9** | 3.297 |
| **Ba\_num\_of\_pendown9** | 4.889 |
| **Ba\_paper\_time24** | 3.723 |
| **Ba\_mean\_acc\_in\_air2** | 3.74 |
| **paper\_time2** | 4.729 |

## The features by Outcome Drive not in Unsupervised  
pander::pander(as.matrix(x1[!(get\_De\_names %in% get\_De\_namesU)]))

|  |  |
| --- | --- |
| **Ba\_paper\_time23** | 8.313 |
| **Ba\_paper\_time9** | 7.468 |
| **Ba\_total\_time6** | 6.213 |
| **Ba\_mean\_speed\_in\_air25** | 5.872 |
| **Ba\_air\_time11** | 4.037 |
| **Ba\_mean\_speed\_in\_air19** | 4.197 |
| **Ba\_total\_time15** | 8.7 |
| **Ba\_total\_time8** | 5.24 |
| **Ba\_total\_time2** | 5.814 |
| **Ba\_pressure\_mean8** | 4.453 |
| **Ba\_total\_time24** | 4.457 |
| **Ba\_gmrt\_on\_paper22** | 4.571 |
| **air\_time9** | 3.947 |
| **Ba\_pressure\_mean15** | 4.312 |
| **Ba\_disp\_index15** | 4.132 |
| **Ba\_total\_time16** | 5.948 |
| **Ba\_total\_time3** | 4.965 |
| **Ba\_mean\_acc\_in\_air17** | 4.777 |
| **Ba\_mean\_jerk\_on\_paper24** | 3.319 |
| **pressure\_mean7** | 4.387 |
| **Ba\_mean\_gmrt1** | 4.115 |
| **paper\_time13** | 4.826 |
| **Ba\_total\_time18** | 5.472 |
| **max\_x\_extension6** | 1.908 |
| **Ba\_mean\_acc\_on\_paper3** | 3.675 |
| **Ba\_pressure\_var4** | 4.192 |
| **Ba\_disp\_index8** | 3.309 |
| **Ba\_mean\_gmrt6** | 3.669 |
| **Ba\_mean\_gmrt14** | 4.598 |
| **pressure\_mean1** | 3.734 |
| **Ba\_pressure\_mean12** | 3.847 |
| **Ba\_air\_time19** | 1.256 |
| **Ba\_mean\_speed\_on\_paper18** | 4.166 |
| **disp\_index7** | 4.445 |
| **air\_time12** | 3.952 |
| **Ba\_mean\_speed\_on\_paper2** | 4.309 |

## The features not in outcome driven  
pander::pander(as.matrix(x2[!(get\_De\_namesU %in% get\_De\_names)]))

|  |  |
| --- | --- |
| **Ba\_air\_time6** | 5.863 |
| **disp\_index9** | 4.369 |
| **Ba\_air\_time15** | 8.146 |
| **Ba\_air\_time2** | 5.073 |
| **Ba\_gmrt\_on\_paper23** | 5 |
| **Ba\_total\_time9** | 6.834 |
| **Ba\_air\_time24** | 3.968 |
| **max\_y\_extension25** | 1.924 |
| **Ba\_air\_time8** | 3.729 |
| **Ba\_air\_time16** | 5.669 |
| **Ba\_gmrt\_on\_paper1** | 3.593 |
| **Ba\_air\_time18** | 4.429 |
| **Ba\_mean\_acc\_in\_air25** | 5.006 |
| **Ba\_mean\_speed\_in\_air6** | 2.134 |
| **Ba\_paper\_time3** | 4.056 |
| **Ba\_mean\_acc\_in\_air21** | 1.489 |
| **Ba\_mean\_acc\_on\_paper24** | 1.957 |