R Notebook

Parametros:

Measure = Matthews correlation coefficient
Columns = sampling, weight_space, underbagging
Performance = tuning_measure
Filter keys = imba.rate
Filter values = 0.01

```
library("scmamp")
library(dplyr)
```

Tratamento dos dados

Carregando data set compilado

```
ds = read.csv("/home/rodrigo/Dropbox/UNICAMP/IC/estudo_cost_learning/SummaryResults/summary_compilation_

ds = filter(ds, learner != "classif.rusboost")
summary(ds)
```

```
##                  learner      weight_space
##  classif.ksvm        :17100   Mode :logical
##  classif.randomForest:17100   FALSE:41040
##  classif.rusboost    :    0   TRUE :10260
##  classif.xgboost     :17100   NA's :0
##
##
##
##                             measure        sampling     underbagging
##  Accuracy                       :10260   ADASYN:10260   Mode :logical
##  Area under the curve           :10260   FALSE :30780   FALSE:41040
##  F1 measure                     :10260   SMOTE :10260   TRUE :10260
##  G-mean                         :10260                  NA's :0
##  Matthews correlation coefficient:10260
##
##
##  tuning_measure    holdout_measure   holdout_measure_residual
##  Min.   :-0.1277   Min.   :-0.2120   Min.   :-0.4658
##  1st Qu.: 0.6911   1st Qu.: 0.4001   1st Qu.: 0.1994
##  Median : 0.9700   Median : 0.8571   Median : 0.5581
##  Mean   : 0.7903   Mean   : 0.6718   Mean   : 0.5298
##  3rd Qu.: 0.9975   3rd Qu.: 0.9900   3rd Qu.: 0.8755
##  Max.   : 1.0000   Max.   : 1.0000   Max.   : 1.0000
##  NA's   :1077      NA's   :1077      NA's   :1077
##  iteration_count                      dataset        imba.rate
##  Min.   :1       abalone                 :  900   Min.   :0.0010
##  1st Qu.:1       adult                   :  900   1st Qu.:0.0100
##  Median :2       bank                    :  900   Median :0.0300
##  Mean   :2       car                     :  900   Mean   :0.0286
```

```
##  3rd Qu.:3       cardiotocography-10clases:  900   3rd Qu.:0.0500
##  Max.   :3       cardiotocography-3clases :  900   Max.   :0.0500
##  NA's   :1077    (Other)                  :45900
```

Filtrando pela metrica

```
ds = filter(ds, measure == params$measure)
```

Filtrando o data set

```
if(params$filter_keys != 'NULL' && !is.null(params$filter_keys)){
  dots = paste0(params$filter_keys," == '",params$filter_values,"'")
  ds = filter_(ds, .dots = dots)
}

summary(ds)
```

```
##                  learner    weight_space
##  classif.ksvm        :600   Mode :logical
##  classif.randomForest:600   FALSE:1440
##  classif.rusboost    :  0   TRUE :360
##  classif.xgboost     :600   NA's :0
##
##
##
##                              measure       sampling    underbagging
##  Accuracy                        :   0   ADASYN: 360   Mode :logical
##  Area under the curve            :   0   FALSE :1080   FALSE:1440
##  F1 measure                      :   0   SMOTE : 360   TRUE :360
##  G-mean                          :   0                 NA's :0
##  Matthews correlation coefficient:1800
##
##
##  tuning_measure     holdout_measure   holdout_measure_residual
##  Min.   :-0.00646   Min.   :-0.1370   Min.   :-0.06817
##  1st Qu.: 0.23261   1st Qu.: 0.0000   1st Qu.: 0.02011
##  Median : 0.82014   Median : 0.3764   Median : 0.19200
##  Mean   : 0.64070   Mean   : 0.4285   Mean   : 0.29498
##  3rd Qu.: 0.99730   3rd Qu.: 0.8152   3rd Qu.: 0.49996
##  Max.   : 1.00000   Max.   : 1.0000   Max.   : 1.00000
##  NA's   :69         NA's   :69        NA's   :69
##  iteration_count                      dataset       imba.rate
##  Min.   :1       abalone                  :  45   Min.   :0.01
##  1st Qu.:1       adult                    :  45   1st Qu.:0.01
##  Median :2       bank                     :  45   Median :0.01
##  Mean   :2       car                      :  45   Mean   :0.01
##  3rd Qu.:3       cardiotocography-10clases:  45   3rd Qu.:0.01
##  Max.   :3       cardiotocography-3clases :  45   Max.   :0.01
##  NA's   :69      (Other)                  :1530
```

Computando as médias das iteracoes

```
ds = group_by(ds, learner , weight_space , measure , sampling , underbagging , dataset , imba.rate)
ds = summarise(ds, tuning_measure = mean(tuning_measure), holdout_measure = mean(holdout_measure),
               holdout_measure_residual = mean(holdout_measure_residual))

ds = as.data.frame(ds)
```

Criando dataframe

```
# Dividindo o ds em n, um para cada técnica
splited_df = ds %>% group_by_at(.vars = params$columns) %>% do(vals = as.data.frame(.)) %>% select(vals)

# Juntando cada uma das partes horizontalmente em um data set
df_tec_wide = do.call("cbind", splited_df)

# Renomeando duplicacao de nomes
colnames(df_tec_wide) = make.unique(colnames(df_tec_wide))

# Selecionando apenas as medidas da performance escolhida
df_tec_wide_residual = select(df_tec_wide, matches(paste("^", params$performance, "$|", params$performa

# Renomeando colunas
new_names = NULL
for(i in (1:length(splited_df))){
  id = toString(sapply(splited_df[[i]][1, params$columns], as.character))
  new_names = c(new_names, id)
}
colnames(df_tec_wide_residual) = new_names

# Verificando a dimensao do df
dim(df_tec_wide_residual)
```

```
## [1] 120   5
```

```
# Renomeando a variavel
df = df_tec_wide_residual

head(df)
```

```
##   ADASYN, FALSE, FALSE FALSE, FALSE, FALSE FALSE, FALSE, TRUE
## 1            0.9711549         -0.00331073         0.03775174
## 2            0.9840938          0.03130559         0.09124314
## 3            0.9976886          0.00000000         0.07291374
## 4            1.0000000          0.84986516         0.83204223
## 5            1.0000000          0.53692615         0.42292522
## 6            0.9973459          0.66437344         0.86395957
##   FALSE, TRUE, FALSE SMOTE, FALSE, FALSE
## 1       -0.002739151           0.9694672
## 2        0.043297878           0.9861198
## 3        0.000000000           0.9973734
## 4        0.849865157           1.0000000
## 5        0.536926146           1.0000000
## 6        0.664373439           0.9973574
```

```
summary(df)
```

```
##  ADASYN, FALSE, FALSE FALSE, FALSE, FALSE FALSE, FALSE, TRUE
##  Min.   :0.6780       Min.   :-0.003311   Min.   :0.02596
##  1st Qu.:0.9909       1st Qu.: 0.055332   1st Qu.:0.15022
##  Median :0.9969       Median : 0.463649   Median :0.28127
##  Mean   :0.9899       Mean   : 0.449997   Mean   :0.35333
##  3rd Qu.:0.9992       3rd Qu.: 0.772768   3rd Qu.:0.48041
##  Max.   :1.0000       Max.   : 1.000000   Max.   :1.00000
```

```
##  NA's   :10           NA's   :3           NA's   :1
##  FALSE, TRUE, FALSE  SMOTE, FALSE, FALSE
##  Min.   :-0.002739   Min.   :0.8777
##  1st Qu.: 0.055182   1st Qu.:0.9923
##  Median : 0.456755   Median :0.9974
##  Mean   : 0.447164   Mean   :0.9933
##  3rd Qu.: 0.767747   3rd Qu.:0.9995
##  Max.   : 1.000000   Max.   :1.0000
##  NA's   :4           NA's   :5
```

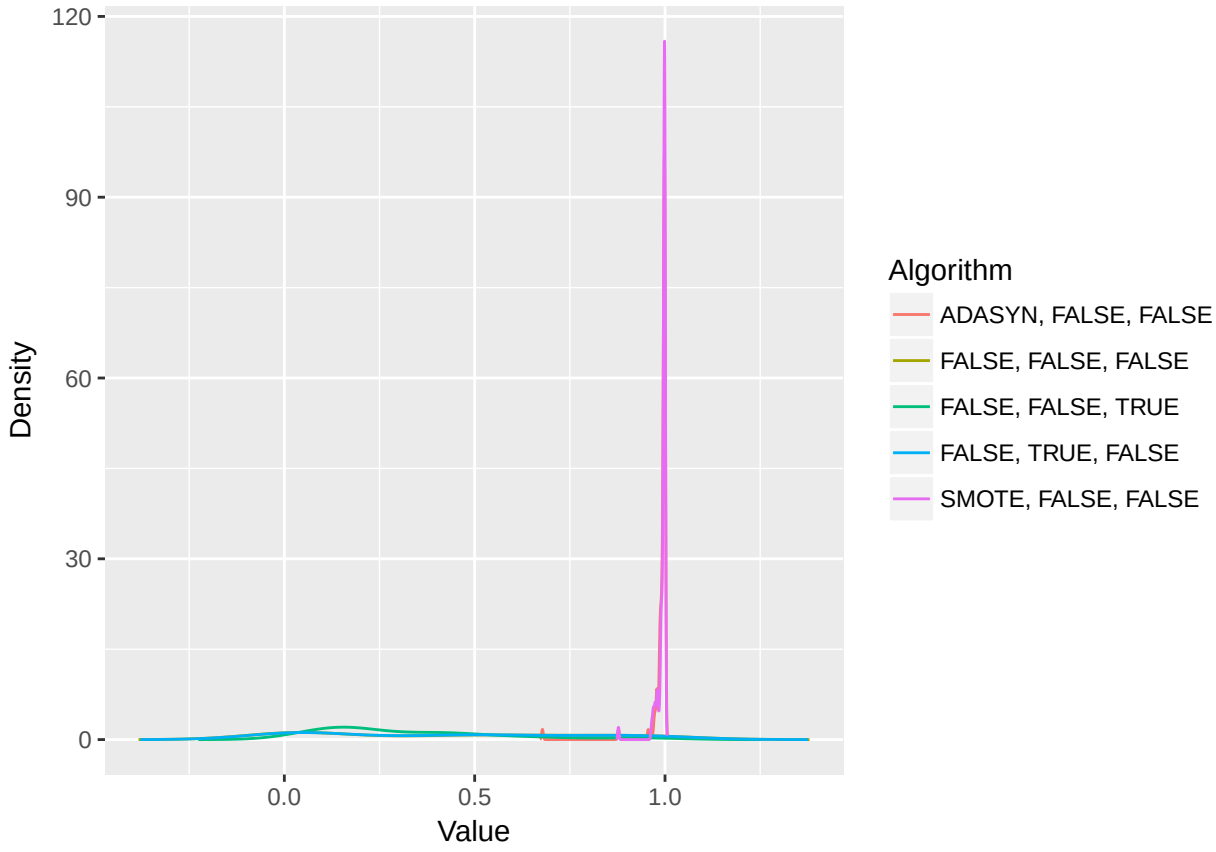
Verificando a média de cada coluna selecionada

```
for(i in (1:dim(df)[2])){
  print(paste("Media da coluna ", colnames(df)[i], " = ", mean(df[,i], na.rm = TRUE), sep=""))
}
```

```
## [1] "Media da coluna ADASYN, FALSE, FALSE = 0.989882835427032"
## [1] "Media da coluna FALSE, FALSE, FALSE = 0.449997386028172"
## [1] "Media da coluna FALSE, FALSE, TRUE = 0.353326414836044"
## [1] "Media da coluna FALSE, TRUE, FALSE = 0.447163711365912"
## [1] "Media da coluna SMOTE, FALSE, FALSE = 0.993286199119989"
```

Fazendo teste de normalidade

```
plotDensities(data = na.omit(df))
```



Testando as diferencas

```
friedmanTest(df)
```

```
##
##  Friedman's rank sum test
##
## data:  df
## Friedman's chi-squared = 249.44, df = 4, p-value < 2.2e-16
```

Testando as diferencas par a par

```
test <- nemenyiTest (df, alpha=0.05)
abs(test$diff.matrix) > test$statistic
```

```
##      ADASYN, FALSE, FALSE FALSE, FALSE, FALSE FALSE, FALSE, TRUE
## [1,]                FALSE                TRUE               TRUE
## [2,]                 TRUE               FALSE              FALSE
## [3,]                 TRUE               FALSE              FALSE
## [4,]                 TRUE               FALSE              FALSE
## [5,]                FALSE                TRUE               TRUE
##      FALSE, TRUE, FALSE SMOTE, FALSE, FALSE
## [1,]               TRUE               FALSE
```

```
## [2,]              FALSE               TRUE
## [3,]              FALSE               TRUE
## [4,]              FALSE               TRUE
## [5,]               TRUE              FALSE
```

Plotando os ranks

```
print(colMeans(rankMatrix(df)))
```

```
## ADASYN, FALSE, FALSE  FALSE, FALSE, FALSE   FALSE, FALSE, TRUE
##             1.887500             3.754167             3.954167
##   FALSE, TRUE, FALSE  SMOTE, FALSE, FALSE
##             3.775000             1.629167
```

Plotando grafico de Critical Diference

```
result = tryCatch({
    plotCD(df, alpha=0.05, cex = 0.35)
}, error = function(e) {})
```