R Notebook

Parametros:

Measure = G-mean
Columns = sampling, weight_space, underbagging
Performance = holdout_measure_residual
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                         :1800                 NA's :0
##  Matthews correlation coefficient:   0
##
##
##  tuning_measure   holdout_measure  holdout_measure_residual
##  Min.   :0.0000   Min.   :0.0000   Min.   :0.0000
##  1st Qu.:0.5895   1st Qu.:0.0000   1st Qu.:0.1104
##  Median :0.9629   Median :0.7066   Median :0.4187
##  Mean   :0.7515   Mean   :0.5605   Mean   :0.4386
##  3rd Qu.:0.9987   3rd Qu.:0.9645   3rd Qu.:0.7566
##  Max.   :1.0000   Max.   :1.0000   Max.   :1.0000
##  NA's   :54       NA's   :54       NA's   :54
##  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   :54      (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           0.22988211           0.1284832          0.5605192
## 2           0.20871555           0.1892378          0.6578023
## 3           0.04517624           0.0000000          0.6206804
## 4           0.10753762           0.2694472          0.7831986
## 5           0.00000000           0.2507360          0.6066726
## 6           0.09607398           0.2088070          0.4125283
##   FALSE, TRUE, FALSE SMOTE, FALSE, FALSE
## 1          0.1254198          0.22399174
## 2          0.1993466          0.21728496
## 3          0.0000000          0.05765257
## 4          0.2694472          0.17055729
## 5          0.2507360          0.04134491
## 6          0.2088070          0.08997243
```

```
summary(df)
```

```
##  ADASYN, FALSE, FALSE FALSE, FALSE, FALSE FALSE, FALSE, TRUE
##  Min.   :0.0000       Min.   :0.00000     Min.   :0.03782
##  1st Qu.:0.1167       1st Qu.:0.05807     1st Qu.:0.57504
##  Median :0.3319       Median :0.27286     Median :0.77235
##  Mean   :0.4039       Mean   :0.35098     Mean   :0.70163
##  3rd Qu.:0.6640       3rd Qu.:0.57319     3rd Qu.:0.89171
##  Max.   :0.9999       Max.   :0.99993     Max.   :0.99992
```

```
##  NA's   :8            NA's   :1
##  FALSE, TRUE, FALSE SMOTE, FALSE, FALSE
##  Min.   :0.00000    Min.   :0.0000
##  1st Qu.:0.07198    1st Qu.:0.1064
##  Median :0.27627    Median :0.3055
##  Mean   :0.34258    Mean   :0.3862
##  3rd Qu.:0.55108    3rd Qu.:0.6847
##  Max.   :0.99993    Max.   :1.0000
##  NA's   :2          NA's   :7
```

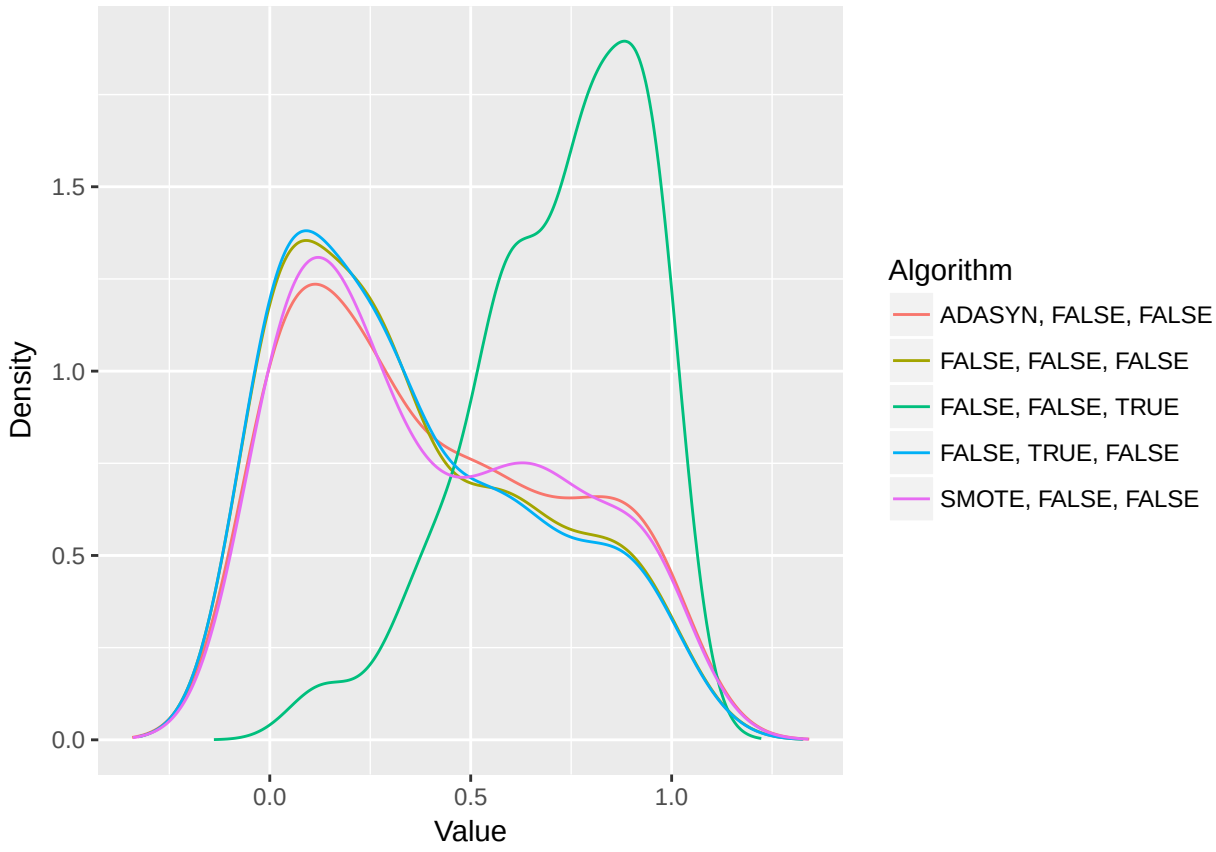
Verificando a média de cada coluna selecionada

```
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 = 0.403918959764426"
## [1] "Media da coluna FALSE, FALSE, FALSE = 0.350983676235026"
## [1] "Media da coluna FALSE, FALSE, TRUE = 0.701626689868324"
## [1] "Media da coluna FALSE, TRUE, FALSE = 0.3425750966275"
## [1] "Media da coluna SMOTE, FALSE, FALSE = 0.386231681126418"
```

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 = 189.74, 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                FALSE                TRUE
## [2,]                FALSE                FALSE                TRUE
## [3,]                 TRUE                 TRUE               FALSE
## [4,]                 TRUE                FALSE                TRUE
## [5,]                FALSE                FALSE                TRUE
##      FALSE, TRUE, FALSE SMOTE, FALSE, FALSE
## [1,]               TRUE               FALSE
```

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

Plotando os ranks

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

```
## ADASYN, FALSE, FALSE  FALSE, FALSE, FALSE   FALSE, FALSE, TRUE
##             3.162500             3.583333             1.275000
##   FALSE, TRUE, FALSE  SMOTE, FALSE, FALSE
##             3.745833             3.233333
```

Plotando grafico de Critical Diference

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