R Notebook

Parametros:

Measure = Accuracy
Columns = sampling, weight_space, underbagging
Performance = holdout_measure_residual
Filter keys = imba.rate
Filter values = 0.05

```
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        :1230   Mode :logical
##  classif.randomForest:1230   FALSE:2952
##  classif.rusboost    :   0   TRUE :738
##  classif.xgboost     :1230   NA's :0
##
##
##
##                              measure       sampling    underbagging
##  Accuracy                        :3690   ADASYN: 738   Mode :logical
##  Area under the curve            :   0   FALSE :2214   FALSE:2952
##  F1 measure                      :   0   SMOTE : 738   TRUE :738
##  G-mean                          :   0                 NA's :0
##  Matthews correlation coefficient:   0
##
##
##  tuning_measure   holdout_measure   holdout_measure_residual
##  Min.   :0.2470   Min.   :0.04739   Min.   :0.0367
##  1st Qu.:0.9494   1st Qu.:0.94505   1st Qu.:0.3902
##  Median :0.9688   Median :0.96078   Median :0.7223
##  Mean   :0.9425   Mean   :0.93413   Mean   :0.6602
##  3rd Qu.:0.9908   3rd Qu.:0.98413   3rd Qu.:0.9315
##  Max.   :1.0000   Max.   :1.00000   Max.   :1.0000
##  NA's   :42       NA's   :42        NA's   :42
##  iteration_count          dataset       imba.rate
##  Min.   :1       abalone      :  45   Min.   :0.05
##  1st Qu.:1       adult        :  45   1st Qu.:0.05
##  Median :2       annealing    :  45   Median :0.05
##  Mean   :2       arrhythmia   :  45   Mean   :0.05
##  3rd Qu.:3       balance-scale:  45   3rd Qu.:0.05
##  Max.   :3       bank         :  45   Max.   :0.05
##  NA's   :42      (Other)      :3420
```

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] 246   5
```

```
# Renomeando a variavel
df = df_tec_wide_residual

head(df)
```

```
##   ADASYN, FALSE, FALSE FALSE, FALSE, FALSE FALSE, FALSE, TRUE
## 1            0.3933596           0.3513412          0.6178953
## 2            0.5230756           0.4414169          0.5486490
## 3            0.7788618           0.7414634          0.7528455
## 4            0.9917695           0.9917695          0.8888889
## 5            0.3276515           0.3418561          0.3106061
## 6            0.6973873           0.6962389          0.6342234
##   FALSE, TRUE, FALSE SMOTE, FALSE, FALSE
## 1          0.3425249           0.4019884
## 2          0.4757891           0.5280143
## 3          0.7772358           0.7853659
## 4          0.9917695           0.9917695
## 5          0.3418561           0.2755682
## 6          0.6962389           0.7034166
```

```
summary(df)
```

```
##  ADASYN, FALSE, FALSE FALSE, FALSE, FALSE FALSE, FALSE, TRUE
##  Min.   :0.03682      Min.   :0.0367      Min.   :0.1657
##  1st Qu.:0.41690      1st Qu.:0.3486      1st Qu.:0.5793
##  Median :0.72591      Median :0.6619      Median :0.7628
##  Mean   :0.66187      Mean   :0.6308      Mean   :0.7187
##  3rd Qu.:0.93151      3rd Qu.:0.9321      3rd Qu.:0.9068
##  Max.   :0.99987      Max.   :0.9999      Max.   :0.9998
```

```
##  NA's   :5            NA's   :1           NA's   :3
##  FALSE, TRUE, FALSE SMOTE, FALSE, FALSE
##  Min.   :0.0367     Min.   :0.03682
##  1st Qu.:0.3436     1st Qu.:0.40321
##  Median :0.6456     Median :0.71970
##  Mean   :0.6282     Mean   :0.66174
##  3rd Qu.:0.9321     3rd Qu.:0.93333
##  Max.   :1.0000     Max.   :0.99986
##  NA's   :1          NA's   :4
```

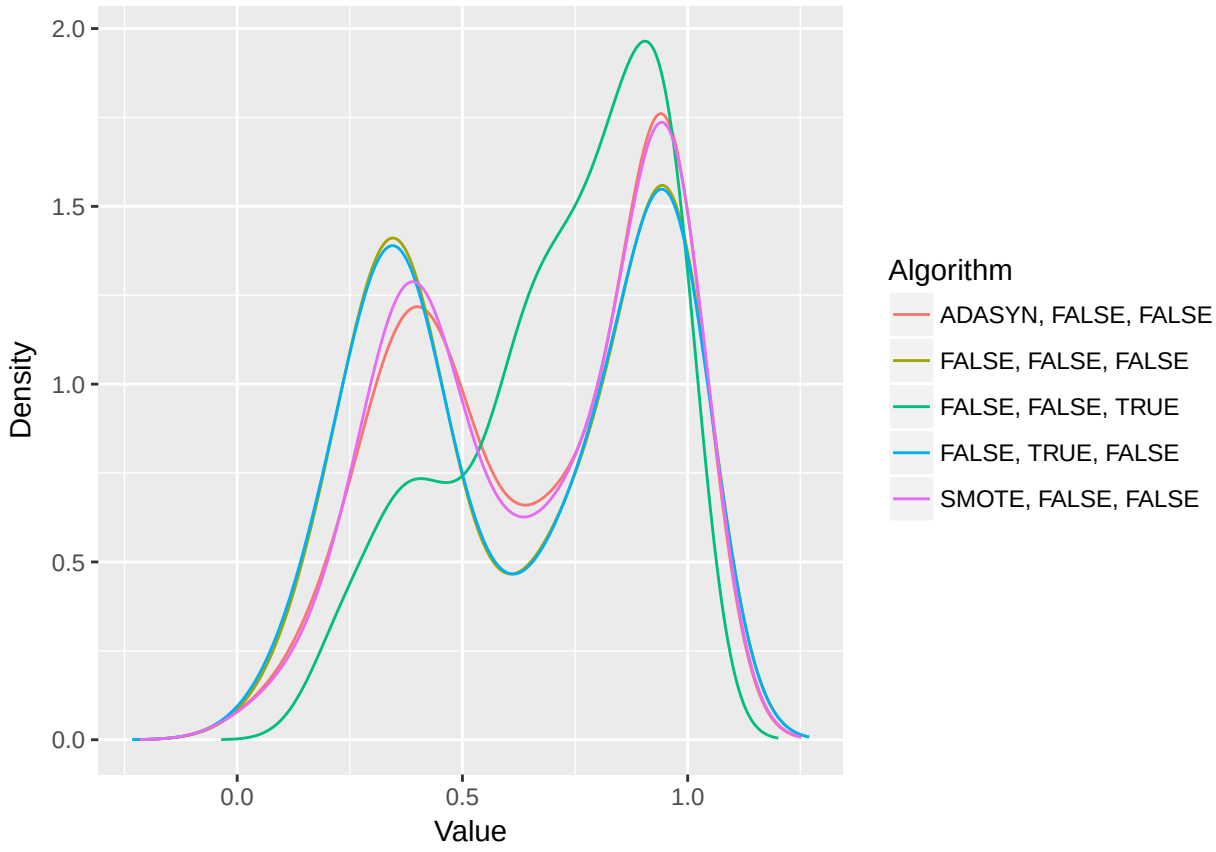
Verificando a média de cada coluna selecionada

```
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 = 0.661866008646066"
## [1] "Media da coluna FALSE, FALSE, FALSE = 0.630833638305747"
## [1] "Media da coluna FALSE, FALSE, TRUE = 0.718656916077962"
## [1] "Media da coluna FALSE, TRUE, FALSE = 0.628207578110678"
## [1] "Media da coluna SMOTE, FALSE, FALSE = 0.661741310871863"
```

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 = 69.443, df = 4, p-value = 2.975e-14
```

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

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

Plotando os ranks

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

```
## ADASYN, FALSE, FALSE  FALSE, FALSE, FALSE   FALSE, FALSE, TRUE
##             2.817073             3.434959             2.546748
##   FALSE, TRUE, FALSE  SMOTE, FALSE, FALSE
##             3.459350             2.741870
```

Plotando grafico de Critical Diference

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