R Notebook

Parametros:

Measure = Accuracy
Columns = sampling, weight_space, underbagging
Performance = holdout_measure
Filter keys = imba.rate
Filter values = 0.03

```
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        :990   Mode :logical
## classif.randomForest:990   FALSE:2376
## classif.rusboost    :  0   TRUE :594
## classif.xgboost     :990   NA's :0
##
##
##
##                             measure       sampling    underbagging
## Accuracy                        :2970   ADASYN: 594   Mode :logical
## Area under the curve            :   0   FALSE :1782   FALSE:2376
## F1 measure                      :   0   SMOTE : 594   TRUE :594
## G-mean                          :   0                 NA's :0
## Matthews correlation coefficient:   0
##
##
## tuning_measure    holdout_measure   holdout_measure_residual
## Min.   :0.09041   Min.   :0.02655   Min.   :0.0346
## 1st Qu.:0.96926   1st Qu.:0.96647   1st Qu.:0.3599
## Median :0.98130   Median :0.97619   Median :0.6882
## Mean   :0.95405   Mean   :0.94750   Mean   :0.6478
## 3rd Qu.:0.99560   3rd Qu.:0.99045   3rd Qu.:0.9438
## Max.   :1.00000   Max.   :1.00000   Max.   :1.0000
## NA's   :57        NA's   :57        NA's   :57
## iteration_count          dataset       imba.rate
## Min.   :1       abalone      :  45   Min.   :0.03
## 1st Qu.:1       adult        :  45   1st Qu.:0.03
## Median :2       annealing    :  45   Median :0.03
## Mean   :2       arrhythmia   :  45   Mean   :0.03
## 3rd Qu.:3       balance-scale:  45   3rd Qu.:0.03
## Max.   :3       bank         :  45   Max.   :0.03
## NA's   :57      (Other)      :2700
```

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

```r
# 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$performan

# 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] 198   5
```

```r
# Renomeando a variavel
df = df_tec_wide_residual

head(df)
```

```
##   ADASYN, FALSE, FALSE FALSE, FALSE, FALSE FALSE, FALSE, TRUE
## 1            0.9175199           0.9476678          0.6080774
## 2            0.9477612           0.9658288          0.9109715
## 3            0.9571429           0.9690476          0.9666667
## 4            0.9767442           0.9767442          0.8178295
## 5            0.9898990           1.0000000          0.9747475
## 6            0.9584860           0.9711030          0.3549044
##   FALSE, TRUE, FALSE SMOTE, FALSE, FALSE
## 1          0.9607509           0.9124005
## 2          0.9655669           0.9476957
## 3          0.9690476           0.9642857
## 4          0.9767442           0.9767442
## 5          1.0000000           0.9949495
## 6          0.9711030           0.9682540
```

```r
summary(df)
```

```
##  ADASYN, FALSE, FALSE FALSE, FALSE, FALSE FALSE, FALSE, TRUE
##  Min.   :0.5458       Min.   :0.9457      Min.   :0.05952
##  1st Qu.:0.9654       1st Qu.:0.9726      1st Qu.:0.74214
##  Median :0.9787       Median :0.9801      Median :0.91610
##  Mean   :0.9691       Mean   :0.9818      Mean   :0.83675
##  3rd Qu.:0.9923       3rd Qu.:0.9908      3rd Qu.:0.97248
##  Max.   :1.0000       Max.   :1.0000      Max.   :1.00000
```

```
##  NA's   :9            NA's   :2           NA's   :2
##  FALSE, TRUE, FALSE SMOTE, FALSE, FALSE
##  Min.   :0.9496     Min.   :0.5447
##  1st Qu.:0.9726     1st Qu.:0.9664
##  Median :0.9804     Median :0.9765
##  Mean   :0.9818     Mean   :0.9690
##  3rd Qu.:0.9905     3rd Qu.:0.9906
##  Max.   :1.0000     Max.   :1.0000
##  NA's   :1          NA's   :5
```

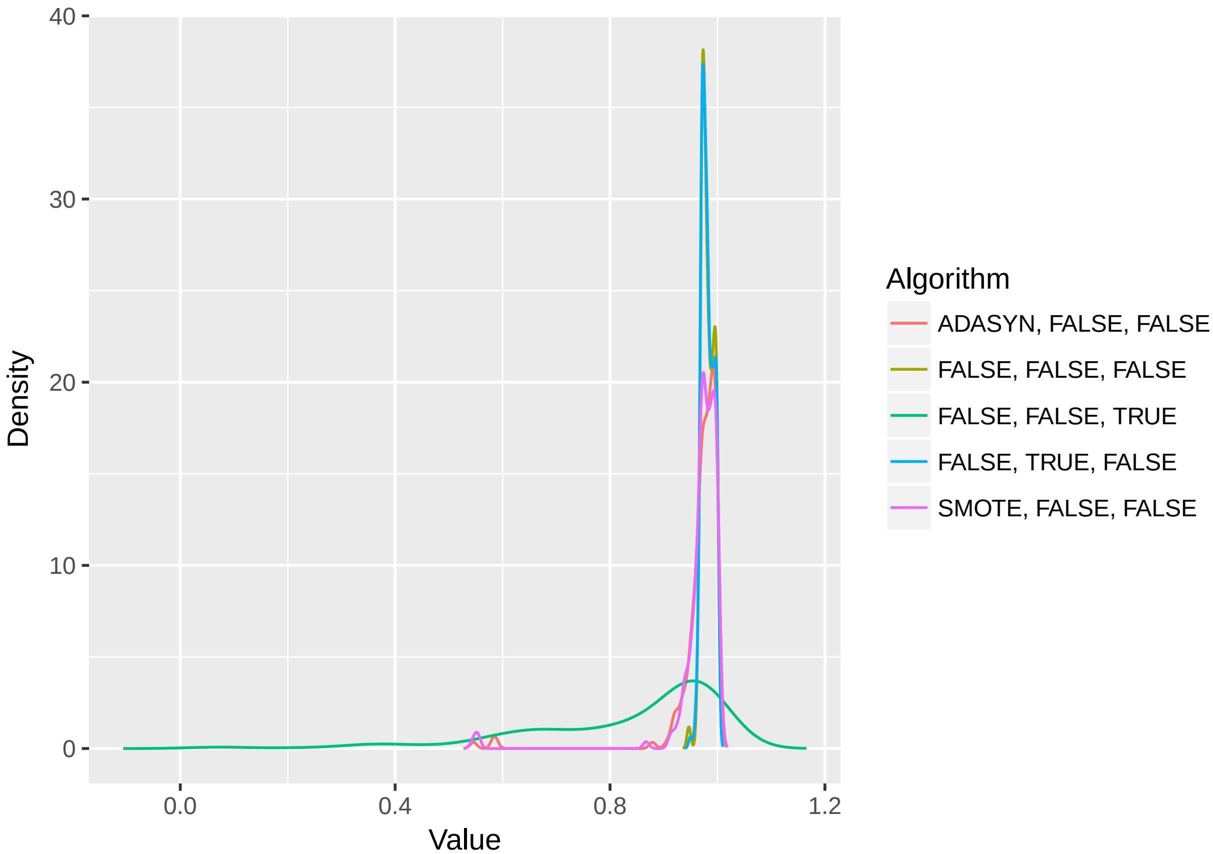
Verificando a média de cada coluna selecionada

```r
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 = 0.969089734647734"
## [1] "Media da coluna FALSE, FALSE, FALSE = 0.981780298127253"
## [1] "Media da coluna FALSE, FALSE, TRUE = 0.836746511754661"
## [1] "Media da coluna FALSE, TRUE, FALSE = 0.981842286172418"
## [1] "Media da coluna SMOTE, FALSE, FALSE = 0.968976116935464"
```

Fazendo teste de normalidade

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



Testando as diferencas

```
friedmanTest(df)
```

```
##
##  Friedman's rank sum test
##
## data:  df
## Friedman's chi-squared = 286.81, 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               TRUE
## [3,]                 TRUE                TRUE              FALSE
## [4,]                 TRUE               FALSE               TRUE
## [5,]                FALSE                TRUE               TRUE
##      FALSE, TRUE, FALSE SMOTE, FALSE, FALSE
## [1,]               TRUE               FALSE
```

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

Plotando os ranks

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

```
## ADASYN, FALSE, FALSE  FALSE, FALSE, FALSE   FALSE, FALSE, TRUE
##             2.914141             2.290404             4.611111
##   FALSE, TRUE, FALSE  SMOTE, FALSE, FALSE
##             2.290404             2.893939
```

Plotando grafico de Critical Diference

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