R Notebook

Parametros:

Measure = Matthews correlation coefficient
Columns = sampling, weight_space, ruspool, learner
Performance = tuning_measure
Filter keys = NULL
Filter values = NULL

```
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_
summary(ds)
```

```
##                  learner      weight_space
##  classif.ksvm        :17100   Mode :logical
##  classif.randomForest:17100   FALSE:41040
##  classif.xgboost     :17100   TRUE :10260
##                               NA's :0
##
##
##
##                              measure        sampling      ruspool
##  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.: 0.5924   1st Qu.: 0.3114   1st Qu.: 0.1648
##  Median : 0.9624   Median : 0.8193   Median : 0.5192
##  Mean   : 0.7570   Mean   : 0.6469   Mean   : 0.5099
##  3rd Qu.: 0.9965   3rd Qu.: 0.9879   3rd Qu.: 0.8636
##  Max.   : 1.0000   Max.   : 1.0000   Max.   : 1.0000
##  NA's   :1761      NA's   :1761      NA's   :1761
##  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   :1761    (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)){
  ds = filter_at(ds, .vars = params$filter_keys, .vars_predicate = any_vars(. == params$filter_values))
}

summary(ds)
```

```
##                   learner     weight_space
##  classif.ksvm         :3420   Mode :logical
##  classif.randomForest:3420   FALSE:8208
##  classif.xgboost      :3420   TRUE :2052
##                               NA's :0
##
##
##
##                               measure        sampling     ruspool
##  Accuracy                         :    0   ADASYN:2052   Mode :logical
##  Area under the curve             :    0   FALSE :6156   FALSE:8208
##  F1 measure                       :    0   SMOTE :2052   TRUE :2052
##  G-mean                           :    0                 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.: 0.2088   1st Qu.: 0.0000   1st Qu.: 0.0067
##  Median : 0.7306   Median : 0.4258   Median : 0.1812
##  Mean   : 0.6065   Mean   : 0.4333   Mean   : 0.2883
##  3rd Qu.: 0.9851   3rd Qu.: 0.8098   3rd Qu.: 0.5031
##  Max.   : 1.0000   Max.   : 1.0000   Max.   : 1.0000
##  NA's   :357       NA's   :357       NA's   :357
##  iteration_count                      dataset       imba.rate
##  Min.   :1       abalone                  : 180   Min.   :0.0010
##  1st Qu.:1       adult                    : 180   1st Qu.:0.0100
##  Median :2       bank                     : 180   Median :0.0300
##  Mean   :2       car                      : 180   Mean   :0.0286
##  3rd Qu.:3       cardiotocography-10clases: 180   3rd Qu.:0.0500
##  Max.   :3       cardiotocography-3clases : 180   Max.   :0.0500
##  NA's   :357     (Other)                  :9180
```

Computando as médias das iteracoes

```
ds = group_by(ds, learner , weight_space , measure , sampling , ruspool , 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$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] 228  15
```

```r
# Removendo linhas com NA's
df_tec_wide_residual = na.omit(df_tec_wide_residual)

# Renomeando a variavel
df = df_tec_wide_residual

summary(df)
```

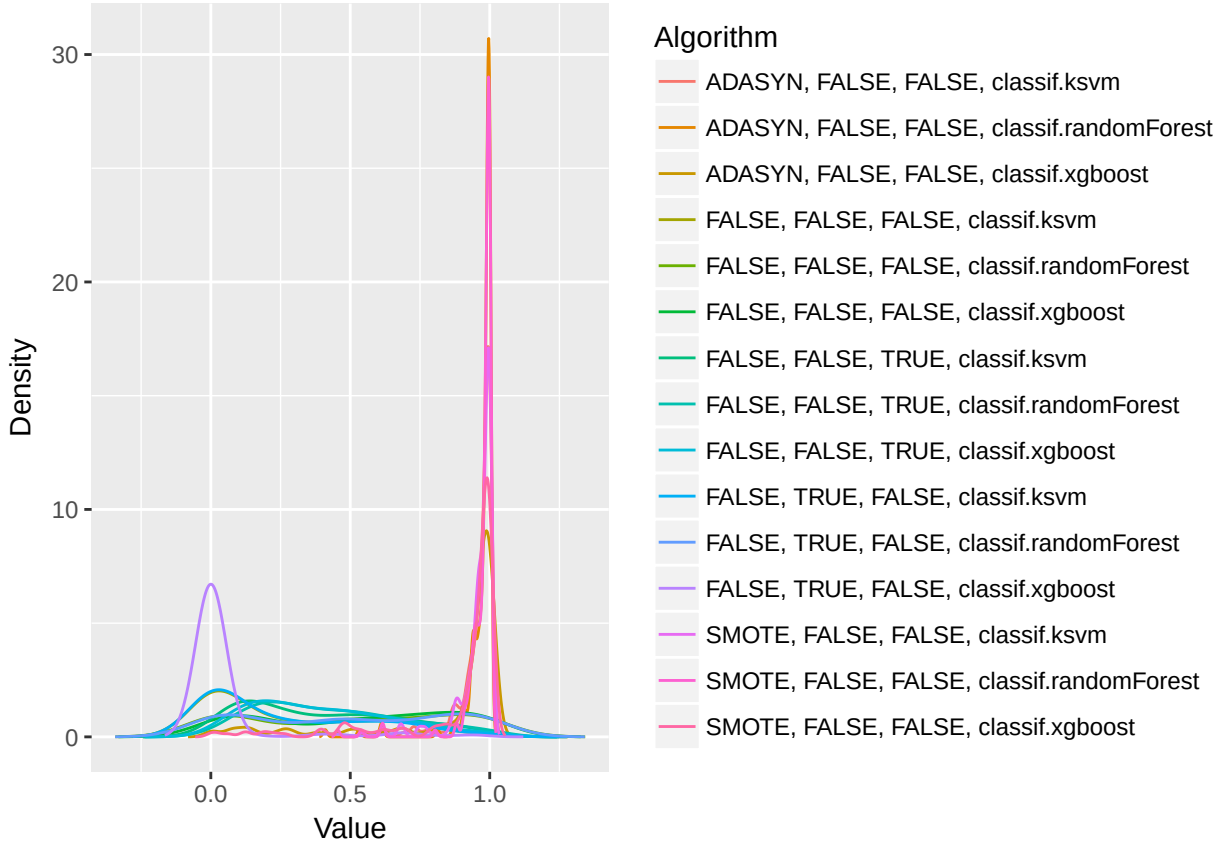
```
##  ADASYN, FALSE, FALSE, classif.ksvm
##  Min.   :0.5483
##  1st Qu.:0.9452
##  Median :0.9888
##  Mean   :0.9554
##  3rd Qu.:0.9970
##  Max.   :1.0000
##  ADASYN, FALSE, FALSE, classif.randomForest
##  Min.   :0.4102
##  1st Qu.:0.9688
##  Median :0.9920
##  Mean   :0.9699
##  3rd Qu.:0.9985
##  Max.   :1.0000
##  ADASYN, FALSE, FALSE, classif.xgboost FALSE, FALSE, FALSE, classif.ksvm
##  Min.   :-0.004855                     Min.   :-0.003311
##  1st Qu.: 0.887821                     1st Qu.: 0.000000
##  Median : 0.977144                     Median : 0.152504
##  Mean   : 0.847552                     Mean   : 0.270594
##  3rd Qu.: 0.995028                     3rd Qu.: 0.509574
##  Max.   : 1.000000                     Max.   : 1.000000
##  FALSE, FALSE, FALSE, classif.randomForest
```

```
##  Min.   :0.0000
##  1st Qu.:0.1509
##  Median :0.5333
##  Mean   :0.5053
##  3rd Qu.:0.8280
##  Max.   :1.0000
##  FALSE, FALSE, FALSE, classif.xgboost FALSE, FALSE, TRUE, classif.ksvm
##  Min.   :-0.004855                    Min.   :0.01683
##  1st Qu.: 0.180835                    1st Qu.:0.14022
##  Median : 0.587372                    Median :0.33145
##  Mean   : 0.535912                    Mean   :0.39113
##  3rd Qu.: 0.835576                    3rd Qu.:0.59555
##  Max.   : 1.000000                    Max.   :0.98137
##  FALSE, FALSE, TRUE, classif.randomForest
##  Min.   :0.006784
##  1st Qu.:0.218368
##  Median :0.377766
##  Mean   :0.429896
##  3rd Qu.:0.609513
##  Max.   :1.000000
##  FALSE, FALSE, TRUE, classif.xgboost FALSE, TRUE, FALSE, classif.ksvm
##  Min.   :0.004119                    Min.   :-0.002739
##  1st Qu.:0.179641                    1st Qu.: 0.000000
##  Median :0.357960                    Median : 0.142270
##  Mean   :0.397605                    Mean   : 0.261711
##  3rd Qu.:0.573437                    3rd Qu.: 0.501757
##  Max.   :1.000000                    Max.   : 1.000000
##  FALSE, TRUE, FALSE, classif.randomForest
##  Min.   :-0.002021
##  1st Qu.: 0.149673
##  Median : 0.495710
##  Mean   : 0.502348
##  3rd Qu.: 0.853277
##  Max.   : 1.000000
##  FALSE, TRUE, FALSE, classif.xgboost SMOTE, FALSE, FALSE, classif.ksvm
##  Min.   :0.00000                     Min.   :0.5423
##  1st Qu.:0.00000                     1st Qu.:0.9500
##  Median :0.00000                     Median :0.9835
##  Mean   :0.04544                     Mean   :0.9543
##  3rd Qu.:0.00000                     3rd Qu.:0.9982
##  Max.   :0.95552                     Max.   :1.0000
##  SMOTE, FALSE, FALSE, classif.randomForest
##  Min.   :0.4552
##  1st Qu.:0.9673
##  Median :0.9914
##  Mean   :0.9701
##  3rd Qu.:0.9986
##  Max.   :1.0000
##  SMOTE, FALSE, FALSE, classif.xgboost
##  Min.   :0.0000
##  1st Qu.:0.9178
##  Median :0.9757
##  Mean   :0.8769
##  3rd Qu.:0.9958
```

```
##  Max.   :1.0000
```

Fazendo teste de normalidade

```
plotDensities(data = df)
```



Testando as diferencas

```
friedmanTest(df)
```

```
##
##  Friedman's rank sum test
##
## data:  df
## Friedman's chi-squared = 1760.4, df = 14, 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, classif.ksvm
##  [1,]                               FALSE
##  [2,]                               FALSE
##  [3,]                               FALSE
##  [4,]                                TRUE
##  [5,]                                TRUE
##  [6,]                                TRUE
##  [7,]                                TRUE
##  [8,]                                TRUE
##  [9,]                                TRUE
## [10,]                                TRUE
## [11,]                                TRUE
## [12,]                                TRUE
## [13,]                               FALSE
## [14,]                               FALSE
## [15,]                               FALSE
##       ADASYN, FALSE, FALSE, classif.randomForest
##  [1,]                                      FALSE
##  [2,]                                      FALSE
##  [3,]                                       TRUE
##  [4,]                                       TRUE
##  [5,]                                       TRUE
##  [6,]                                       TRUE
##  [7,]                                       TRUE
##  [8,]                                       TRUE
##  [9,]                                       TRUE
## [10,]                                       TRUE
## [11,]                                       TRUE
## [12,]                                       TRUE
## [13,]                                      FALSE
## [14,]                                      FALSE
## [15,]                                       TRUE
##       ADASYN, FALSE, FALSE, classif.xgboost
##  [1,]                                 FALSE
##  [2,]                                  TRUE
##  [3,]                                 FALSE
##  [4,]                                  TRUE
##  [5,]                                  TRUE
##  [6,]                                  TRUE
##  [7,]                                  TRUE
##  [8,]                                  TRUE
##  [9,]                                  TRUE
## [10,]                                  TRUE
## [11,]                                  TRUE
## [12,]                                  TRUE
## [13,]                                 FALSE
## [14,]                                  TRUE
## [15,]                                 FALSE
##       FALSE, FALSE, FALSE, classif.ksvm
##  [1,]                               TRUE
##  [2,]                               TRUE
##  [3,]                               TRUE
##  [4,]                              FALSE
##  [5,]                               TRUE
```

```
##  [6,]                              TRUE
##  [7,]                              TRUE
##  [8,]                              TRUE
##  [9,]                             FALSE
## [10,]                             FALSE
## [11,]                              TRUE
## [12,]                              TRUE
## [13,]                              TRUE
## [14,]                              TRUE
## [15,]                              TRUE
##       FALSE, FALSE, FALSE, classif.randomForest
##  [1,]                                       TRUE
##  [2,]                                       TRUE
##  [3,]                                       TRUE
##  [4,]                                       TRUE
##  [5,]                                      FALSE
##  [6,]                                      FALSE
##  [7,]                                      FALSE
##  [8,]                                      FALSE
##  [9,]                                      FALSE
## [10,]                                       TRUE
## [11,]                                      FALSE
## [12,]                                       TRUE
## [13,]                                       TRUE
## [14,]                                       TRUE
## [15,]                                       TRUE
##       FALSE, FALSE, FALSE, classif.xgboost
##  [1,]                                 TRUE
##  [2,]                                 TRUE
##  [3,]                                 TRUE
##  [4,]                                 TRUE
##  [5,]                                FALSE
##  [6,]                                FALSE
##  [7,]                                 TRUE
##  [8,]                                FALSE
##  [9,]                                 TRUE
## [10,]                                 TRUE
## [11,]                                FALSE
## [12,]                                 TRUE
## [13,]                                 TRUE
## [14,]                                 TRUE
## [15,]                                 TRUE
##       FALSE, FALSE, TRUE, classif.ksvm
##  [1,]                            TRUE
##  [2,]                            TRUE
##  [3,]                            TRUE
##  [4,]                            TRUE
##  [5,]                           FALSE
##  [6,]                            TRUE
##  [7,]                           FALSE
##  [8,]                           FALSE
##  [9,]                           FALSE
## [10,]                            TRUE
## [11,]                           FALSE
```

```
## [12,]                            TRUE
## [13,]                            TRUE
## [14,]                            TRUE
## [15,]                            TRUE
##       FALSE, FALSE, TRUE, classif.randomForest
##  [1,]                                     TRUE
##  [2,]                                     TRUE
##  [3,]                                     TRUE
##  [4,]                                     TRUE
##  [5,]                                    FALSE
##  [6,]                                    FALSE
##  [7,]                                    FALSE
##  [8,]                                    FALSE
##  [9,]                                    FALSE
## [10,]                                     TRUE
## [11,]                                    FALSE
## [12,]                                     TRUE
## [13,]                                     TRUE
## [14,]                                     TRUE
## [15,]                                     TRUE
##       FALSE, FALSE, TRUE, classif.xgboost FALSE, TRUE, FALSE, classif.ksvm
##  [1,]                                TRUE                               TRUE
##  [2,]                                TRUE                               TRUE
##  [3,]                                TRUE                               TRUE
##  [4,]                               FALSE                              FALSE
##  [5,]                               FALSE                               TRUE
##  [6,]                                TRUE                               TRUE
##  [7,]                               FALSE                               TRUE
##  [8,]                               FALSE                               TRUE
##  [9,]                               FALSE                               TRUE
## [10,]                                TRUE                              FALSE
## [11,]                               FALSE                               TRUE
## [12,]                                TRUE                               TRUE
## [13,]                                TRUE                               TRUE
## [14,]                                TRUE                               TRUE
## [15,]                                TRUE                               TRUE
##       FALSE, TRUE, FALSE, classif.randomForest
##  [1,]                                     TRUE
##  [2,]                                     TRUE
##  [3,]                                     TRUE
##  [4,]                                     TRUE
##  [5,]                                    FALSE
##  [6,]                                    FALSE
##  [7,]                                    FALSE
##  [8,]                                    FALSE
##  [9,]                                    FALSE
## [10,]                                     TRUE
## [11,]                                    FALSE
## [12,]                                     TRUE
## [13,]                                     TRUE
## [14,]                                     TRUE
## [15,]                                     TRUE
##       FALSE, TRUE, FALSE, classif.xgboost
##  [1,]                                TRUE
```

```
##  [2,]                                TRUE
##  [3,]                                TRUE
##  [4,]                                TRUE
##  [5,]                                TRUE
##  [6,]                                TRUE
##  [7,]                                TRUE
##  [8,]                                TRUE
##  [9,]                                TRUE
## [10,]                                TRUE
## [11,]                                TRUE
## [12,]                               FALSE
## [13,]                                TRUE
## [14,]                                TRUE
## [15,]                                TRUE
##       SMOTE, FALSE, FALSE, classif.ksvm
##  [1,]                              FALSE
##  [2,]                              FALSE
##  [3,]                              FALSE
##  [4,]                               TRUE
##  [5,]                               TRUE
##  [6,]                               TRUE
##  [7,]                               TRUE
##  [8,]                               TRUE
##  [9,]                               TRUE
## [10,]                               TRUE
## [11,]                               TRUE
## [12,]                               TRUE
## [13,]                              FALSE
## [14,]                              FALSE
## [15,]                              FALSE
##       SMOTE, FALSE, FALSE, classif.randomForest
##  [1,]                                      FALSE
##  [2,]                                      FALSE
##  [3,]                                       TRUE
##  [4,]                                       TRUE
##  [5,]                                       TRUE
##  [6,]                                       TRUE
##  [7,]                                       TRUE
##  [8,]                                       TRUE
##  [9,]                                       TRUE
## [10,]                                       TRUE
## [11,]                                       TRUE
## [12,]                                       TRUE
## [13,]                                      FALSE
## [14,]                                      FALSE
## [15,]                                       TRUE
##       SMOTE, FALSE, FALSE, classif.xgboost
##  [1,]                                FALSE
##  [2,]                                 TRUE
##  [3,]                                FALSE
##  [4,]                                 TRUE
##  [5,]                                 TRUE
##  [6,]                                 TRUE
##  [7,]                                 TRUE
```

```
##  [8,]                                TRUE
##  [9,]                                TRUE
## [10,]                                TRUE
## [11,]                                TRUE
## [12,]                                TRUE
## [13,]                               FALSE
## [14,]                                TRUE
## [15,]                               FALSE
```

Plotando grafico de Critical Diference

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