

# R Notebook

## Parametros:

Measure = Matthews correlation coefficient  
Columns = learner  
Performance = tuning\_measure  
Filter keys = sampling, weight\_space, underbagging  
Filter values = FALSE, FALSE, FALSE

```
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      cardiocography-10clases: 900 3rd Qu.:0.0500
## Max. :3      cardiocography-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)){
  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.rusboost   :    0  TRUE :2052
## classif.xgboost    :3420  NA's :0
##
##
##
##          measure      sampling  underbagging
## 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.   :-0.46576
## 1st Qu.: 0.3307  1st Qu.: 0.0000  1st Qu.: 0.03886
## Median : 0.8174  Median : 0.4907  Median : 0.21377
## Mean   : 0.6548  Mean   : 0.4657  Mean   : 0.30966
## 3rd Qu.: 0.9890  3rd Qu.: 0.8152  3rd Qu.: 0.53139
## Max.   : 1.0000  Max.   : 1.0000  Max.   : 1.00000
## NA's   :225     NA's   :225     NA's   :225
## 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          cardiocography-10clases: 180  3rd Qu.:0.0500
## Max.    :3          cardiocography-3clases : 180  Max.    :0.0500
## NA's    :225      (Other)          :9180
```

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$performance)))

# 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] 1140    3

# Renomeando a variavel
df = df_tec_wide_residual

summary(df)
```

```
##   classif.ksvm      classif.randomForest classif.xgboost
## Min.   :-0.003311  Min.   :-0.00202      Min.   :-0.004855
## 1st Qu.: 0.176386  1st Qu.: 0.40931      1st Qu.: 0.431806
## Median : 0.687330  Median : 0.85779      Median : 0.854959
## Mean   : 0.587792  Mean   : 0.68088      Mean   : 0.696939
## 3rd Qu.: 0.977786  3rd Qu.: 0.99137      3rd Qu.: 0.988614
## Max.   : 1.000000  Max.   : 1.00000      Max.   : 1.000000
## NA's   :7         NA's   :68
```

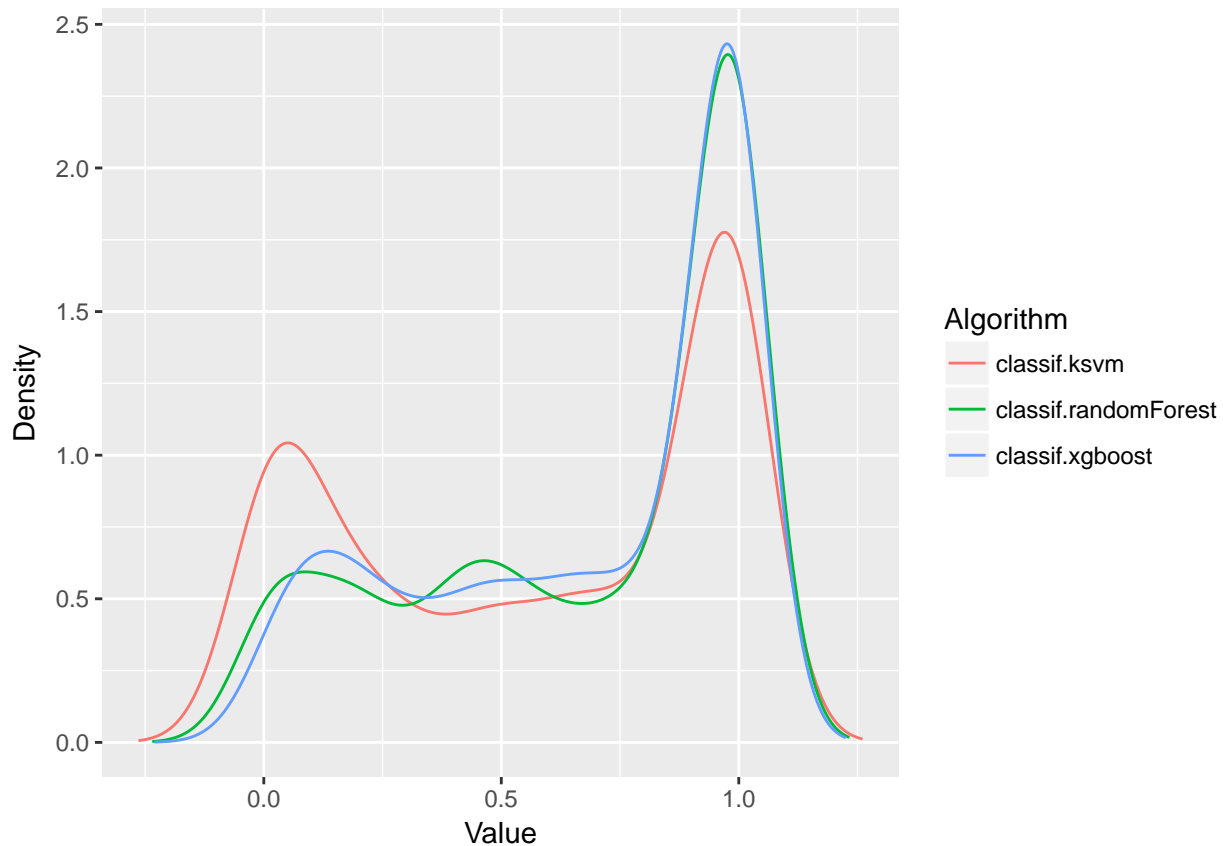
## Verificando a média de cada coluna selecionada

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

## [1] "Media da coluna classif.ksvm = 0.587791654430029"
## [1] "Media da coluna classif.randomForest = 0.680882611692483"
## [1] "Media da coluna classif.xgboost = 0.696938879386522"
```

## 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 = 92.67, df = 2, p-value < 2.2e-16
```

## Testando as diferencas par a par

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

```
##      classif.ksvm classif.randomForest classif.xgboost
## [1,]          FALSE                TRUE              TRUE
## [2,]           TRUE                FALSE             FALSE
## [3,]           TRUE                FALSE             FALSE
```

## Plotando grafico de Critical Difference

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

