

R Notebook

Parametros:

```
Measure = G-mean
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.csv")
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              :10260          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.:0.6205  1st Qu.:0.0000  1st Qu.:0.1683
## Median :0.9426  Median :0.7071  Median :0.4879
## Mean :0.7570  Mean :0.5918  Mean :0.4829
## 3rd Qu.:0.9950  3rd Qu.:0.9547  3rd Qu.:0.7996
## Max. :1.0000  Max. :1.0000  Max. :1.0000
## NA's :189  NA's :189  NA's :189
## 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 :189  (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.   :0.0000   Min.   :0.0000         Min.   :0.0000
## 1st Qu.:0.4064   1st Qu.:0.6960         1st Qu.:0.7230
## Median :0.8203   Median :0.9581         Median :0.9597
## Mean   :0.6750   Mean   :0.7890         Mean   :0.8080
## 3rd Qu.:0.9894   3rd Qu.:0.9963         3rd Qu.:0.9943
## Max.   :1.0000   Max.   :1.0000         Max.   :1.0000
## NA's   :7       NA's   :56
```

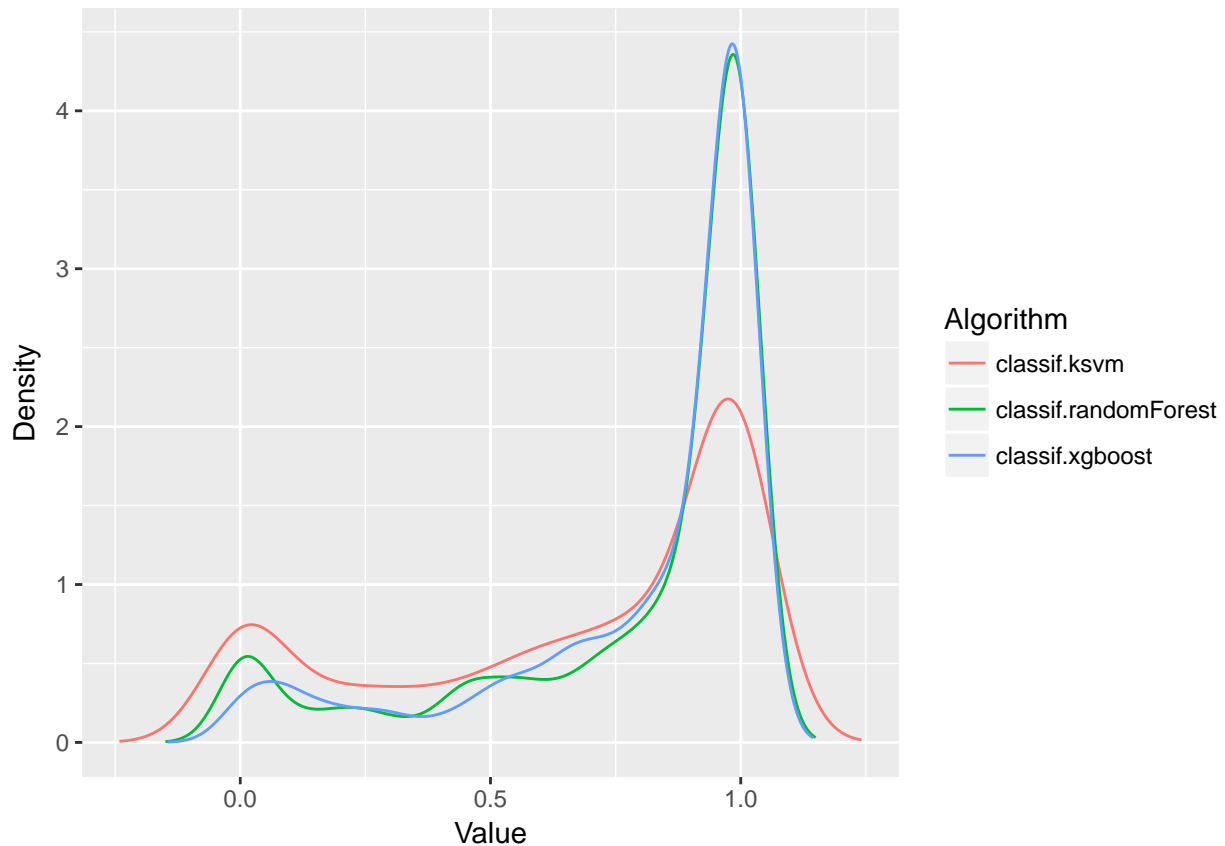
Verificando a média de cada coluna selecionada

```
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 = 0.675016700618211"
## [1] "Media da coluna classif.randomForest = 0.788991261898387"
## [1] "Media da coluna classif.xgboost = 0.807990678141841"
```

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 = 199.28, 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) {})
```

