

R Notebook

Parametros:

```
Measure = Accuracy
Columns = learner
Performance = holdout_measure_residual
Filter keys = sampling, weight_space, underbagging, imba.rate
Filter values = FALSE, FALSE, FALSE, 0.001
```

```
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)){
  dots = paste0(params$filter_keys, " == '",params$filter_values,"'")
  ds = filter_(ds, .dots = dots)
}
```

```
summary(ds)
```

```
##          learner      weight_space
## classif.ksvm      :120 Mode :logical
## classif.randomForest:120 FALSE:360
## classif.rusboost   : 0  NA's :0
## classif.xgboost    :120
##
##
##
##          measure      sampling  underbagging
## Accuracy              :360 ADASYN: 0 Mode :logical
## Area under the curve   : 0 FALSE :360 FALSE:360
## F1 measure              : 0 SMOTE : 0 NA's :0
## G-mean                  : 0
## Matthews correlation coefficient: 0
##
##
## tuning_measure  holdout_measure  holdout_measure_residual
## Min. :0.9857 Min. :0.9800 Min. :0.03881
## 1st Qu.:0.9900 1st Qu.:0.9909 1st Qu.:0.32577
## Median :0.9920 Median :0.9929 Median :0.73202
## Mean :0.9933 Mean :0.9941 Mean :0.64527
## 3rd Qu.:0.9961 3rd Qu.:0.9974 3rd Qu.:0.97711
## Max. :1.0000 Max. :1.0000 Max. :1.00000
## NA's :6 NA's :6 NA's :6
## iteration_count      dataset      imba.rate
## Min. :1 abalone : 9 Min. :0.001
## 1st Qu.:1 adult : 9 1st Qu.:0.001
## Median :2 bank : 9 Median :0.001
## Mean :2 car : 9 Mean :0.001
## 3rd Qu.:3 cardiocography-10clases: 9 3rd Qu.:0.001
## Max. :3 cardiocography-3clases : 9 Max. :0.001
## NA's :6 (Other) :306
```

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] 40 3
```

```
# Renomeando a variavel
df = df_tec_wide_residual

head(df)
```

```
##   classif.ksvm classif.randomForest classif.xgboost
## 1    0.3329890          0.3286846          0.3286846
## 2    0.4313027                NA          0.5114979
## 3    0.6298259          0.6298259          0.6303306
## 4    0.8337062          0.8337062          0.7613721
## 5    0.8852978          0.8852978          0.8846641
## 6    0.7471074          0.7922865          0.8082645
```

```
summary(df)
```

```
##   classif.ksvm   classif.randomForest classif.xgboost
## Min.   :0.03881   Min.   :0.06542   Min.   :0.04973
## 1st Qu.:0.31355   1st Qu.:0.32528   1st Qu.:0.37904
## Median :0.71294   Median :0.74077   Median :0.74121
## Mean   :0.62944   Mean   :0.64753   Mean   :0.65896
## 3rd Qu.:0.94182   3rd Qu.:0.97617   3rd Qu.:0.97695
## Max.   :0.99991   Max.   :0.99987   Max.   :0.99985
##                                     NA's   :2
```

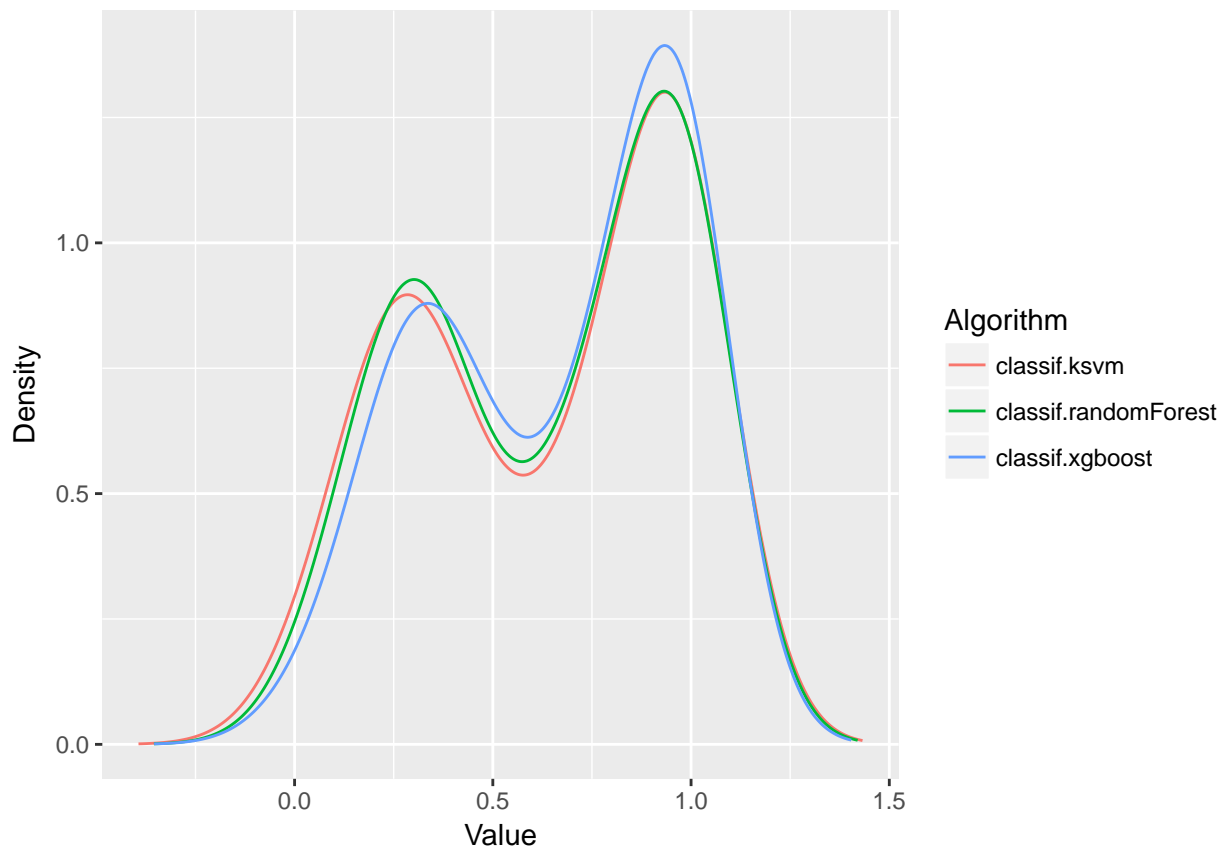
Verificando a média de cada coluna selecionada

```
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 classif.ksvm = 0.629443338349023"
## [1] "Media da coluna classif.randomForest = 0.647525706592087"
## [1] "Media da coluna classif.xgboost = 0.658960156606477"
```

Fazendo teste de normalidade

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



Testando as diferenças

```
friedmanTest(df)
```

```
##
## Friedman's rank sum test
##
## data: df
## Friedman's chi-squared = 6.9125, df = 2, p-value = 0.03155
```

Testando as diferenças par a par

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

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

Plotando os ranks

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

```
##      classif.ksvm classif.randomForest      classif.xgboost
##              2.2000              2.1375              1.6625
```

Plotando grafico de Critical Difference

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

