

R Notebook

Parametros:

```
Measure = Accuracy
Columns = learner
Performance = tuning_measure
Filter keys = sampling, weight_space, underbagging, imba.rate
Filter values = FALSE, FALSE, FALSE, 0.01
```

```
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.:0.32653
## Median :0.9919  Median :0.9928  Median :0.72113
## Mean :0.9933  Mean :0.9941  Mean :0.64427
## 3rd Qu.:0.9961  3rd Qu.:0.9974  3rd Qu.:0.97646
## Max. :1.0000  Max. :1.0000  Max. :1.00000
## NA's :3      NA's :3      NA's :3
## iteration_count      dataset      imba.rate
## Min. :1      abalone      : 9  Min. :0.01
## 1st Qu.:1      adult      : 9  1st Qu.:0.01
## Median :2      bank      : 9  Median :0.01
## Mean :2      car      : 9  Mean :0.01
## 3rd Qu.:3      cardiocography-10clases: 9  3rd Qu.:0.01
## Max. :3      cardiocography-3clases : 9  Max. :0.01
## NA's :3      (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      0.9878042      0.9897371      0.9897373
## 2      0.9891070      0.9913157      0.9915333
## 3      0.9900002      0.9900002      0.9901044
## 4      0.9976581      1.0000000      0.9997404
## 5      0.9933338      0.9931254      0.9945831
## 6      0.9943033      0.9975915      0.9967127
```

```
summary(df)
```

```
##      classif.ksvm      classif.randomForest classif.xgboost
## Min.      :0.9878    Min.      :0.9893      Min.      :0.9896
## 1st Qu.:0.9899      1st Qu.:0.9902      1st Qu.:0.9904
## Median :0.9905      Median :0.9931      Median :0.9933
## Mean    :0.9921      Mean    :0.9938      Mean    :0.9940
## 3rd Qu.:0.9937      3rd Qu.:0.9976      3rd Qu.:0.9970
## Max.    :1.0000      Max.    :1.0000      Max.    :1.0000
## NA's    :1
```

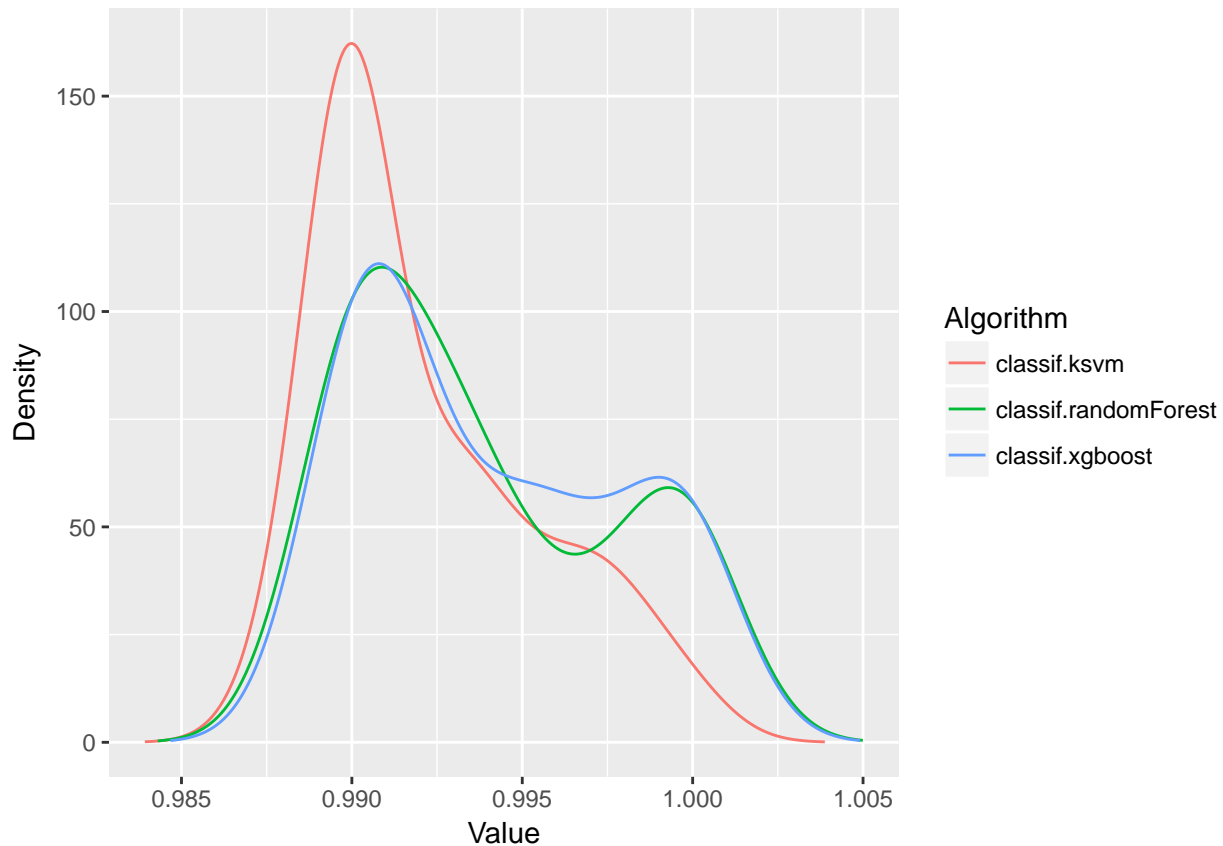
Verificando a média de cada coluna selecionada

```
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 = 0.992104909528212"
## [1] "Media da coluna classif.randomForest = 0.993814923112317"
## [1] "Media da coluna classif.xgboost = 0.994020154009022"
```

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 = 26.25, df = 2, p-value = 1.995e-06
```

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

Plotando os ranks

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

```
##      classif.ksvm classif.randomForest      classif.xgboost
##              2.625              1.875              1.500
```

Plotando grafico de Critical Difference

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

