

# R Notebook

## Parametros:

```
Measure = Accuracy
Columns = learner
Performance = holdout_measure
Filter keys = sampling, weight_space, underbagging, imba.rate
Filter values = FALSE, FALSE, FALSE, 0.05
```

```
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      :246  Mode :logical
## classif.randomForest:246 FALSE:738
## classif.rusboost   : 0  NA's :0
## classif.xgboost    :246
##
##
##
##          measure      sampling  underbagging
## Accuracy          :738  ADASYN: 0  Mode :logical
## Area under the curve : 0  FALSE :738  FALSE:738
## F1 measure          : 0  SMOTE : 0  NA's :0
## G-mean              : 0
## Matthews correlation coefficient: 0
##
##
## tuning_measure  holdout_measure  holdout_measure_residual
## Min. :0.9125  Min. :0.8605  Min. :0.0367
## 1st Qu.:0.9500 1st Qu.:0.9518 1st Qu.:0.3383
## Median :0.9626 Median :0.9665 Median :0.6714
## Mean :0.9668 Mean :0.9691 Mean :0.6308
## 3rd Qu.:0.9830 3rd Qu.:0.9859 3rd Qu.:0.9351
## Max. :1.0000 Max. :1.0000 Max. :1.0000
## NA's :3 NA's :3 NA's :3
## iteration_count      dataset      imba.rate
## Min. :1      abalone : 9  Min. :0.05
## 1st Qu.:1      adult : 9  1st Qu.:0.05
## Median :2      annealing : 9  Median :0.05
## Mean :2      arrhythmia : 9  Mean :0.05
## 3rd Qu.:3      balance-scale: 9  3rd Qu.:0.05
## Max. :3      bank : 9  Max. :0.05
## NA's :3      (Other) :684
```

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] 82 3
```

```
# Renomeando a variavel
df = df_tec_wide_residual

head(df)
```

```
##      classif.ksvm classif.randomForest classif.xgboost
## 1      0.9227778      0.9500000      0.9500000
## 2      0.9418284      0.9633545      0.9649561
## 3      0.9478458      0.9750567      0.9637188
## 4      0.9607843      0.9673203      0.9803922
## 5      1.0000000      1.0000000      1.0000000
## 6      0.9500000      0.9500000      0.9440476
```

```
summary(df)
```

```
##      classif.ksvm      classif.randomForest classif.xgboost
## Min.      :0.9228    Min.      :0.9333      Min.      :0.9333
## 1st Qu.:0.9501    1st Qu.:0.9554      1st Qu.:0.9576
## Median :0.9570    Median :0.9733      Median :0.9752
## Mean      :0.9614    Mean      :0.9731      Mean      :0.9728
## 3rd Qu.:0.9737    3rd Qu.:0.9894      3rd Qu.:0.9863
## Max.      :1.0000    Max.      :1.0000      Max.      :1.0000
## NA's      :1
```

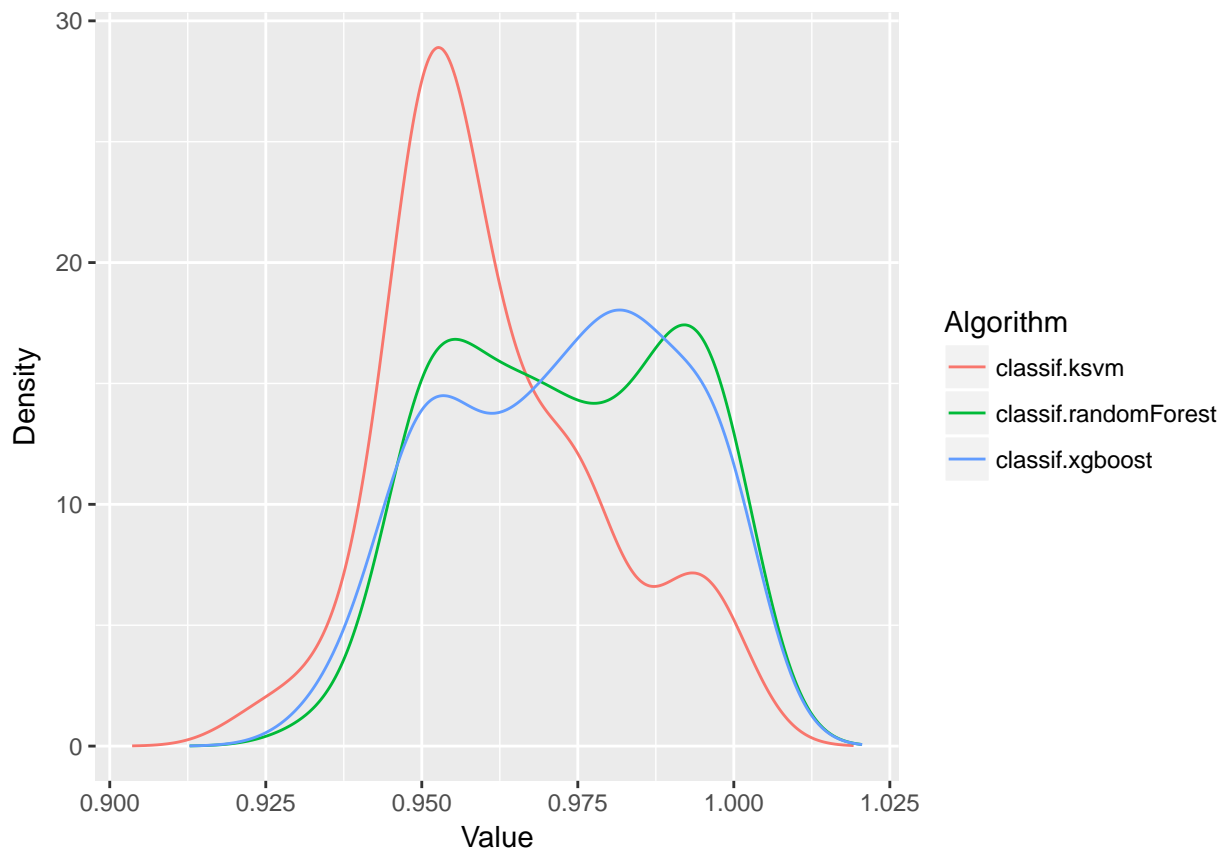
## Verificando a média de cada coluna selecionada

```
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 = 0.961419018550742"
## [1] "Media da coluna classif.randomForest = 0.973087334234863"
## [1] "Media da coluna classif.xgboost = 0.972820661306621"
```

## 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 = 29.384, df = 2, p-value = 4.162e-07
```

## 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
##      2.475610      1.859756      1.664634
```

## Plotando grafico de Critical Difference

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

