R Notebook

Parametros:

Measure = Matthews correlation coefficient
Columns = learner
Performance = tuning_measure
Filter keys = sampling, weight_space, underbagging, imba.rate
Filter values = FALSE, FALSE, FALSE, 0.03

```
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       cardiotocography-10clases:  900   3rd Qu.:0.0500
##  Max.   :3       cardiotocography-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        :198   Mode :logical
##  classif.randomForest:198   FALSE:594
##  classif.rusboost    :  0   NA's :0
##  classif.xgboost     :198
##
##
##
##                              measure      sampling   underbagging
##  Accuracy                        :  0   ADASYN:  0   Mode :logical
##  Area under the curve            :  0   FALSE :594   FALSE:594
##  F1 measure                      :  0   SMOTE :  0   NA's :0
##  G-mean                          :  0
##  Matthews correlation coefficient:594
##
##
##  tuning_measure     holdout_measure    holdout_measure_residual
##  Min.   :-0.02717   Min.   :-0.03872   Min.   :-0.3218
##  1st Qu.: 0.04560   1st Qu.: 0.00000   1st Qu.: 0.0000
##  Median : 0.52172   Median : 0.57178   Median : 0.1669
##  Mean   : 0.47487   Mean   : 0.48068   Mean   : 0.2837
##  3rd Qu.: 0.82008   3rd Qu.: 0.84929   3rd Qu.: 0.4780
##  Max.   : 1.00000   Max.   : 1.00000   Max.   : 1.0000
##  NA's   :6          NA's   :6          NA's   :6
##  iteration_count          dataset      imba.rate
##  Min.   :1       abalone      :  9   Min.   :0.03
##  1st Qu.:1       adult        :  9   1st Qu.:0.03
##  Median :2       annealing    :  9   Median :0.03
##  Mean   :2       arrhythmia   :  9   Mean   :0.03
##  3rd Qu.:3       balance-scale:  9   3rd Qu.:0.03
##  Max.   :3       bank         :  9   Max.   :0.03
##  NA's   :6       (Other)      :540
```

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$performa

# 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] 66  3
```

```
# Renomeando a variavel
df = df_tec_wide_residual

head(df)
```

```
##   classif.ksvm classif.randomForest classif.xgboost
## 1   0.02820236           0.02094578     0.005814705
## 2   0.11635362           0.47846662     0.497229873
## 3   0.17638584           0.51635002     0.417950912
## 4   0.00000000           0.45302968     0.471018509
## 5   0.95818163           1.00000000     1.000000000
## 6   0.05285858           0.08104800     0.161216151
```

```
summary(df)
```

```
##   classif.ksvm       classif.randomForest classif.xgboost
##  Min.   :-0.001814   Min.   :0.0000       Min.   :-0.004855
##  1st Qu.: 0.009720   1st Qu.:0.1395       1st Qu.: 0.384607
##  Median : 0.154596   Median :0.5711       Median : 0.640134
##  Mean   : 0.299413   Mean   :0.5348       Mean   : 0.592192
##  3rd Qu.: 0.614705   3rd Qu.:0.8705       3rd Qu.: 0.870799
##  Max.   : 0.960041   Max.   :1.0000       Max.   : 1.000000
##                      NA's   :2
```

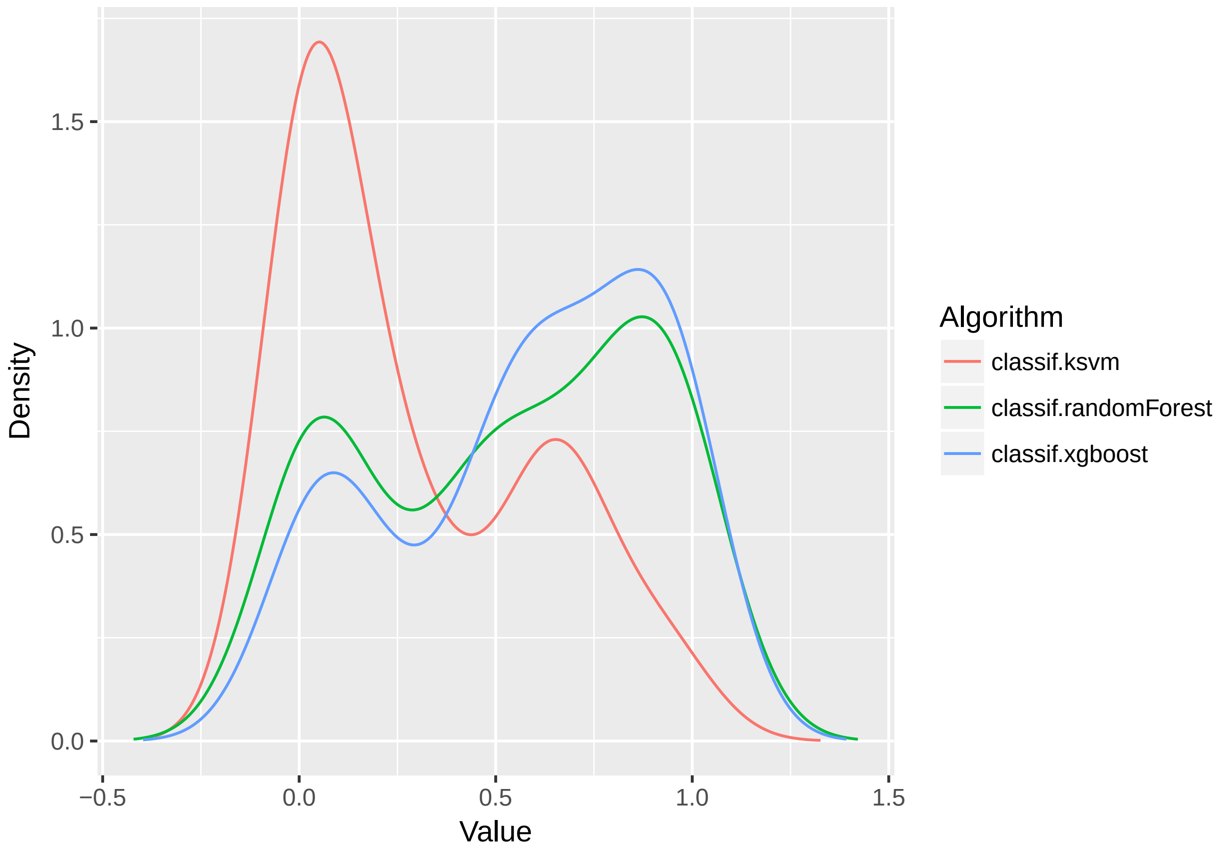
Verificando a média de cada coluna selecionada

```
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 = 0.29941264429869"
## [1] "Media da coluna classif.randomForest = 0.534816715535788"
## [1] "Media da coluna classif.xgboost = 0.592192099426845"
```

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 = 36.644, df = 2, p-value = 1.104e-08
```

Testando as diferencas par a par

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

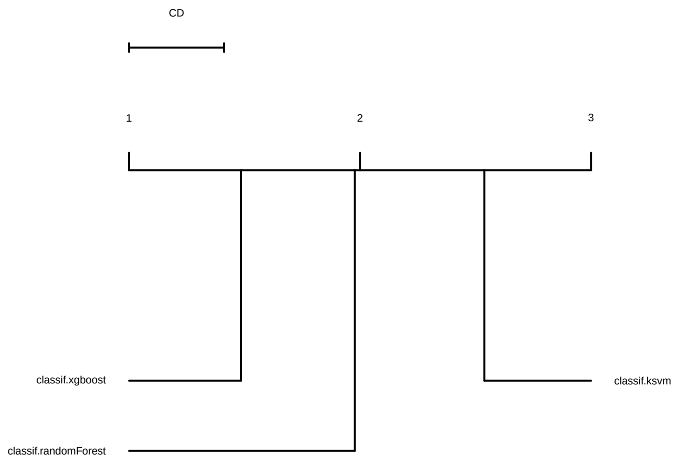
Plotando os ranks

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

```
##         classif.ksvm classif.randomForest      classif.xgboost
##             2.537879             1.977273             1.484848
```

Plotando grafico de Critical Diference

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


CD
classif.xgboost
classif.randomForest
classif.ksvm