

R Notebook

Parametros:

```
Measure = G-mean
Columns = sampling, weight_space, underbagging
Performance = tuning_measure
Filter keys = imba.rate
Filter values = 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.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      :990 Mode :logical
## classif.randomForest:990 FALSE:2376
## classif.rusboost   : 0 TRUE :594
## classif.xgboost    :990 NA's :0
##
##
##
##          measure      sampling      underbagging
## Accuracy          : 0 ADASYN: 594 Mode :logical
## Area under the curve : 0 FALSE :1782 FALSE:2376
## F1 measure          : 0 SMOTE : 594 TRUE :594
## G-mean              :2970 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.:0.6338 1st Qu.:0.2132 1st Qu.:0.1828
## Median :0.9453 Median :0.7348 Median :0.4920
## Mean :0.7583 Mean :0.6032 Mean :0.4882
## 3rd Qu.:0.9933 3rd Qu.:0.9533 3rd Qu.:0.8073
## Max. :1.0000 Max. :1.0000 Max. :1.0000
## NA's :48 NA's :48 NA's :48
## iteration_count      dataset      imba.rate
## Min. :1 abalone : 45 Min. :0.03
## 1st Qu.:1 adult : 45 1st Qu.:0.03
## Median :2 annealing : 45 Median :0.03
## Mean :2 arrhythmia : 45 Mean :0.03
## 3rd Qu.:3 balance-scale: 45 3rd Qu.:0.03
## Max. :3 bank : 45 Max. :0.03
## NA's :48 (Other) :2700
```

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] 198 5
```

```
# Renomeando a variavel
df = df_tec_wide_residual

head(df)
```

```
## ADASYN, FALSE, FALSE FALSE, FALSE, FALSE FALSE, FALSE, TRUE
## 1 0.9592389 0.23019478 0.6590811
## 2 0.9748817 0.34575254 0.7556106
## 3 0.9830574 0.26604411 0.7592993
## 4 0.9190492 0.00000000 0.6059312
## 5 1.0000000 0.95922146 0.9674543
## 6 0.9849672 0.08803044 0.5458562
## FALSE, TRUE, FALSE SMOTE, FALSE, FALSE
## 1 0.18890575 0.9608493
## 2 0.34514464 0.9762996
## 3 0.26604411 0.9821256
## 4 0.00000000 0.8568056
## 5 0.95922146 1.0000000
## 6 0.08803044 0.9838950
```

```
summary(df)
```

```
## ADASYN, FALSE, FALSE FALSE, FALSE, FALSE FALSE, FALSE, TRUE
## Min. :0.7368 Min. :0.0000 Min. :0.3521
## 1st Qu.:0.9797 1st Qu.:0.1583 1st Qu.:0.7084
## Median :0.9944 Median :0.5885 Median :0.8619
## Mean :0.9820 Mean :0.5140 Mean :0.8152
## 3rd Qu.:0.9983 3rd Qu.:0.8546 3rd Qu.:0.9542
## Max. :1.0000 Max. :1.0000 Max. :1.0000
```

```
## NA's :9          NA's :1          NA's :1
## FALSE, TRUE, FALSE SMOTE, FALSE, FALSE
## Min. :0.0000    Min. :0.7425
## 1st Qu.:0.1170   1st Qu.:0.9813
## Median :0.5798   Median :0.9947
## Mean :0.5063     Mean :0.9839
## 3rd Qu.:0.8526   3rd Qu.:0.9987
## Max. :1.0000     Max. :1.0000
## NA's :2          NA's :3
```

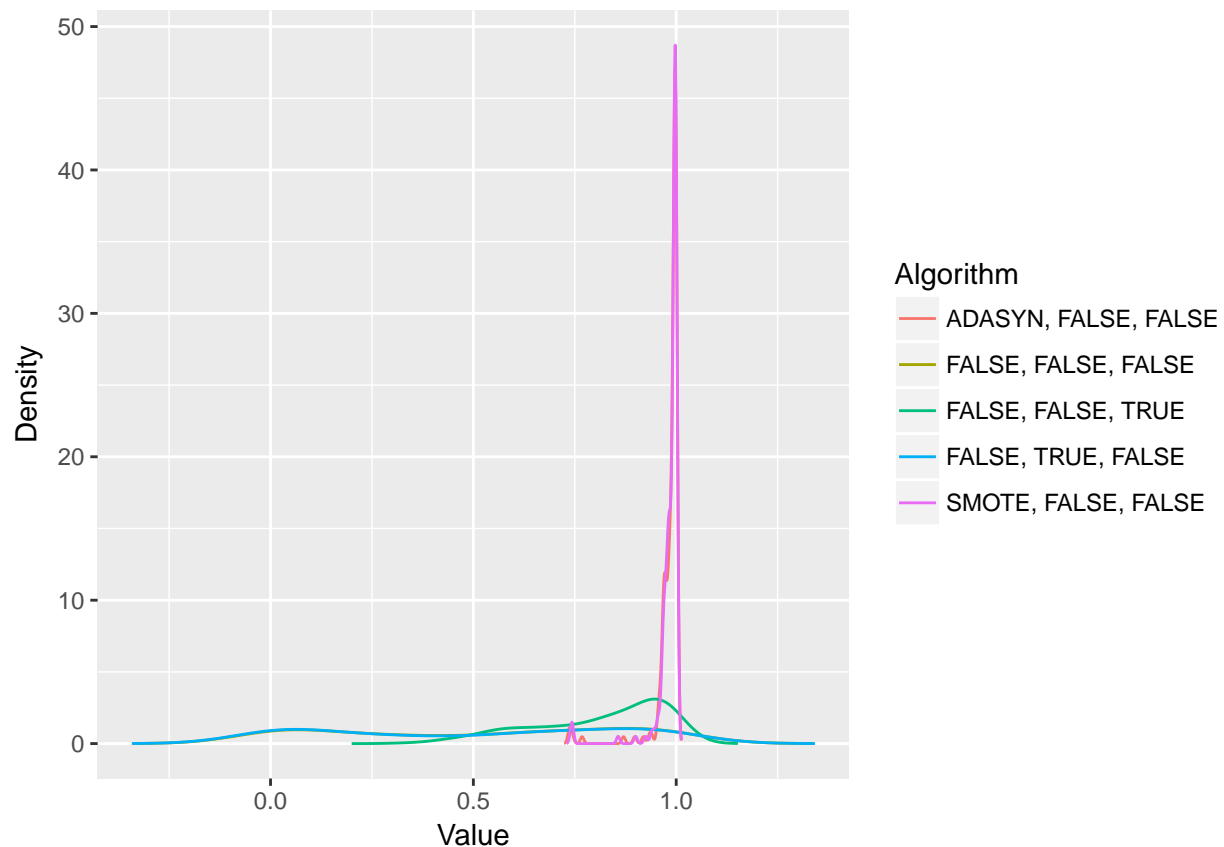
Verificando a média de cada coluna selecionada

```
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 ADASYN, FALSE, FALSE = 0.982009350116814"
## [1] "Media da coluna FALSE, FALSE, FALSE = 0.514005256533357"
## [1] "Media da coluna FALSE, FALSE, TRUE = 0.815178695747866"
## [1] "Media da coluna FALSE, TRUE, FALSE = 0.506345059072567"
## [1] "Media da coluna SMOTE, FALSE, FALSE = 0.983919894112913"
```

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 = 553.36, df = 4, p-value < 2.2e-16
```

Testando as diferencas par a par

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

```
##      ADASYN, FALSE, FALSE FALSE, FALSE, FALSE FALSE, FALSE, TRUE
## [1,]          FALSE          TRUE          TRUE
## [2,]          TRUE          FALSE          TRUE
## [3,]          TRUE          TRUE          FALSE
## [4,]          TRUE          FALSE          TRUE
## [5,]          FALSE          TRUE          TRUE
##      FALSE, TRUE, FALSE SMOTE, FALSE, FALSE
## [1,]          TRUE          FALSE
```

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

Plotando os ranks

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

```
## ADASYN, FALSE, FALSE  FALSE, FALSE, FALSE  FALSE, FALSE, TRUE
##          1.707071          4.267677          3.088384
##  FALSE, TRUE, FALSE  SMOTE, FALSE, FALSE
##          4.328283          1.608586
```

Plotando grafico de Critical Difference

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

