

# R Notebook

## Parametros:

Measure = Area under the curve  
Columns = sampling, weight\_space, underbagging  
Performance = holdout\_measure\_residual  
Filter keys = imba.rate  
Filter values = 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.  
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)){
  ds = filter_at(ds, .vars = params$filter_keys, .vars_predicate = any_vars(. == params$filter_values))
}
```

```
summary(ds)
```

```
##           learner      weight_space
## classif.ksvm      :1230 Mode :logical
## classif.randomForest:1230 FALSE:2952
## classif.rusboost   :  0  TRUE :738
## classif.xgboost    :1230 NA's :0
##
##
##
##           measure      sampling      underbagging
## Accuracy           :  0  ADASYN: 738 Mode :logical
## Area under the curve :3690 FALSE :2214 FALSE:2952
## F1 measure          :  0  SMOTE : 738 TRUE :738
## G-mean              :  0           NA's :0
## Matthews correlation coefficient:  0
##
##
## tuning_measure  holdout_measure  holdout_measure_residual
## Min. :0.3977  Min. :0.0000  Min. :0.0000
## 1st Qu.:0.9145  1st Qu.:0.8175  1st Qu.:0.6976
## Median :0.9932  Median :0.9755  Median :0.8806
## Mean :0.9282  Mean :0.8846  Mean :0.8211
## 3rd Qu.:0.9997  3rd Qu.:0.9992  3rd Qu.:0.9784
## Max. :1.0000  Max. :1.0000  Max. :1.0000
## NA's :84      NA's :84      NA's :84
## iteration_count      dataset      imba.rate
## Min. :1      abalone : 45  Min. :0.05
## 1st Qu.:1      adult : 45  1st Qu.:0.05
## Median :2      annealing : 45  Median :0.05
## Mean :2      arrhythmia : 45  Mean :0.05
## 3rd Qu.:3      balance-scale: 45  3rd Qu.:0.05
## Max. :3      bank : 45  Max. :0.05
## NA's :84      (Other) :3420
```

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] 246 5
```

```
# Renomeando a variavel
df = df_tec_wide_residual

summary(df)
```

```
## ADASYN, FALSE, FALSE FALSE, FALSE, FALSE FALSE, FALSE, TRUE
## Min. :0.3506 Min. :0.3885 Min. :0.3653
## 1st Qu.:0.7146 1st Qu.:0.7080 1st Qu.:0.6728
## Median :0.8738 Median :0.8796 Median :0.8371
## Mean :0.8250 Mean :0.8266 Mean :0.8013
## 3rd Qu.:0.9773 3rd Qu.:0.9750 3rd Qu.:0.9566
## Max. :1.0000 Max. :1.0000 Max. :1.0000
## NA's :8 NA's :6 NA's :3
## FALSE, TRUE, FALSE SMOTE, FALSE, FALSE
## Min. :0.4130 Min. :0.3945
## 1st Qu.:0.7122 1st Qu.:0.7107
## Median :0.8726 Median :0.8667
## Mean :0.8254 Mean :0.8275
## 3rd Qu.:0.9761 3rd Qu.:0.9752
## Max. :1.0000 Max. :1.0000
## NA's :4 NA's :7
```

## Verificando a média de cada coluna selecionada

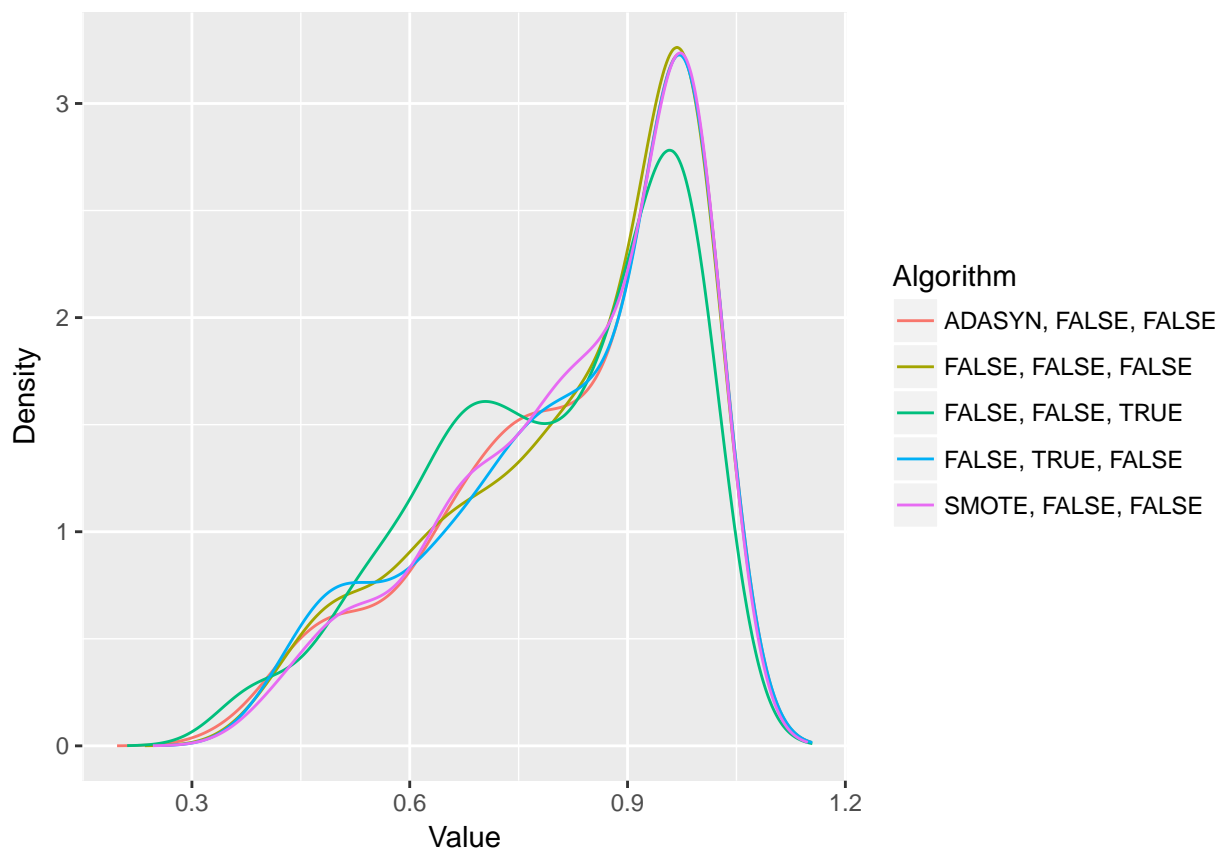
```
for(i in (1:dim(df)[2])){
  #print(df[,i])
}
```

```
print(paste("Media da coluna ", colnames(df)[i], " = ", mean(df[,i], na.rm = TRUE), sep=""))
}

## [1] "Media da coluna ADASYN, FALSE, FALSE = 0.825045335525325"
## [1] "Media da coluna FALSE, FALSE, FALSE = 0.826565590222471"
## [1] "Media da coluna FALSE, FALSE, TRUE = 0.801261015448162"
## [1] "Media da coluna FALSE, TRUE, FALSE = 0.825414328632424"
## [1] "Media da coluna SMOTE, FALSE, FALSE = 0.827450322953879"
```

## 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 = 50.181, df = 4, p-value = 3.309e-10
```

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

## Plotando grafico de Critical Difference

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

