

R Notebook

Parametros:

```
Measure = F1 measure
Columns = sampling, weight_space, underbagging
Performance = holdout_measure_residual
Filter keys = imba.rate
Filter values = 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      :600  Mode :logical
## classif.randomForest:600 FALSE:1440
## classif.rusboost   : 0  TRUE :360
## classif.xgboost    :600 NA's :0
##
##
##
##          measure      sampling      underbagging
## Accuracy          : 0  ADASYN: 360  Mode :logical
## Area under the curve : 0  FALSE :1080 FALSE:1440
## F1 measure          :1800 SMOTE : 360  TRUE :360
## G-mean              : 0          NA's :0
## Matthews correlation coefficient: 0
##
##
## tuning_measure  holdout_measure  holdout_measure_residual
## Min. :0.0000  Min. :0.0000  Min. :0.00000
## 1st Qu.:0.1475 1st Qu.:0.0000 1st Qu.:0.02254
## Median :0.8030 Median :0.3333 Median :0.20700
## Mean :0.6194 Mean :0.4107 Mean :0.32309
## 3rd Qu.:0.9986 3rd Qu.:0.8000 3rd Qu.:0.58363
## Max. :1.0000 Max. :1.0000 Max. :1.00000
## NA's :54 NA's :54 NA's :54
## iteration_count      dataset      imba.rate
## Min. :1      abalone      : 45  Min. :0.01
## 1st Qu.:1      adult      : 45  1st Qu.:0.01
## Median :2      bank      : 45  Median :0.01
## Mean :2      car      : 45  Mean :0.01
## 3rd Qu.:3      cardiocography-10clases: 45 3rd Qu.:0.01
## Max. :3      cardiocography-3clases : 45 Max. :0.01
## NA's :54      (Other) :1530
```

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] 120 5
```

```
# Renomeando a variavel
df = df_tec_wide_residual
```

```
head(df)
```

```
## ADASYN, FALSE, FALSE FALSE, FALSE, FALSE FALSE, FALSE, TRUE
## 1 0.101905890 0.03448112 0.75056379
## 2 0.083783692 0.07719857 0.56827651
## 3 0.004065052 0.00000000 0.63842237
## 4 0.034684412 0.10702333 0.69934641
## 5 0.000000000 0.13077942 0.01990050
## 6 0.032084899 0.08378653 0.05623665
## FALSE, TRUE, FALSE SMOTE, FALSE, FALSE
## 1 0.03255014 0.097251914
## 2 0.08452969 0.090957308
## 3 0.00000000 0.006769571
## 4 0.10702333 0.077783026
## 5 0.13077942 0.010101010
## 6 0.08378653 0.016512026
```

```
summary(df)
```

```
## ADASYN, FALSE, FALSE FALSE, FALSE, FALSE FALSE, FALSE, TRUE
## Min. :0.00000 Min. :0.00000 Min. :0.0003698
## 1st Qu.:0.02829 1st Qu.:0.01318 1st Qu.:0.1707113
## Median :0.17791 Median :0.14329 Median :0.5762303
## Mean :0.29262 Mean :0.25651 Mean :0.5092883
## 3rd Qu.:0.47484 3rd Qu.:0.43143 3rd Qu.:0.8347326
## Max. :0.96197 Max. :0.90794 Max. :0.9818223
```

```
## NA's :11          NA's :1
## FALSE, TRUE, FALSE SMOTE, FALSE, FALSE
## Min. :0.00000 Min. :0.00000
## 1st Qu.:0.01539 1st Qu.:0.03254
## Median :0.16074 Median :0.17967
## Mean :0.25574 Mean :0.29590
## 3rd Qu.:0.42784 3rd Qu.:0.51402
## Max. :0.90326 Max. :0.95598
## NA's :2          NA's :4
```

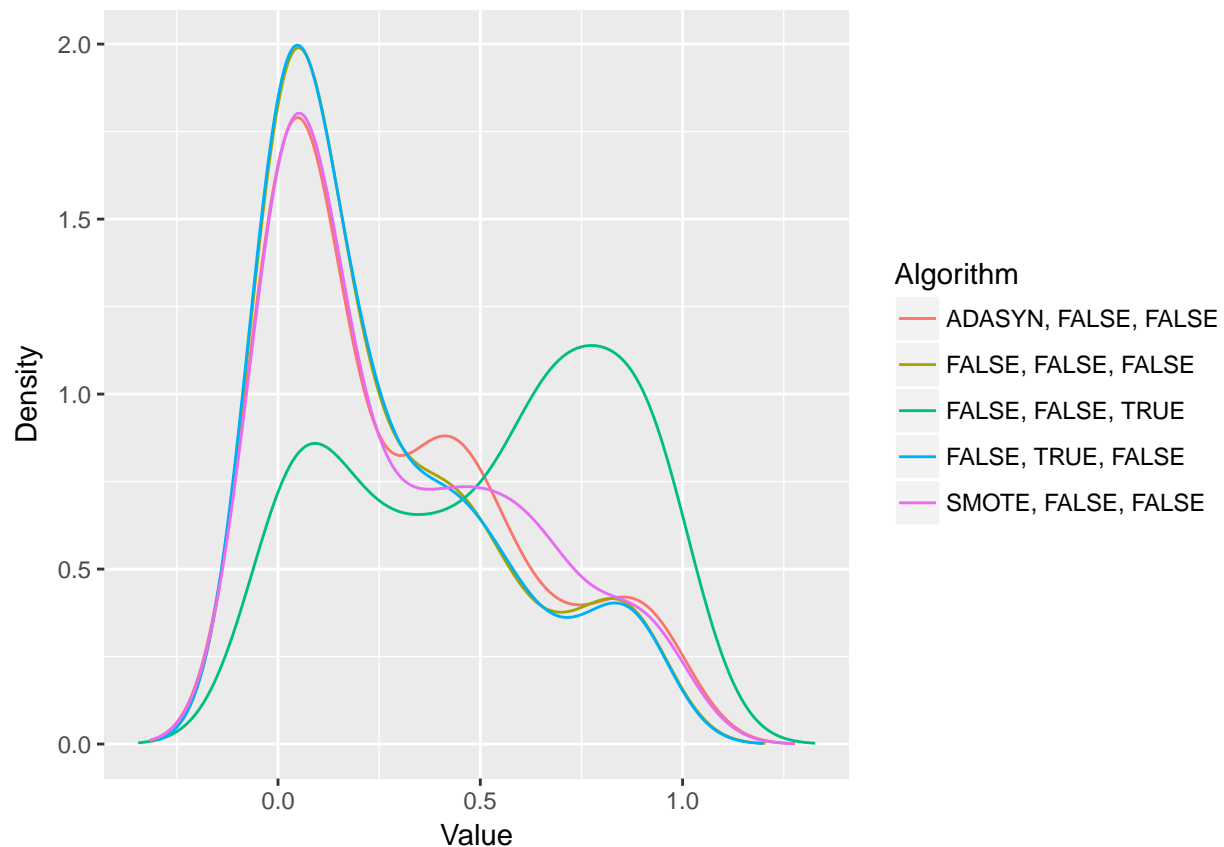
Verificando a média de cada coluna selecionada

```
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 = 0.292621494143355"
## [1] "Media da coluna FALSE, FALSE, FALSE = 0.256507238826597"
## [1] "Media da coluna FALSE, FALSE, TRUE = 0.509288324109169"
## [1] "Media da coluna FALSE, TRUE, FALSE = 0.255737916955024"
## [1] "Media da coluna SMOTE, FALSE, FALSE = 0.295901340395582"
```

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 = 82.412, 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      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 os ranks

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

```
## ADASYN, FALSE, FALSE  FALSE, FALSE, FALSE  FALSE, FALSE, TRUE
##           3.162500           3.425000           1.883333
##  FALSE, TRUE, FALSE  SMOTE, FALSE, FALSE
##           3.512500           3.016667
```

Plotando grafico de Critical Difference

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

