

R Notebook

Parametros:

Measure = G-mean

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.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      :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   :  0  FALSE :2214  FALSE:2952
## F1 measure             :  0  SMOTE : 738  TRUE :738
## G-mean                 :3690              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.:0.6329  1st Qu.:0.3162  1st Qu.:0.2321
## Median :0.9254  Median :0.7412  Median :0.5564
## Mean :0.7606  Mean :0.6130  Mean :0.5202
## 3rd Qu.:0.9872  3rd Qu.:0.9487  3rd Qu.:0.8165
## Max. :1.0000  Max. :1.0000  Max. :1.0000
## NA's :39      NA's :39      NA's :39
## 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 :39      (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

head(df)
```

```
## ADASYN, FALSE, FALSE FALSE, FALSE, FALSE FALSE, FALSE, TRUE
## 1 0.3591805 0.3217932 0.6140664
## 2 0.4457936 0.4872910 0.7758681
## 3 0.4942148 0.4519600 0.7074974
## 4 0.0000000 0.0000000 0.5582570
## 5 0.3703755 0.3978394 0.4467726
## 6 0.1432253 0.3240835 0.6727911
## FALSE, TRUE, FALSE SMOTE, FALSE, FALSE
## 1 0.3179478 0.3728492
## 2 0.4669393 0.4536133
## 3 0.4865114 0.5098786
## 4 0.0000000 0.0000000
## 5 0.3978394 0.2378804
## 6 0.2500764 0.2171279
```

```
summary(df)
```

```
## ADASYN, FALSE, FALSE FALSE, FALSE, FALSE FALSE, FALSE, TRUE
## Min. :0.0000 Min. :0.0000 Min. :0.02295
## 1st Qu.:0.2319 1st Qu.:0.1604 1st Qu.:0.54108
## Median :0.4951 Median :0.3978 Median :0.73250
## Mean :0.5083 Mean :0.4417 Mean :0.69534
## 3rd Qu.:0.8005 3rd Qu.:0.7449 3rd Qu.:0.89411
## Max. :0.9999 Max. :1.0000 Max. :0.99992
```

```
## NA's :4          NA's :1          NA's :3
## FALSE, TRUE, FALSE SMOTE, FALSE, FALSE
## Min. :0.0000    Min. :0.0000
## 1st Qu.:0.1620   1st Qu.:0.2390
## Median :0.3976   Median :0.4899
## Mean :0.4428     Mean :0.5138
## 3rd Qu.:0.7377   3rd Qu.:0.8030
## Max. :1.0000     Max. :0.9999
## NA's :1         NA's :4
```

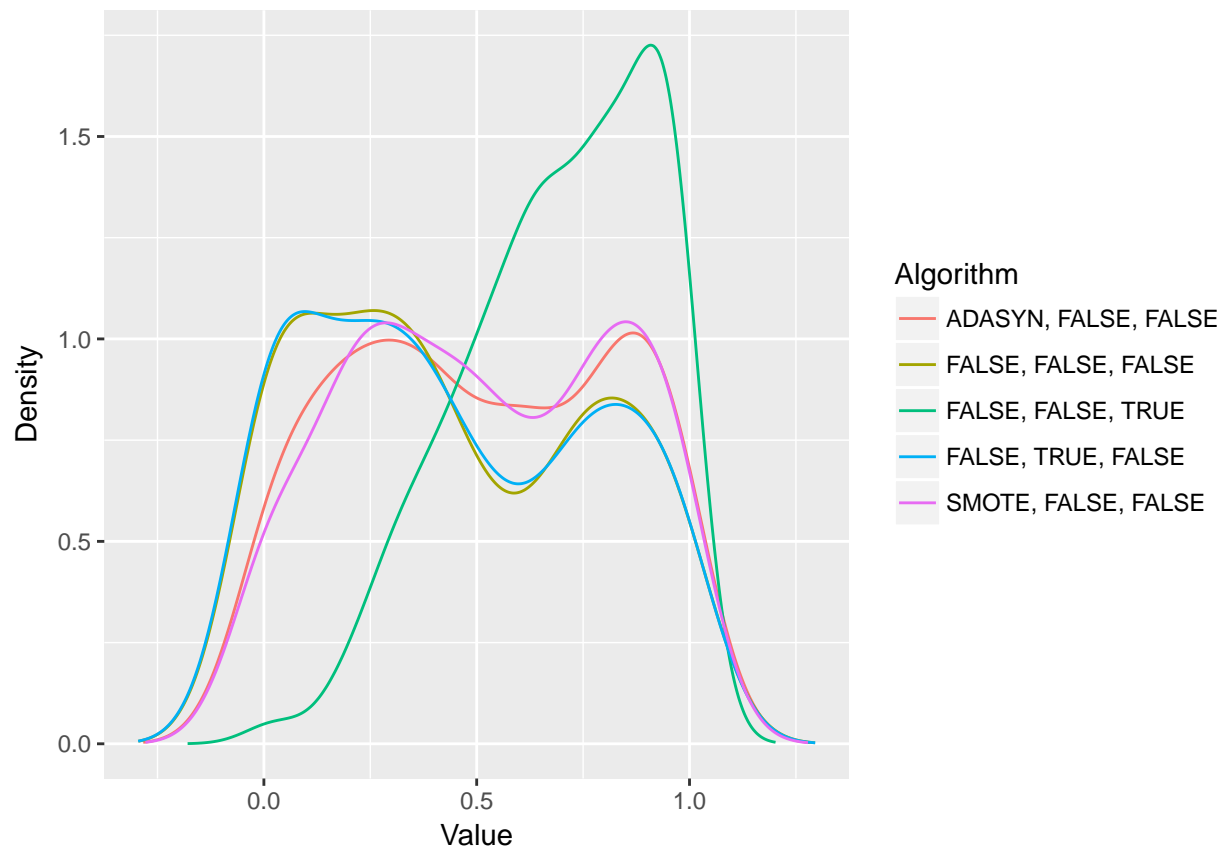
Verificando a média de cada coluna selecionada

```
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 = 0.508311898726346"
## [1] "Media da coluna FALSE, FALSE, FALSE = 0.441726553207309"
## [1] "Media da coluna FALSE, FALSE, TRUE = 0.695337999020246"
## [1] "Media da coluna FALSE, TRUE, FALSE = 0.442801335125135"
## [1] "Media da coluna SMOTE, FALSE, FALSE = 0.51384339748726"
```

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 = 356.59, 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
##          2.987805          3.747967          1.475610
##  FALSE, TRUE, FALSE  SMOTE, FALSE, FALSE
##          3.857724          2.930894
```

Plotando grafico de Critical Difference

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

