

R Notebook

Parametros:

```
Measure = F1 measure
Columns = sampling, weight_space, underbagging
Performance = holdout_measure_residual
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          :2970 SMOTE : 594 TRUE :594
## 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.:0.2788 1st Qu.:0.0481 1st Qu.:0.04815
## Median :0.8296 Median :0.4840 Median :0.28571
## Mean :0.6542 Mean :0.4646 Mean :0.37464
## 3rd Qu.:0.9927 3rd Qu.:0.8000 3rd Qu.:0.70061
## Max. :1.0000 Max. :1.0000 Max. :1.00000
## NA's :51 NA's :51 NA's :51
## 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 :51 (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 0.21605452 0.14887811 0.72122868
## 2 0.25222439 0.25340122 0.79040534
## 3 0.43272429 0.21114404 0.57989418
## 4 0.00000000 0.00000000 0.05797101
## 5 0.01179527 0.17351608 0.15452774
## 6 0.17141022 0.02262443 0.57195077
## FALSE, TRUE, FALSE SMOTE, FALSE, FALSE
## 1 0.12147113 0.19840898
## 2 0.25573787 0.26357526
## 3 0.21114404 0.35061227
## 4 0.00000000 0.00000000
## 5 0.17351608 0.15009040
## 6 0.02262443 0.03068515
```

```
summary(df)
```

```
## ADASYN, FALSE, FALSE FALSE, FALSE, FALSE FALSE, FALSE, TRUE
## Min. :0.00000 Min. :0.00000 Min. :0.0001813
## 1st Qu.:0.06961 1st Qu.:0.03852 1st Qu.:0.2542507
## Median :0.26001 Median :0.18592 Median :0.6262288
## Mean :0.35352 Mean :0.31363 Mean :0.5482115
## 3rd Qu.:0.62260 3rd Qu.:0.57115 3rd Qu.:0.8423164
## Max. :0.99745 Max. :1.00000 Max. :0.9797133
```

```
## NA's      :8          NA's      :1          NA's      :2
## FALSE, TRUE, FALSE SMOTE, FALSE, FALSE
## Min.      :0.00000    Min.      :0.00000
## 1st Qu.:0.03621    1st Qu.:0.07072
## Median :0.17986    Median :0.26471
## Mean      :0.30593    Mean      :0.35157
## 3rd Qu.:0.52520    3rd Qu.:0.62892
## Max.      :0.99746    Max.      :1.00000
## NA's      :1          NA's      :5
```

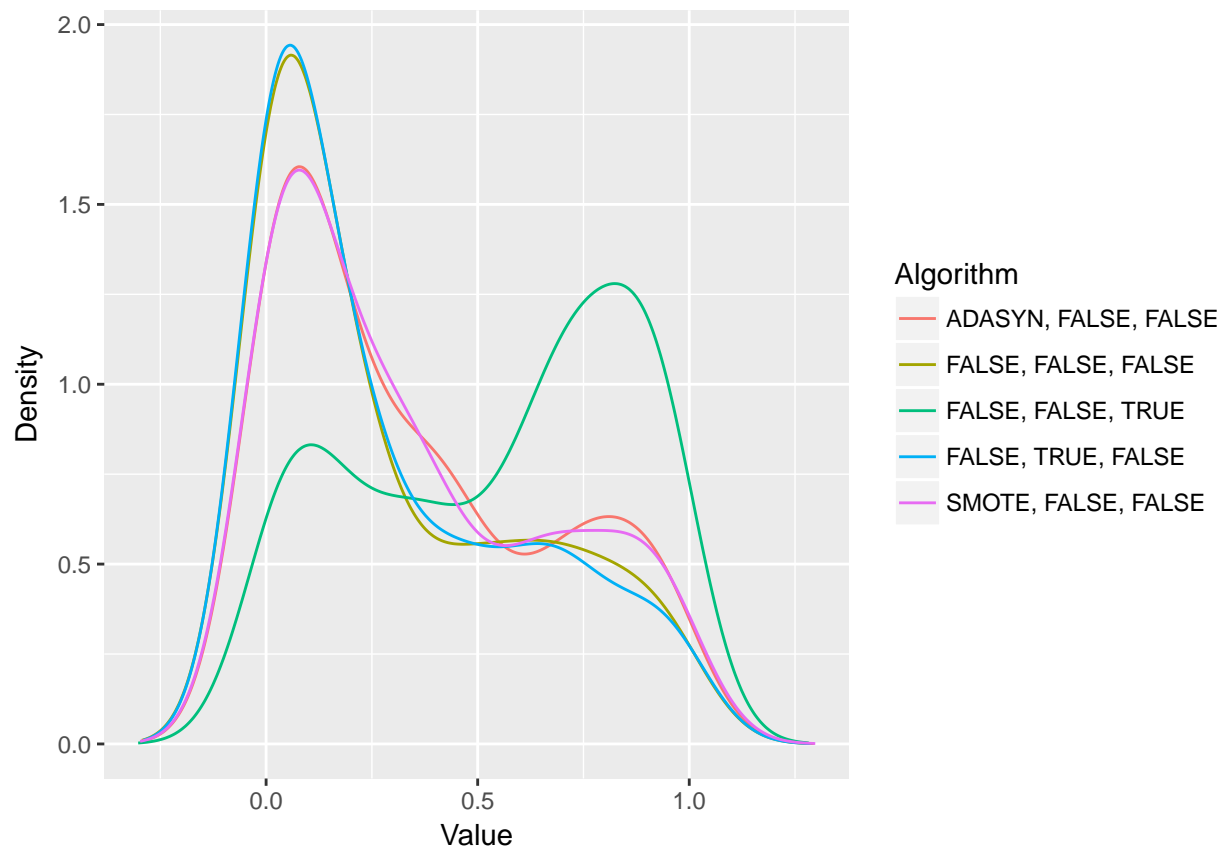
Verificando a média de cada coluna selecionada

```
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 = 0.35351582651326"
## [1] "Media da coluna FALSE, FALSE, FALSE = 0.313633417700381"
## [1] "Media da coluna FALSE, FALSE, TRUE = 0.548211536337494"
## [1] "Media da coluna FALSE, TRUE, FALSE = 0.305931212522305"
## [1] "Media da coluna SMOTE, FALSE, FALSE = 0.351565387843028"
```

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 = 144.15, 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
##           2.919192           3.515152           1.974747
##  FALSE, TRUE, FALSE  SMOTE, FALSE, FALSE
##           3.696970           2.893939
```

Plotando grafico de Critical Diference

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

