R Notebook

Parametros:

Measure = Area under the curve
Columns = sampling, weight_space, underbagging, learner
Performance = holdout_measure_residual
Filter keys = imba.rate
Filter values = 0.03

```r
library("scmamp")
library(dplyr)
```

Tratamento dos dados

Carregando data set compilado

```r
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       cardiotocography-10clases:  900   3rd Qu.:0.0500
##  Max.   :3       cardiotocography-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            :2970   FALSE :1782   FALSE:2376
##  F1 measure                      :   0   SMOTE : 594   TRUE :594
##  G-mean                          :   0                 NA's :0
##  Matthews correlation coefficient:   0
##
##
##  tuning_measure   holdout_measure  holdout_measure_residual
##  Min.   :0.3023   Min.   :0.0000   Min.   :0.00057
##  1st Qu.:0.9338   1st Qu.:0.8603   1st Qu.:0.69645
##  Median :0.9963   Median :0.9835   Median :0.89271
##  Mean   :0.9356   Mean   :0.8947   Mean   :0.82476
##  3rd Qu.:0.9999   3rd Qu.:0.9998   3rd Qu.:0.98444
##  Max.   :1.0000   Max.   :1.0000   Max.   :1.00000
##  NA's   :66       NA's   :66       NA's   :66
##  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   :66      (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$performan

# 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] 66 15
```

```
# Renomeando a variavel
df = df_tec_wide_residual

summary(df)
```

```
##  ADASYN, FALSE, FALSE, classif.ksvm
##  Min.   :0.3781
##  1st Qu.:0.6948
##  Median :0.8653
##  Mean   :0.8100
##  3rd Qu.:0.9695
##  Max.   :0.9996
##  NA's   :3
##  ADASYN, FALSE, FALSE, classif.randomForest
##  Min.   :0.3050
##  1st Qu.:0.7503
##  Median :0.9296
##  Mean   :0.8421
##  3rd Qu.:0.9859
##  Max.   :1.0000
##  NA's   :5
##  ADASYN, FALSE, FALSE, classif.xgboost FALSE, FALSE, FALSE, classif.ksvm
##  Min.   :0.3300                        Min.   :0.3959
##  1st Qu.:0.7225                        1st Qu.:0.6743
##  Median :0.9250                        Median :0.8413
##  Mean   :0.8343                        Mean   :0.8016
##  3rd Qu.:0.9856                        3rd Qu.:0.9681
##  Max.   :1.0000                        Max.   :1.0000
##                                        NA's   :1
##  FALSE, FALSE, FALSE, classif.randomForest
##  Min.   :0.4142
##  1st Qu.:0.7629
##  Median :0.9277
##  Mean   :0.8608
##  3rd Qu.:0.9859
##  Max.   :1.0000
##  NA's   :1
##  FALSE, FALSE, FALSE, classif.xgboost FALSE, FALSE, TRUE, classif.ksvm
##  Min.   :0.3577                       Min.   :0.3864
##  1st Qu.:0.7227                       1st Qu.:0.6189
##  Median :0.9154                       Median :0.7652
##  Mean   :0.8376                       Mean   :0.7626
##  3rd Qu.:0.9738                       3rd Qu.:0.9079
##  Max.   :0.9999                       Max.   :0.9998
##
##  FALSE, FALSE, TRUE, classif.randomForest
##  Min.   :0.2777
##  1st Qu.:0.6945
##  Median :0.8893
##  Mean   :0.8294
##  3rd Qu.:0.9814
##  Max.   :1.0000
##  NA's   :2
##  FALSE, FALSE, TRUE, classif.xgboost FALSE, TRUE, FALSE, classif.ksvm
##  Min.   :0.3213                      Min.   :0.3959
##  1st Qu.:0.6848                      1st Qu.:0.6674
##  Median :0.9062                      Median :0.8352
##  Mean   :0.8205                      Mean   :0.7958
##  3rd Qu.:0.9767                      3rd Qu.:0.9643
##  Max.   :1.0000                      Max.   :1.0000
##                                      NA's   :1
##  FALSE, TRUE, FALSE, classif.randomForest
##  Min.   :0.4384
##  1st Qu.:0.7348
##  Median :0.9029
##  Mean   :0.8482
##  3rd Qu.:0.9821
##  Max.   :1.0000
##  NA's   :4
##  FALSE, TRUE, FALSE, classif.xgboost SMOTE, FALSE, FALSE, classif.ksvm
##  Min.   :0.2916                      Min.   :0.2778
##  1st Qu.:0.7020                      1st Qu.:0.6818
##  Median :0.9231                      Median :0.8352
##  Mean   :0.8375                      Mean   :0.7975
##  3rd Qu.:0.9763                      3rd Qu.:0.9458
##  Max.   :0.9999                      Max.   :1.0000
##                                      NA's   :2
##  SMOTE, FALSE, FALSE, classif.randomForest
##  Min.   :0.3383
##  1st Qu.:0.7537
##  Median :0.9339
##  Mean   :0.8535
##  3rd Qu.:0.9904
##  Max.   :1.0000
##  NA's   :3
##  SMOTE, FALSE, FALSE, classif.xgboost
##  Min.   :0.2896
##  1st Qu.:0.7511
##  Median :0.9021
##  Mean   :0.8424
##  3rd Qu.:0.9827
##  Max.   :1.0000
##
```

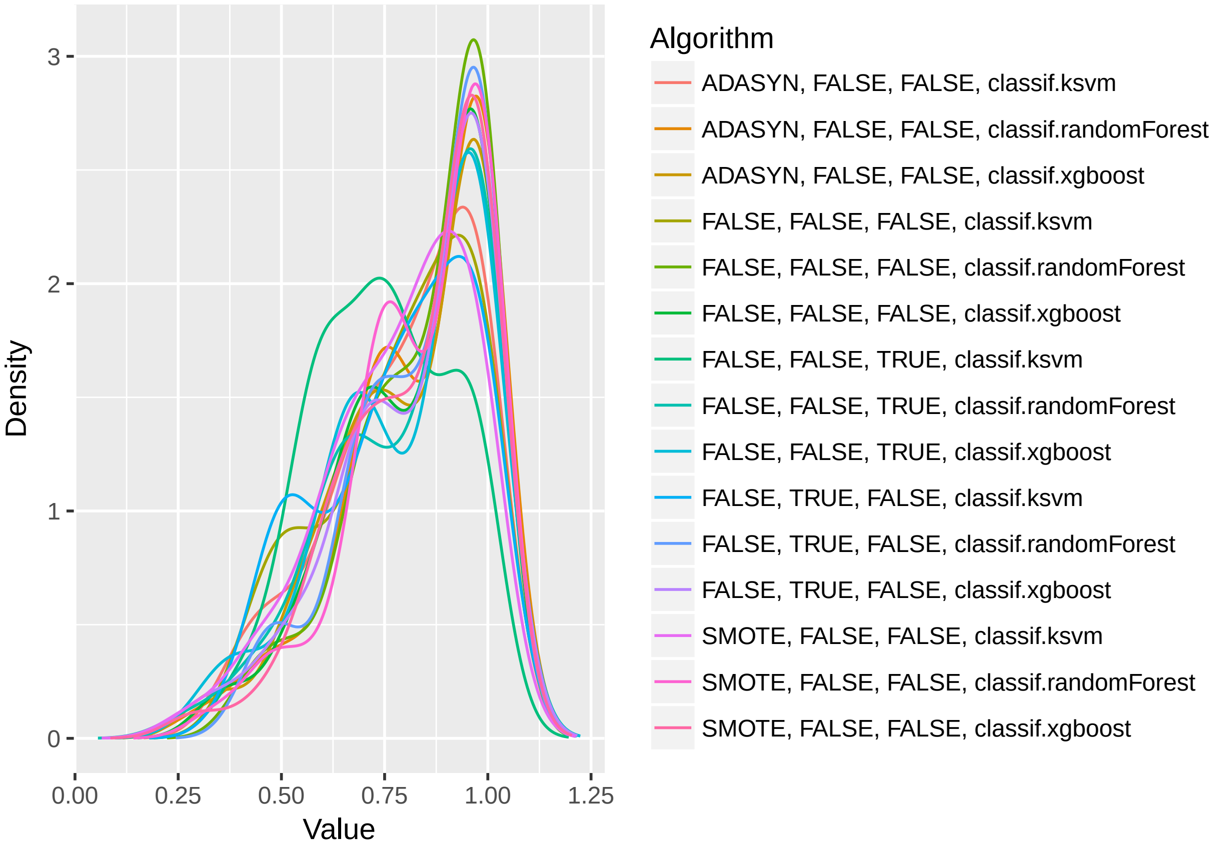
Verificando a média de cada coluna selecionada

```
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, classif.ksvm = 0.81002888811386"
## [1] "Media da coluna ADASYN, FALSE, FALSE, classif.randomForest = 0.842087894930025"
## [1] "Media da coluna ADASYN, FALSE, FALSE, classif.xgboost = 0.834262123965253"
## [1] "Media da coluna FALSE, FALSE, FALSE, classif.ksvm = 0.80164059172482"
## [1] "Media da coluna FALSE, FALSE, FALSE, classif.randomForest = 0.860811237724216"
## [1] "Media da coluna FALSE, FALSE, FALSE, classif.xgboost = 0.837639325782842"
## [1] "Media da coluna FALSE, FALSE, TRUE, classif.ksvm = 0.762625385991208"
## [1] "Media da coluna FALSE, FALSE, TRUE, classif.randomForest = 0.829400812031909"
## [1] "Media da coluna FALSE, FALSE, TRUE, classif.xgboost = 0.820473290301526"
## [1] "Media da coluna FALSE, TRUE, FALSE, classif.ksvm = 0.79582598135536"
## [1] "Media da coluna FALSE, TRUE, FALSE, classif.randomForest = 0.848222541686779"
## [1] "Media da coluna FALSE, TRUE, FALSE, classif.xgboost = 0.837452500301411"
## [1] "Media da coluna SMOTE, FALSE, FALSE, classif.ksvm = 0.797488425998206"
## [1] "Media da coluna SMOTE, FALSE, FALSE, classif.randomForest = 0.85354012036193"
## [1] "Media da coluna SMOTE, FALSE, FALSE, classif.xgboost = 0.842360720807623"
```

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 = 134.15, df = 14, p-value < 2.2e-16
```

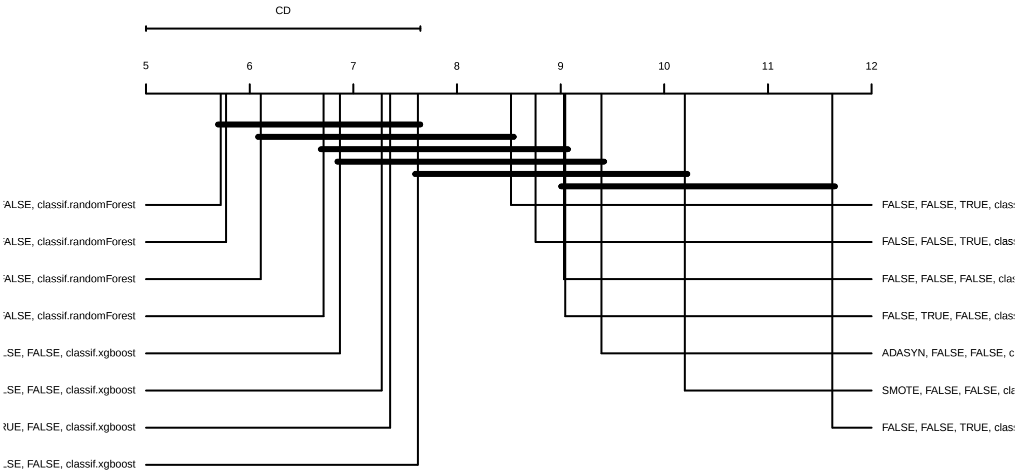
Testando as diferencas par a par

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

```
##       ADASYN, FALSE, FALSE, classif.ksvm
##  [1,]                              FALSE
##  [2,]                               TRUE
##  [3,]                              FALSE
##  [4,]                              FALSE
##  [5,]                               TRUE
##  [6,]                              FALSE
##  [7,]                              FALSE
##  [8,]                              FALSE
##  [9,]                              FALSE
## [10,]                              FALSE
## [11,]                               TRUE
## [12,]                              FALSE
## [13,]                              FALSE
## [14,]                               TRUE
## [15,]                              FALSE
##       ADASYN, FALSE, FALSE, classif.randomForest
##  [1,]                                       TRUE
##  [2,]                                      FALSE
##  [3,]                                      FALSE
##  [4,]                                       TRUE
##  [5,]                                      FALSE
##  [6,]                                      FALSE
##  [7,]                                       TRUE
##  [8,]                                      FALSE
##  [9,]                                       TRUE
## [10,]                                       TRUE
## [11,]                                      FALSE
## [12,]                                      FALSE
## [13,]                                       TRUE
## [14,]                                      FALSE
## [15,]                                      FALSE
##       ADASYN, FALSE, FALSE, classif.xgboost
##  [1,]                                 FALSE
##  [2,]                                 FALSE
##  [3,]                                 FALSE
##  [4,]                                 FALSE
##  [5,]                                 FALSE
##  [6,]                                 FALSE
##  [7,]                                  TRUE
##  [8,]                                 FALSE
##  [9,]                                 FALSE
## [10,]                                 FALSE
## [11,]                                 FALSE
## [12,]                                 FALSE
## [13,]                                  TRUE
## [14,]                                 FALSE
## [15,]                                 FALSE
##       FALSE, FALSE, FALSE, classif.ksvm
##  [1,]                             FALSE
##  [2,]                              TRUE
##  [3,]                             FALSE
##  [4,]                             FALSE
##  [5,]                              TRUE
##  [6,]                             FALSE
##  [7,]                             FALSE
##  [8,]                             FALSE
##  [9,]                             FALSE
## [10,]                             FALSE
## [11,]                             FALSE
## [12,]                             FALSE
## [13,]                             FALSE
## [14,]                              TRUE
## [15,]                             FALSE
##       FALSE, FALSE, FALSE, classif.randomForest
##  [1,]                                      TRUE
##  [2,]                                     FALSE
##  [3,]                                     FALSE
##  [4,]                                      TRUE
##  [5,]                                     FALSE
##  [6,]                                     FALSE
##  [7,]                                      TRUE
##  [8,]                                      TRUE
##  [9,]                                      TRUE
## [10,]                                      TRUE
## [11,]                                     FALSE
## [12,]                                     FALSE
## [13,]                                      TRUE
## [14,]                                     FALSE
## [15,]                                     FALSE
##       FALSE, FALSE, FALSE, classif.xgboost
##  [1,]                                FALSE
##  [2,]                                FALSE
##  [3,]                                FALSE
##  [4,]                                FALSE
##  [5,]                                FALSE
##  [6,]                                FALSE
##  [7,]                                 TRUE
##  [8,]                                FALSE
##  [9,]                                FALSE
## [10,]                                FALSE
## [11,]                                FALSE
## [12,]                                FALSE
## [13,]                                FALSE
## [14,]                                FALSE
## [15,]                                FALSE
##       FALSE, FALSE, TRUE, classif.ksvm
##  [1,]                            FALSE
##  [2,]                             TRUE
##  [3,]                             TRUE
##  [4,]                            FALSE
##  [5,]                             TRUE
##  [6,]                             TRUE
##  [7,]                            FALSE
##  [8,]                             TRUE
##  [9,]                             TRUE
## [10,]                            FALSE
## [11,]                             TRUE
## [12,]                             TRUE
## [13,]                            FALSE
## [14,]                             TRUE
## [15,]                             TRUE
##       FALSE, FALSE, TRUE, classif.randomForest
##  [1,]                                    FALSE
##  [2,]                                    FALSE
##  [3,]                                    FALSE
##  [4,]                                    FALSE
##  [5,]                                     TRUE
##  [6,]                                    FALSE
##  [7,]                                     TRUE
##  [8,]                                    FALSE
##  [9,]                                    FALSE
## [10,]                                    FALSE
## [11,]                                    FALSE
## [12,]                                    FALSE
## [13,]                                    FALSE
## [14,]                                     TRUE
## [15,]                                    FALSE
##       FALSE, FALSE, TRUE, classif.xgboost FALSE, TRUE, FALSE, classif.ksvm
##  [1,]                               FALSE                            FALSE
##  [2,]                                TRUE                             TRUE
##  [3,]                               FALSE                            FALSE
##  [4,]                               FALSE                            FALSE
##  [5,]                                TRUE                             TRUE
##  [6,]                               FALSE                            FALSE
##  [7,]                                TRUE                            FALSE
##  [8,]                               FALSE                            FALSE
##  [9,]                               FALSE                            FALSE
## [10,]                               FALSE                            FALSE
## [11,]                               FALSE                            FALSE
## [12,]                               FALSE                            FALSE
## [13,]                               FALSE                            FALSE
## [14,]                                TRUE                             TRUE
## [15,]                               FALSE                            FALSE
##       FALSE, TRUE, FALSE, classif.randomForest
##  [1,]                                     TRUE
##  [2,]                                    FALSE
##  [3,]                                    FALSE
##  [4,]                                    FALSE
##  [5,]                                    FALSE
##  [6,]                                    FALSE
##  [7,]                                     TRUE
##  [8,]                                    FALSE
##  [9,]                                    FALSE
## [10,]                                    FALSE
## [11,]                                    FALSE
## [12,]                                    FALSE
## [13,]                                     TRUE
## [14,]                                    FALSE
## [15,]                                    FALSE
##       FALSE, TRUE, FALSE, classif.xgboost
##  [1,]                               FALSE
##  [2,]                               FALSE
##  [3,]                               FALSE
##  [4,]                               FALSE
##  [5,]                               FALSE
##  [6,]                               FALSE
##  [7,]                                TRUE
##  [8,]                               FALSE
##  [9,]                               FALSE
## [10,]                               FALSE
## [11,]                               FALSE
## [12,]                               FALSE
## [13,]                                TRUE
## [14,]                               FALSE
## [15,]                               FALSE
##       SMOTE, FALSE, FALSE, classif.ksvm
##  [1,]                             FALSE
##  [2,]                              TRUE
##  [3,]                              TRUE
##  [4,]                             FALSE
##  [5,]                              TRUE
##  [6,]                             FALSE
##  [7,]                             FALSE
##  [8,]                             FALSE
##  [9,]                             FALSE
## [10,]                             FALSE
## [11,]                              TRUE
## [12,]                              TRUE
## [13,]                             FALSE
## [14,]                              TRUE
## [15,]                              TRUE
##       SMOTE, FALSE, FALSE, classif.randomForest
##  [1,]                                      TRUE
##  [2,]                                     FALSE
##  [3,]                                     FALSE
##  [4,]                                      TRUE
##  [5,]                                     FALSE
##  [6,]                                     FALSE
##  [7,]                                      TRUE
##  [8,]                                      TRUE
##  [9,]                                      TRUE
## [10,]                                      TRUE
## [11,]                                     FALSE
## [12,]                                     FALSE
## [13,]                                      TRUE
## [14,]                                     FALSE
## [15,]                                     FALSE
##       SMOTE, FALSE, FALSE, classif.xgboost
##  [1,]                                FALSE
##  [2,]                                FALSE
##  [3,]                                FALSE
##  [4,]                                FALSE
##  [5,]                                FALSE
##  [6,]                                FALSE
##  [7,]                                 TRUE
##  [8,]                                FALSE
##  [9,]                                FALSE
## [10,]                                FALSE
## [11,]                                FALSE
## [12,]                                FALSE
## [13,]                                 TRUE
## [14,]                                FALSE
## [15,]                                FALSE
```

Plotando grafico de Critical Diference

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


CD
ALSE, classif.randomForest
ALSE, classif.randomForest
ALSE, classif.randomForest
ALSE, classif.randomForest
LSE, FALSE, classif.xgboost
LSE, FALSE, classif.xgboost
RUE, FALSE, classif.xgboost
LSE, FALSE, classif.xgboost
FALSE, FALSE, TRUE, clas
FALSE, FALSE, TRUE, clas
FALSE, FALSE, FALSE, clas
FALSE, TRUE, FALSE, clas
ADASYN, FALSE, FALSE, c
SMOTE, FALSE, FALSE, cla
FALSE, FALSE, TRUE, clas