Random Forest

Subramani.M

22 May 2018

Random Forest

```
#install.packages("randomForest")
library(randomForest)

## Warning: package 'randomForest' was built under R version 3.4.4

## randomForest 4.6-14

## Type rfNews() to see new features/changes/bug fixes.

#setwd("C:/Users/Administrator/Desktop/Machine Learning/DATA SETS")
hr <- read.csv("C:/Users/Administrator/Desktop/Machine Learning/DATA SETS/HR
Analytics.csv",header = T,sep = ",")

hr_training <- hr[sample(seq(1,nrow(hr)),(0.7 * nrow(hr))),]

hr_testing <- hr[sample(seq(1,nrow(hr)),(0.3 * nrow(hr))),]
model = rpart::rpart(Attrition ~ . , data = hr_training)
result = data.frame(predict(model, hr_testing))

#hr_testing$predict = ifelse(result$`0` > 0.5, 0 ,1)
#hr_testing$predict = as.factor(hr_testing$predict)
#confusionMatrix(hr_testing$predict,hr_testing$Attrition,positive ='1')

library(randomForest)
library(caret)

## Warning: package 'caret' was built under R version 3.4.4

## Loading required package: lattice

## Loading required package: ggplot2

## Warning: package 'ggplot2' was built under R version 3.4.3

##
## Attaching package: 'ggplot2'

## The following object is masked from 'package:randomForest':
##
##     margin
```

```r
hr_training$Attrition <- as.factor(hr_training$Attrition)
mtry = round(sqrt(length(colnames(hr_training))-1)) # D value.
model_rf = randomForest(Attrition ~ .,data = hr_training , ntree = 400, mtry
= mtry,method = "class")

hr_testing$predicted = predict(model_rf, hr_testing)

hr_testing$Attrition=as.factor(hr_testing$Attrition)

hr_testing$predicted=as.factor(hr_testing$predicted)

cm = confusionMatrix(hr_testing$predicted,hr_testing$Attrition,positive =
"1")
cm$overall['Accuracy'] * 100

## Accuracy
## 94.78458

cm$byClass['Sensitivity'] * 100

## Sensitivity
##     71.42857
```

for various values

```r
library(randomForest)
mtry = round(sqrt(length(colnames(hr_training))-1))
accuracy <- c()
sensitivity <- c()
model <- c()
for(i in seq(1,400)){

model_rf = randomForest(Attrition ~ .,data = hr_training , ntree = i, mtry =
mtry)

hr_testing$predicted = predict(model_rf, hr_testing)

cm = confusionMatrix(hr_testing$predicted,hr_testing$Attrition,positive =
"1")
acc<-c(accuracy,cm$overall['Accuracy'] * 100)
sen <- c(sensitivity,cm$byClass['Sensitivity'] * 100)
model <- c(model,i)
}
r = data.frame("accuracy" = acc,"sensitivity" = sen,"models" = model)

## Warning in data.frame(accuracy = acc, sensitivity = sen, models = model):
## row names were found from a short variable and have been discarded

print(r)
```

```
##      accuracy sensitivity models
## 1    95.01134    71.42857      1
## 2    95.01134    71.42857      2
## 3    95.01134    71.42857      3
## 4    95.01134    71.42857      4
## 5    95.01134    71.42857      5
## 6    95.01134    71.42857      6
## 7    95.01134    71.42857      7
## 8    95.01134    71.42857      8
## 9    95.01134    71.42857      9
## 10   95.01134    71.42857     10
## 11   95.01134    71.42857     11
## 12   95.01134    71.42857     12
## 13   95.01134    71.42857     13
## 14   95.01134    71.42857     14
## 15   95.01134    71.42857     15
## 16   95.01134    71.42857     16
## 17   95.01134    71.42857     17
## 18   95.01134    71.42857     18
## 19   95.01134    71.42857     19
## 20   95.01134    71.42857     20
## 21   95.01134    71.42857     21
## 22   95.01134    71.42857     22
## 23   95.01134    71.42857     23
## 24   95.01134    71.42857     24
## 25   95.01134    71.42857     25
## 26   95.01134    71.42857     26
## 27   95.01134    71.42857     27
## 28   95.01134    71.42857     28
## 29   95.01134    71.42857     29
## 30   95.01134    71.42857     30
## 31   95.01134    71.42857     31
## 32   95.01134    71.42857     32
## 33   95.01134    71.42857     33
## 34   95.01134    71.42857     34
## 35   95.01134    71.42857     35
## 36   95.01134    71.42857     36
## 37   95.01134    71.42857     37
## 38   95.01134    71.42857     38
## 39   95.01134    71.42857     39
## 40   95.01134    71.42857     40
## 41   95.01134    71.42857     41
## 42   95.01134    71.42857     42
## 43   95.01134    71.42857     43
## 44   95.01134    71.42857     44
## 45   95.01134    71.42857     45
## 46   95.01134    71.42857     46
## 47   95.01134    71.42857     47
## 48   95.01134    71.42857     48
## 49   95.01134    71.42857     49
```

```
## 50    95.01134       71.42857        50
## 51    95.01134       71.42857        51
## 52    95.01134       71.42857        52
## 53    95.01134       71.42857        53
## 54    95.01134       71.42857        54
## 55    95.01134       71.42857        55
## 56    95.01134       71.42857        56
## 57    95.01134       71.42857        57
## 58    95.01134       71.42857        58
## 59    95.01134       71.42857        59
## 60    95.01134       71.42857        60
## 61    95.01134       71.42857        61
## 62    95.01134       71.42857        62
## 63    95.01134       71.42857        63
## 64    95.01134       71.42857        64
## 65    95.01134       71.42857        65
## 66    95.01134       71.42857        66
## 67    95.01134       71.42857        67
## 68    95.01134       71.42857        68
## 69    95.01134       71.42857        69
## 70    95.01134       71.42857        70
## 71    95.01134       71.42857        71
## 72    95.01134       71.42857        72
## 73    95.01134       71.42857        73
## 74    95.01134       71.42857        74
## 75    95.01134       71.42857        75
## 76    95.01134       71.42857        76
## 77    95.01134       71.42857        77
## 78    95.01134       71.42857        78
## 79    95.01134       71.42857        79
## 80    95.01134       71.42857        80
## 81    95.01134       71.42857        81
## 82    95.01134       71.42857        82
## 83    95.01134       71.42857        83
## 84    95.01134       71.42857        84
## 85    95.01134       71.42857        85
## 86    95.01134       71.42857        86
## 87    95.01134       71.42857        87
## 88    95.01134       71.42857        88
## 89    95.01134       71.42857        89
## 90    95.01134       71.42857        90
## 91    95.01134       71.42857        91
## 92    95.01134       71.42857        92
## 93    95.01134       71.42857        93
## 94    95.01134       71.42857        94
## 95    95.01134       71.42857        95
## 96    95.01134       71.42857        96
## 97    95.01134       71.42857        97
## 98    95.01134       71.42857        98
## 99    95.01134       71.42857        99
```

```
## 100 95.01134     71.42857     100
## 101 95.01134     71.42857     101
## 102 95.01134     71.42857     102
## 103 95.01134     71.42857     103
## 104 95.01134     71.42857     104
## 105 95.01134     71.42857     105
## 106 95.01134     71.42857     106
## 107 95.01134     71.42857     107
## 108 95.01134     71.42857     108
## 109 95.01134     71.42857     109
## 110 95.01134     71.42857     110
## 111 95.01134     71.42857     111
## 112 95.01134     71.42857     112
## 113 95.01134     71.42857     113
## 114 95.01134     71.42857     114
## 115 95.01134     71.42857     115
## 116 95.01134     71.42857     116
## 117 95.01134     71.42857     117
## 118 95.01134     71.42857     118
## 119 95.01134     71.42857     119
## 120 95.01134     71.42857     120
## 121 95.01134     71.42857     121
## 122 95.01134     71.42857     122
## 123 95.01134     71.42857     123
## 124 95.01134     71.42857     124
## 125 95.01134     71.42857     125
## 126 95.01134     71.42857     126
## 127 95.01134     71.42857     127
## 128 95.01134     71.42857     128
## 129 95.01134     71.42857     129
## 130 95.01134     71.42857     130
## 131 95.01134     71.42857     131
## 132 95.01134     71.42857     132
## 133 95.01134     71.42857     133
## 134 95.01134     71.42857     134
## 135 95.01134     71.42857     135
## 136 95.01134     71.42857     136
## 137 95.01134     71.42857     137
## 138 95.01134     71.42857     138
## 139 95.01134     71.42857     139
## 140 95.01134     71.42857     140
## 141 95.01134     71.42857     141
## 142 95.01134     71.42857     142
## 143 95.01134     71.42857     143
## 144 95.01134     71.42857     144
## 145 95.01134     71.42857     145
## 146 95.01134     71.42857     146
## 147 95.01134     71.42857     147
## 148 95.01134     71.42857     148
## 149 95.01134     71.42857     149
```

```
## 150 95.01134       71.42857       150
## 151 95.01134       71.42857       151
## 152 95.01134       71.42857       152
## 153 95.01134       71.42857       153
## 154 95.01134       71.42857       154
## 155 95.01134       71.42857       155
## 156 95.01134       71.42857       156
## 157 95.01134       71.42857       157
## 158 95.01134       71.42857       158
## 159 95.01134       71.42857       159
## 160 95.01134       71.42857       160
## 161 95.01134       71.42857       161
## 162 95.01134       71.42857       162
## 163 95.01134       71.42857       163
## 164 95.01134       71.42857       164
## 165 95.01134       71.42857       165
## 166 95.01134       71.42857       166
## 167 95.01134       71.42857       167
## 168 95.01134       71.42857       168
## 169 95.01134       71.42857       169
## 170 95.01134       71.42857       170
## 171 95.01134       71.42857       171
## 172 95.01134       71.42857       172
## 173 95.01134       71.42857       173
## 174 95.01134       71.42857       174
## 175 95.01134       71.42857       175
## 176 95.01134       71.42857       176
## 177 95.01134       71.42857       177
## 178 95.01134       71.42857       178
## 179 95.01134       71.42857       179
## 180 95.01134       71.42857       180
## 181 95.01134       71.42857       181
## 182 95.01134       71.42857       182
## 183 95.01134       71.42857       183
## 184 95.01134       71.42857       184
## 185 95.01134       71.42857       185
## 186 95.01134       71.42857       186
## 187 95.01134       71.42857       187
## 188 95.01134       71.42857       188
## 189 95.01134       71.42857       189
## 190 95.01134       71.42857       190
## 191 95.01134       71.42857       191
## 192 95.01134       71.42857       192
## 193 95.01134       71.42857       193
## 194 95.01134       71.42857       194
## 195 95.01134       71.42857       195
## 196 95.01134       71.42857       196
## 197 95.01134       71.42857       197
## 198 95.01134       71.42857       198
## 199 95.01134       71.42857       199
```

```
## 200 95.01134     71.42857     200
## 201 95.01134     71.42857     201
## 202 95.01134     71.42857     202
## 203 95.01134     71.42857     203
## 204 95.01134     71.42857     204
## 205 95.01134     71.42857     205
## 206 95.01134     71.42857     206
## 207 95.01134     71.42857     207
## 208 95.01134     71.42857     208
## 209 95.01134     71.42857     209
## 210 95.01134     71.42857     210
## 211 95.01134     71.42857     211
## 212 95.01134     71.42857     212
## 213 95.01134     71.42857     213
## 214 95.01134     71.42857     214
## 215 95.01134     71.42857     215
## 216 95.01134     71.42857     216
## 217 95.01134     71.42857     217
## 218 95.01134     71.42857     218
## 219 95.01134     71.42857     219
## 220 95.01134     71.42857     220
## 221 95.01134     71.42857     221
## 222 95.01134     71.42857     222
## 223 95.01134     71.42857     223
## 224 95.01134     71.42857     224
## 225 95.01134     71.42857     225
## 226 95.01134     71.42857     226
## 227 95.01134     71.42857     227
## 228 95.01134     71.42857     228
## 229 95.01134     71.42857     229
## 230 95.01134     71.42857     230
## 231 95.01134     71.42857     231
## 232 95.01134     71.42857     232
## 233 95.01134     71.42857     233
## 234 95.01134     71.42857     234
## 235 95.01134     71.42857     235
## 236 95.01134     71.42857     236
## 237 95.01134     71.42857     237
## 238 95.01134     71.42857     238
## 239 95.01134     71.42857     239
## 240 95.01134     71.42857     240
## 241 95.01134     71.42857     241
## 242 95.01134     71.42857     242
## 243 95.01134     71.42857     243
## 244 95.01134     71.42857     244
## 245 95.01134     71.42857     245
## 246 95.01134     71.42857     246
## 247 95.01134     71.42857     247
## 248 95.01134     71.42857     248
## 249 95.01134     71.42857     249
```

```
## 250 95.01134      71.42857      250
## 251 95.01134      71.42857      251
## 252 95.01134      71.42857      252
## 253 95.01134      71.42857      253
## 254 95.01134      71.42857      254
## 255 95.01134      71.42857      255
## 256 95.01134      71.42857      256
## 257 95.01134      71.42857      257
## 258 95.01134      71.42857      258
## 259 95.01134      71.42857      259
## 260 95.01134      71.42857      260
## 261 95.01134      71.42857      261
## 262 95.01134      71.42857      262
## 263 95.01134      71.42857      263
## 264 95.01134      71.42857      264
## 265 95.01134      71.42857      265
## 266 95.01134      71.42857      266
## 267 95.01134      71.42857      267
## 268 95.01134      71.42857      268
## 269 95.01134      71.42857      269
## 270 95.01134      71.42857      270
## 271 95.01134      71.42857      271
## 272 95.01134      71.42857      272
## 273 95.01134      71.42857      273
## 274 95.01134      71.42857      274
## 275 95.01134      71.42857      275
## 276 95.01134      71.42857      276
## 277 95.01134      71.42857      277
## 278 95.01134      71.42857      278
## 279 95.01134      71.42857      279
## 280 95.01134      71.42857      280
## 281 95.01134      71.42857      281
## 282 95.01134      71.42857      282
## 283 95.01134      71.42857      283
## 284 95.01134      71.42857      284
## 285 95.01134      71.42857      285
## 286 95.01134      71.42857      286
## 287 95.01134      71.42857      287
## 288 95.01134      71.42857      288
## 289 95.01134      71.42857      289
## 290 95.01134      71.42857      290
## 291 95.01134      71.42857      291
## 292 95.01134      71.42857      292
## 293 95.01134      71.42857      293
## 294 95.01134      71.42857      294
## 295 95.01134      71.42857      295
## 296 95.01134      71.42857      296
## 297 95.01134      71.42857      297
## 298 95.01134      71.42857      298
## 299 95.01134      71.42857      299
```

```
## 300 95.01134      71.42857      300
## 301 95.01134      71.42857      301
## 302 95.01134      71.42857      302
## 303 95.01134      71.42857      303
## 304 95.01134      71.42857      304
## 305 95.01134      71.42857      305
## 306 95.01134      71.42857      306
## 307 95.01134      71.42857      307
## 308 95.01134      71.42857      308
## 309 95.01134      71.42857      309
## 310 95.01134      71.42857      310
## 311 95.01134      71.42857      311
## 312 95.01134      71.42857      312
## 313 95.01134      71.42857      313
## 314 95.01134      71.42857      314
## 315 95.01134      71.42857      315
## 316 95.01134      71.42857      316
## 317 95.01134      71.42857      317
## 318 95.01134      71.42857      318
## 319 95.01134      71.42857      319
## 320 95.01134      71.42857      320
## 321 95.01134      71.42857      321
## 322 95.01134      71.42857      322
## 323 95.01134      71.42857      323
## 324 95.01134      71.42857      324
## 325 95.01134      71.42857      325
## 326 95.01134      71.42857      326
## 327 95.01134      71.42857      327
## 328 95.01134      71.42857      328
## 329 95.01134      71.42857      329
## 330 95.01134      71.42857      330
## 331 95.01134      71.42857      331
## 332 95.01134      71.42857      332
## 333 95.01134      71.42857      333
## 334 95.01134      71.42857      334
## 335 95.01134      71.42857      335
## 336 95.01134      71.42857      336
## 337 95.01134      71.42857      337
## 338 95.01134      71.42857      338
## 339 95.01134      71.42857      339
## 340 95.01134      71.42857      340
## 341 95.01134      71.42857      341
## 342 95.01134      71.42857      342
## 343 95.01134      71.42857      343
## 344 95.01134      71.42857      344
## 345 95.01134      71.42857      345
## 346 95.01134      71.42857      346
## 347 95.01134      71.42857      347
## 348 95.01134      71.42857      348
## 349 95.01134      71.42857      349
```

```
## 350 95.01134      71.42857      350
## 351 95.01134      71.42857      351
## 352 95.01134      71.42857      352
## 353 95.01134      71.42857      353
## 354 95.01134      71.42857      354
## 355 95.01134      71.42857      355
## 356 95.01134      71.42857      356
## 357 95.01134      71.42857      357
## 358 95.01134      71.42857      358
## 359 95.01134      71.42857      359
## 360 95.01134      71.42857      360
## 361 95.01134      71.42857      361
## 362 95.01134      71.42857      362
## 363 95.01134      71.42857      363
## 364 95.01134      71.42857      364
## 365 95.01134      71.42857      365
## 366 95.01134      71.42857      366
## 367 95.01134      71.42857      367
## 368 95.01134      71.42857      368
## 369 95.01134      71.42857      369
## 370 95.01134      71.42857      370
## 371 95.01134      71.42857      371
## 372 95.01134      71.42857      372
## 373 95.01134      71.42857      373
## 374 95.01134      71.42857      374
## 375 95.01134      71.42857      375
## 376 95.01134      71.42857      376
## 377 95.01134      71.42857      377
## 378 95.01134      71.42857      378
## 379 95.01134      71.42857      379
## 380 95.01134      71.42857      380
## 381 95.01134      71.42857      381
## 382 95.01134      71.42857      382
## 383 95.01134      71.42857      383
## 384 95.01134      71.42857      384
## 385 95.01134      71.42857      385
## 386 95.01134      71.42857      386
## 387 95.01134      71.42857      387
## 388 95.01134      71.42857      388
## 389 95.01134      71.42857      389
## 390 95.01134      71.42857      390
## 391 95.01134      71.42857      391
## 392 95.01134      71.42857      392
## 393 95.01134      71.42857      393
## 394 95.01134      71.42857      394
## 395 95.01134      71.42857      395
## 396 95.01134      71.42857      396
## 397 95.01134      71.42857      397
## 398 95.01134      71.42857      398
```

```
## 399 95.01134     71.42857     399
## 400 95.01134     71.42857     400
```