Project 2 notebook

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Dataset – Teaching Assistant Evaluation

http://archive.ics.uci.edu/ml/datasets/Teaching+Assistant+Evaluation

```
#Meenakshi Nagarajan
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library("dplyr")

##
## Attaching package: 'dplyr'

## The following objects are masked from 'package:stats':
##
##     filter, lag

## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union

#Load the data into 'mydata'
mydata=read.csv(file="/Users/meenakshinagarajan/Desktop/Datamining/Teaching_A
ssistant_Evaluation.csv",head=TRUE,sep=",")
head(mydata)

##   Typeofspeaker CourseInstructor Course TypeofSemester ClassSize
## 1             1              23      3              1        19
## 2             2              15      3              1        17
## 3             1              23      3              2        49
## 4             1               5      2              2        33
## 5             2               7     11              2        55
## 6             2              23      3              1        20
##   ClassAttribute
## 1              3
## 2              3
## 3              3
## 4              3
## 5              3
## 6              3
```

Background of data

The dataset used in this study is obtained from the UCI Machine learning repository. (http://archive.ics.uci.edu/ml/datasets.html). It consists of teaching performance evaluation of 151 teaching assistant assignments at statistics department of University of Wisconsin-Madison. The output classs attribute is divinded into three categories namely, low (1), medium(2) and high(3).

Dataset Characteristics: Multivariate

Attribute characteristics: Categorical, integer

Date Donated: 1997/ 06/07

Number of instances: 151

Number of Attributes: 5

Missing values: None

Attributes

Type of speaker: 1 = English speaker 2= Non-English speaker

Course Instructor: It is divided into 25 categories

Course: The course that is being taught is divided into 26 categories

Type of semester : Summer or regular semester. 1= Summer 2= Regular

Class size: Number of students in a class. It is a numerical value.

ClassAttribute: Performance measure of TA. 1 = Low 2= Medium 3= High

Converting numerics to factors

```
mydata$ClassAttribute <- factor(mydata$ClassAttribute, levels=sort(unique(myd
ata$ClassAttribute)))
mydata$Typeofspeaker<- factor(mydata$Typeofspeaker, levels=sort(unique(mydata
$Typeofspeaker)))
mydata$CourseInstructor<- factor(mydata$CourseInstructor, levels=sort(unique(
mydata$CourseInstructor)))
mydata$Course<- factor(mydata$Course, levels=sort(unique(mydata$Course)))
mydata$TypeofSemester<- factor(mydata$TypeofSemester, levels=sort(unique(myda
ta$TypeofSemester)))
#structure of data
str(mydata)
```

```
## 'data.frame':    151 obs. of  6 variables:
##  $ Typeofspeaker   : Factor w/ 2 levels "1","2": 1 2 1 1 2 2 2 2 1 2 ...
```

```
##  $ CourseInstructor: Factor w/ 25 levels "1","2","3","4",..: 23 15 23 5 7
23 9 10 22 15 ...
##  $ Course          : Factor w/ 26 levels "1","2","3","4",..: 3 3 3 2 11 3
5 3 3 3 ...
##  $ TypeofSemester  : Factor w/ 2 levels "1","2": 1 1 2 2 2 1 2 2 1 1 ...
##  $ ClassSize       : int  19 17 49 33 55 20 19 27 58 20 ...
##  $ ClassAttribute  : Factor w/ 3 levels "1","2","3": 3 3 3 3 3 3 3 3 3 3 .
..
```

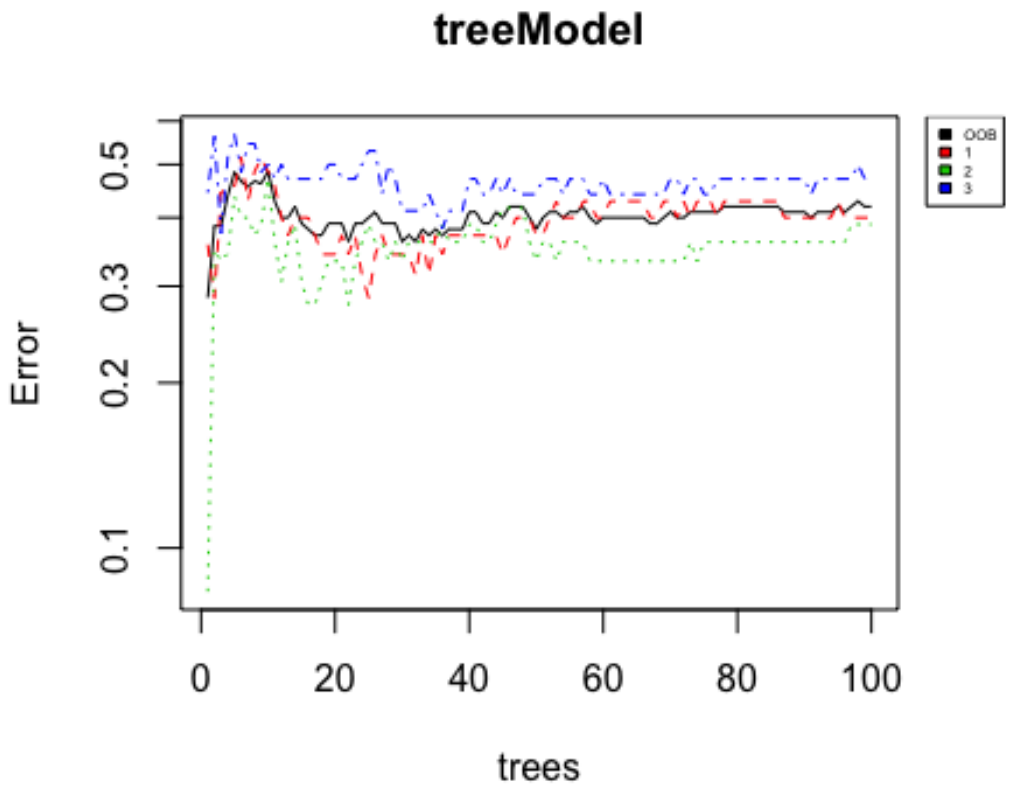
Creating training and testing data

```
set.seed(100)
#70-30 split
trainingData <- sample(1:nrow(mydata), 0.7*nrow(mydata))
training <- mydata[trainingData, ]
test <- mydata[-trainingData, ]
```

Build and test a Model using RandomForest approach

```
library(randomForest)

## randomForest 4.6-12

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

##
## Attaching package: 'randomForest'

## The following object is masked from 'package:dplyr':
##
##     combine

myModel = ClassAttribute ~ .
treeModel <- randomForest(myModel, data=training, ntree=100, proximity=TRUE,l
og="y")
print(treeModel)

##
## Call:
##  randomForest(formula = myModel, data = training, ntree = 100,      proxim
ity = TRUE, log = "y")
##                Type of random forest: classification
##                      Number of trees: 100
## No. of variables tried at each split: 2
##
##         OOB estimate of  error rate: 41.9%
## Confusion matrix:
##    1  2  3 class.error
## 1 21  7  7   0.4000000
```

```
## 2  9 22  5   0.3888889
## 3  8  8 18   0.4705882

layout(matrix(c(1,2),nrow=1),
       width=c(4,1))
#No margin on the right side
par(mar=c(5,4,4,0))

#Overall error of the model
plot(treeModel, log="y")
#No margin on the left side
par(mar=c(5,0,4,2))
plot(c(0,1),type="n", axes=F, xlab="", ylab="")
#Adding legend
legend("top", colnames(treeModel$err.rate),col=1:4,cex=0.4,fill=1:4)
```



Predict on test data

```
predClass <- predict(treeModel,newdata=test)
#confusion matrix
table(predClass, test$ClassAttribute)
```

```
##
## predClass  1  2  3
##         1  8  6  2
##         2  2  4  3
##         3  4  4 13
```

```
cat("MisClassification Error Rate:",mean(as.character(predClass) != as.charac
ter(test$ClassAttribute)))
```

```
## MisClassification Error Rate: 0.4565217
```

A misclassification error of 45.6% is high. It could be improved by changing the model terms.