## Lab06

```r
library(ISLR)

#install.packages("tree")
library(tree)
attach(Carseats)
High=ifelse(Sales <=8,"No","Yes")

Carseats =data.frame(Carseats ,High)
tree.carseats =tree(High~.-Sales , Carseats)

summary(tree.carseats)
plot(tree.carseats)
text(tree.carseats ,pretty = 0)

tree.carseats

set.seed(2)
train=sample (1: nrow(Carseats ), 200)
Carseats.test=Carseats [-train ,]
High.test=High[-train]
tree.carseats =tree(High~.-Sales , Carseats ,subset=train)
tree.pred=predict(tree.carseats, Carseats.test, type="class")
table(tree.pred, High.test)
(86+57) /200

set.seed(3)
cv.carseats = cv.tree(tree.carseats, FUN = prune.misclass)
names(cv.carseats)

par(mfrow=c(1,2))
plot(cv.carseats$size, cv.carseats$dev, type = "b")
plot(cv.carseats$k, cv.carseats$dev, type = "b")

prune.carseats = prune.misclass(tree.carseats, best = 9)
plot(prune.carseats)
text(prune.carseats, pretty = 0)

prune.carseats = prune.misclass (tree.carseats, best = 15)
plot(prune.carseats)
text(prune.carseats, pretty = 0)
tree.pred = predict(prune.carseats, Carseats.test, type = "class")
table(tree.pred, High.test)
(86+62) /200
```

```r
library(MASS)
set.seed(1)
train = sample(1 : nrow(Boston), nrow(Boston) / 2)
tree.boston = tree(medv~., Boston, subset = train)
summary(tree.boston)

plot(tree.boston)
text(tree.boston, pretty = 0)

cv.boston = cv.tree(tree.boston)
plot(cv.boston$size, cv.boston$dev, type = 'b')

prune.boston = prune.tree(tree.boston, best = 5)
plot(prune.boston)
text(prune.boston , pretty = 0)

yhat = predict(tree.boston, newdata=Boston[-train ,])
boston.test = Boston[-train, "medv"]
plot(yhat, boston.test)
abline(0, 1)
mean((yhat -boston.test) ^ 2)
```

## Exercise06

```r
library(ISLR)
attach(Carseats)

#(a) Split the data set into a training set and a test set.
set.seed(401) #Yeah, like the error.
training = sample(nrow(Carseats), nrow(Carseats) / 2)
Carseats.training = Carseats[training, ]
Carseats.test = Carseats[-training, ]


#(b) Fit a regression tree to the training set.
#    Plot the tree, and interpret the results.
#    What test MSE do you obtain?
library(tree)
tree.carseats = tree(Sales ~ ., data = Carseats.training)
summary(tree.carseats)
```

```
Regression tree:
tree(formula = Sales ~ ., data = Carseats.training)
Variables actually used in tree construction:
[1] "High"      "ShelveLoc" "CompPrice" "Income"      "Price"      "Age"
Number of terminal nodes:  10
Residual mean deviance:  1.733 = 329.3 / 190
Distribution of residuals:
    Min.   1st Qu.   Median      Mean   3rd Qu.      Max.
-3.38400 -0.84320 -0.04009  0.00000  1.03700  3.28600
```

```r
plot(tree.carseats)
text(tree.carseats, pretty = 0, cex = 0.5)
```
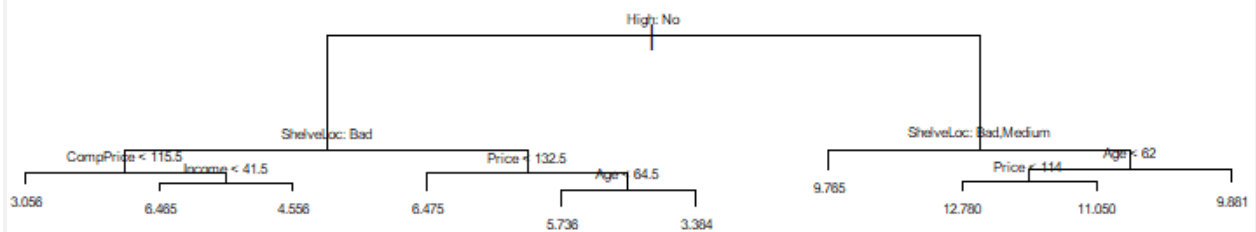


```r
pred.carseats = predict(tree.carseats, Carseats.test)
mean((Carseats.test$Sales - pred.carseats) ^ 2) #MSE obtained of [1] 2.916513
```

MSE of 2.917