Car price prediction Ridge regression

Load the dataset

```
load("rda/carPrice.rda")
head(carPrice)
```

```
##   symboling  carCompany fueltype aspiration doornumber     carbody
## 1         3 alfa-romero      gas        std        two convertible
## 2         3 alfa-romero      gas        std        two convertible
## 3         1 alfa-romero      gas        std        two   hatchback
## 4         2        audi      gas        std       four       sedan
## 5         2        audi      gas        std       four       sedan
## 6         2        audi      gas        std        two       sedan
##   drivewheel enginelocation wheelbase carlength carwidth carheight
## 1        rwd          front      88.6     168.8     64.1      48.8
## 2        rwd          front      88.6     168.8     64.1      48.8
## 3        rwd          front      94.5     171.2     65.5      52.4
## 4        fwd          front      99.8     176.6     66.2      54.3
## 5        4wd          front      99.4     176.6     66.4      54.3
## 6        fwd          front      99.8     177.3     66.3      53.1
##   curbweight enginetype cylindernumber enginesize fuelsystem boreratio
## 1       2548       dohc           four        130       mpfi      3.47
## 2       2548       dohc           four        130       mpfi      3.47
## 3       2823       ohcv            six        152       mpfi      2.68
## 4       2337        ohc           four        109       mpfi      3.19
## 5       2824        ohc           five        136       mpfi      3.19
## 6       2507        ohc           five        136       mpfi      3.19
##   stroke compressionratio horsepower peakrpm citympg highwaympg price
## 1   2.68             9.0        111    5000      21         27 13495
## 2   2.68             9.0        111    5000      21         27 16500
## 3   3.47             9.0        154    5000      19         26 16500
## 4   3.40            10.0        102    5500      24         30 13950
## 5   3.40             8.0        115    5500      18         22 17450
## 6   3.40             8.5        110    5500      19         25 15250
```

Create a matrix "x" of all independent variables and store dependent variable in "y".

```
x <- model.matrix(price~.,data=carPrice)[,-1]
y <-carPrice$price
```

Divide you data in 70:30

```
set.seed(1)
train= sample(1:nrow(x), 0.7*nrow(x))
```

Store indices into test which is not present in train

```
test = (-train)
```

Dependend variable for test data

```
y.test = y[test]
```

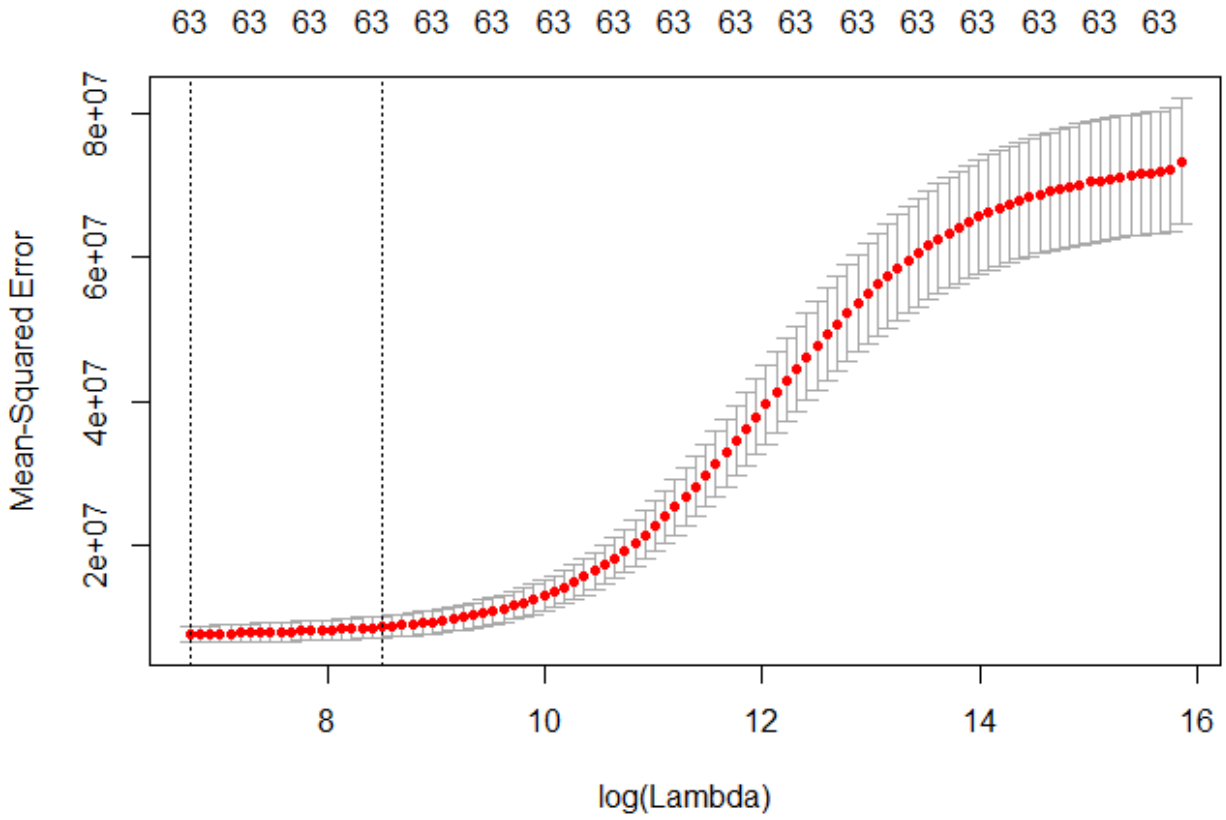
library(glmnet)

Cross Validation to find lambda values

```
cv.out <- cv.glmnet(x[train,],y[train],alpha=0)
```

Plot crossvalidation output.

```
plot(cv.out)
```



Optimal lamda

```
minlamda <- cv.out$lambda.min
minlamda
```

```
## [1] 843.3589
```

Apply model on train dataset at lambda equal to minlamda

```
ridge.mod <- glmnet(x[train,],y[train],alpha=0,lambda =minlamda)
```

Prediction on test dataset

```
ridge.pred <- predict(ridge.mod,s=minlamda,newx=x[test,])
```

MSE with ridge

```
mean((ridge.pred-y.test)^2)
```

```
## [1] 4530257
```

Apply model on train dataset at lambda equal to zero, LR without regularisation

```
ridge.mod <- glmnet(x[train,],y[train],alpha=0,lambda = 0)
```

Linear Regression model

```
ridge.pred_0 <- predict(ridge.mod,s=0,newx=x[test,])
```

MSE Linear regression model

```
mean((ridge.pred_0-y.test)^2)
```

```
## [1] 9109487
```

Final model Coefficents

```
ridge_coef <-predict(ridge.mod,type="coefficients",s=minlamda)
ridge_coef
```

```
## 65 x 1 sparse Matrix of class "dgCMatrix"
##                                      1
## (Intercept)             -24479.530053
## symboling                  -578.543774
## carCompanyaudi           -2107.913688
## carCompanybmw            -1512.595816
## carCompanychevrolet      -7280.065593
## carCompanydodge          -9730.762739
## carCompanyhonda          -7739.243955
## carCompanyisuzu          -7905.564590
## carCompanyjaguar        -10738.379301
## carCompanymazda          -5798.662698
## carCompanymercedes-benz  -3764.909963
## carCompanymercury        -7531.316245
## carCompanymitsubishi    -11111.328104
## carCompanynissan         -5960.492645
## carCompanypeugot          -3041.205885
```

```
## carCompanypeugot          3041.205885
## carCompanyplymouth       -9734.484267
## carCompanyporsche        -3977.113627
## carCompanyrenault        -8651.222095
## carCompanysaab           -3761.521144
## carCompanysubaru         -7867.273309
## carCompanytoyota         -7019.007831
## carCompanyvolkswagen     -5742.988582
## carCompanyvolvo         -10814.536590
## fueltypegas              -3854.842146
## aspirationturbo           1955.366071
## doornumbertwo               84.388667
## carbodyhardtop            1010.926758
## carbodyhatchback         -1049.195932
## carbodysedan               153.025389
## carbodywagon              -313.456811
## drivewheelfwd              672.885128
## drivewheelrwd             1517.490883
## enginelocationrear        7067.088321

## wheelbase                  168.389981
## carlength                 -235.739118
## carwidth                   692.849229
## carheight                 -382.203313
## curbweight                  12.329593
## enginetypedohcv          -1696.380604
## enginetypel             -11088.330652
## enginetypeohc             4204.618489
## enginetypeohcf            5043.990541
## enginetypeohcv           -5228.881614
## enginetyperotor            994.975003
## cylindernumberfive      -10279.214109
## cylindernumberfour       -4037.561917
## cylindernumbersix        -3679.622531
## cylindernumberthree      16764.096801
## cylindernumbertwelve     -5223.155843
## cylindernumbertwo        -3972.634190
## enginesize                 123.763043
## fuelsystem2bbl            2446.692968
## fuelsystem4bbl            8424.729785
## fuelsystemidi            -1210.373720
## fuelsystemmfi                   .
## fuelsystemmpfi            1769.626971
## fuelsystemspdi            1829.142723
## fuelsystemspfi            -385.507867
## boreratio                -3172.831777
## stroke                   -1721.849098
## compressionratio          -183.046086
## horsepower                 -41.937872
## peakrpm                      3.569884
## citympg                     47.749249
## highwaympg                  54.362042
```