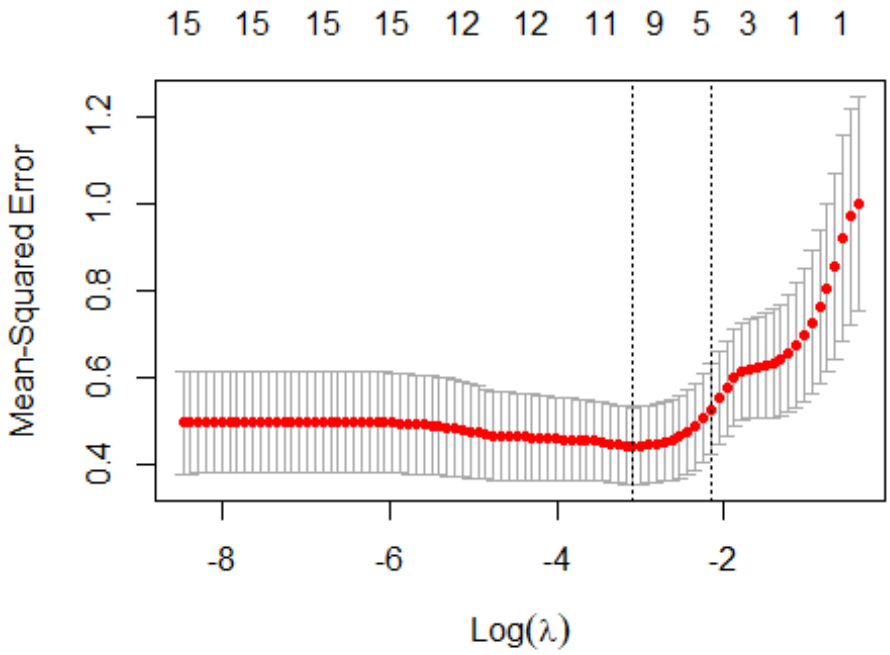
hw8.R

2021-10-20

```
library(MASS)
library(glmnet)

## Loading required package: Matrix

## Loaded glmnet 4.1-2

setwd("C:/Users/Muhammad/ISYE/hw8")
data <- read.table("uscrime.txt", stringsAsFactors = FALSE, header = TRUE)

#Q11.1 1:

reg1 <- lm(Crime ~., data = data)

#Training for stepwise regression, validation through AIC
stepwise <- stepAIC(reg1, direction = "both", trace = FALSE)

#Best model using stepwise regression using both backward and forward
selection
summary(stepwise)

##
## Call:
## lm(formula = Crime ~ M + Ed + Po1 + M.F + U1 + U2 + Ineq + Prob,
##     data = data)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -444.70 -111.07    3.03  122.15  483.30
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) -6426.10    1194.61  -5.379 4.04e-06 ***
## M              93.32      33.50   2.786  0.00828 **
## Ed            180.12      52.75   3.414  0.00153 **
## Po1           102.65      15.52   6.613 8.26e-08 ***
## M.F            22.34      13.60   1.642  0.10874
## U1          -6086.63    3339.27  -1.823  0.07622 .
## U2            187.35      72.48   2.585  0.01371 *
## Ineq           61.33      13.96   4.394 8.63e-05 ***
## Prob        -3796.03    1490.65  -2.547  0.01505 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
```

```
## Residual standard error: 195.5 on 38 degrees of freedom
## Multiple R-squared:  0.7888, Adjusted R-squared:  0.7444
## F-statistic: 17.74 on 8 and 38 DF,  p-value: 1.159e-10

#Data too small otherwise I would split the data into training, validation
and testing set

#sacling data
data_scaled <- scale(data, center = TRUE, scale = TRUE)
x<- data_scaled[,1:15]
y<- data_scaled[,16]

# Q11.1.2
fit_lasso <- glmnet(as.matrix(x), as.matrix(y), family="mgaussian", alpha =
1)
summary(fit_lasso)

##           Length Class     Mode
## a0          99   -none-    numeric
## beta      1485   dgCMatrix S4
## df          99   -none-    numeric
## dim          2   -none-    numeric
## lambda      99   -none-    numeric
## dev.ratio   99   -none-    numeric
## nulldev      1   -none-    numeric
## npasses      1   -none-    numeric
## jerr         1   -none-    numeric
## offset       1   -none-    logical
## call         5   -none-    call
## nobs         1   -none-    numeric

cv.glm <- cv.glmnet(as.matrix(x), as.matrix(y), alpha=1)
plot(cv.glm)
```




```
#best value of lambda:
best_lambda <- cv.glm$lambda.min
best_lambda

## [1] 0.04580907
```