

Lab 8

Daniel Tshiani

2025-06-01

a

```
library(ISLR)
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("../data/Auto-3.rda")

n <- nrow(Auto)
set.seed(1234)
training_data <- sample(n, n/2)
train_set <- Auto[training_data, ]
test_set <- Auto[-training_data, ]

model <- lm(mpg ~ weight + horsepower + acceleration, data = train_set)

model2 <- glm(mpg ~ weight + horsepower + acceleration, data = train_set)

predictions <- predict(model)
actuals <- test_set$mpg
mse <- mean((actuals - predictions)^2)
mse

## [1] 103.398
```

b

```
library(boot)
regCV <- cv.glm(train_set, model)
regCV2 <- cv.glm(train_set, model2)

glimpse(regCV2)
```

```
## List of 4
## $ call : language cv.glm(data = train_set, glmfit = model2)
## $ K : num 196
## $ delta: num [1:2] 20.2 20.2
## $ seed : int [1:626] 10403 601 1407173775 141192598 911446336 1689480195 -1101853151 -2062419696 -1
```

c

```
cv.error <- rep(NA, 10)

for (i in 1:10) {
  model <- glm(mpg ~ poly(weight, i) + poly(horsepower, i) + poly(acceleration, i), data = train_set)

  cv_result <- cv.glm(train_set, model)

  cv.error[i] <- cv_result$delta[1]
}
cv.error

## [1] 20.24498 18.37205 18.89343 19.48636 19.98138 22.65319 37.32522
## [8] 61.82781 87.34725 767.04584
```

d

```
model3 <- glm(mpg ~ weight + horsepower + acceleration, data = Auto)
cv_result <- cv.glm(Auto, model3, K = 10)
cv_result$delta

## [1] 18.20669 18.18741
```