

DSA 8020 R Lab 2: Multiple Linear Regression I

Put your name here

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Contents

Housing Values in Suburbs of Boston	1
Load the dataset	1
Exploratory Data Analysis	2
Numerical summary	2
Graphical summary	2
Model Fitting	2
Simple Linear Regression	2
Multiple Linear Regression	3

Housing Values in Suburbs of Boston

The Boston housing data was collected in 1978. Each of the 506 entries represents aggregated data about 14 features for homes from various suburbs in Boston, MA.

Data Source: Harrison, D. and Rubinfeld, D.L. (1978) Hedonic prices and the demand for clean air. **J. Environ. Economics and Management** 5, 81–102.

Load the dataset

Code:

```
library(MASS)
data(Boston)
```

For the purposes of this lab, we will use only the following variables for conducting data analysis:

1. **medv**: median value of owner-occupied homes in \$1000s;
2. **lstat**: lower status of the population (percent);
3. **rm**: average number of rooms per dwelling;
4. **crim**: per capita crime rate by town

Code:

You can use the code below to extract these variables:

```
vars <- c("medv", "lstat", "rm", "crim")
data <- Boston[, vars]
```

Exploratory Data Analysis

Numerical summary

1. Use the `summary` command to produce various numerical summaries of each of the 4 variables under consideration.

Code:

Graphical summary

2. Make a boxplot for each variable

Code:

3. Briefly discuss the shape of the distribution of each variable

Answer:

4. Create a scatterplot matrix to explore the inter-dependence between these these variables

Code:

Model Fitting

Here we will use `medv` as the response and `lstat`, `rm`, `crim` as predictors.

Simple Linear Regression

5. Fit a simple linear regression.

Code:

6. Write down the fitted linear regression equation.

Answer:

Multiple Linear Regression

7. Fit a multiple linear regression using all predictors

Code:

8. Write down the fitted linear regression equation

Answer:

9. Perform an overall F-test, state the hypotheses, test statistic, p-value, decision, and conclusion

Code:

Answer: