STA302 Lec5101, Methods of Data Analysis 1
Module 8: Problem set

November 3, 2024

Problem.

Which of the statements is true regarding the three types of problematic points in linear regression?

- The presence of a leverage point will always impact the estimated regression surface/line (i.e. always impacts where the line/surface is placed through the data).
- A point that has been classified as an outlier must also be classified as a leverage point.
- An observation that has been classified as influential must also be classified as an outlier.
- None of the statements are true
- More than one of the statements are true

Problem.

Consider a model with 2 predictors based on a small dataset with 35 observations. The following values have been computed for one observation in the dataset. What type of problematic observations is this?

$h_{i,i} = 0.08$ $r_i = 3.34$ $\text{DFBETAS}_{1,(i)} = -0.80$

Problem.

Consider a model with 2 predictors based on a small dataset with 25 observations. Observation in the dataset has a leverage value of 0.43 and a standardized residual of -0.21. Calculate the Cook's Distance for this observation. (Round ONLY your final answer to 3 decimal places.)

Problem.

The NYC dataset has data on 168 restaurants. The response of interest is the Price for a menu item, and predictors of interest are the Food rating, Service rating, Décor rating, and the location (East/West). Fit a regression model to this data using Food, Decor and East variables and determine whether observation 130 is influential on the estimated slope of Decor.

1 Basic learning objective practice

For each problem,

- discuss the impact of identified problematic observations on the model
- consider whether it would be appropriate to remove the observation(s) or note them as a limitation
- describe the process of identifying problematic points in words as you would in a report.

Problem.

Sheather: Chapter 6, Exercise 3 (bad leverage points mean influential here)

Load the data with R:

```
carsdata = read.csv("https://gattonweb.uky.edu/sheather/book/docs/datasets/cars04.csv",
header = T)
```

Problem.

Weisberg: Chapter 9 Problems 1 (omit t_i)

Problem.

Weisberg: Chapter 9 Problems 2 (omit t_i)