

Statistics 550 Homework assignment 3

Problems 1-5 are problems 10.1, 10.3, 11.1, 11.3, and 11.4 (for conductors only) in the text, respectively.

6.(Continuation of 10.1) On your observation space diagram, draw in the projection of the data vector \mathbf{y} on the covariate vector \mathbf{x} , to obtain the least squares estimator of the slope β in a model without an intercept. Then compute the projection matrix $\mathbf{P} = \mathbf{X}(\mathbf{X}'\mathbf{X})^{-1}\mathbf{X}'$, and verify that it is idempotent and symmetric. Compute $\hat{\mathbf{y}} = \mathbf{P}\mathbf{y}$ and show that it is the projected value from \mathbf{y} onto \mathbf{x} .

7. For the the following data, compute the least squares estimates for the linear regression model: $y_i = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \varepsilon_i$.

x_1	x_2	y
1.4	3.6	10.90
2.3	6.1	15.85
5.3	2.1	17.46
7.2	2.2	17.58
8.0	6.8	27.36
11.1	7.2	38.27
6.9	4.3	22.18
3.3	2.9	13.17
14.7	3.8	39.73
1.8	12.5	27.91

Then create plots (like Figure 11.5a) of the hat values, the studentized residuals, Cook's distance values, the DFFITS statistic, and the COVRATIO statistic. Are any of them above the recommended cutoff values? (Use $2\bar{h}$ for the hat values)

8. Mention ideas that you are considering for your class talk at the end of the semester.