

HOMEWORK4INF552:

6.8.3 :

a. **As we increase s from 0, the training RSS will :**

Steadily decrease. As we increase s from 0, we are restricting the B_j coefficients less and less (the coefficients will increase to their least squares estimates), and so the model is becoming more and more flexible which provokes a steady decrease in the training RSS.

b. **Repeat (a) for test RSS.**

Decrease initially, and then eventually start increasing in a U shape. As we increase s from 0, we are restricting the B_j coefficients less and less (the coefficients will increase to their least squares estimates), and so the model is becoming more and more flexible which provokes at first a decrease in the test RSS before increasing again after that in a typical U shape.

c. **Repeat (a) for variance.**

Steadily increase. As we increase s from 0, we are restricting the B_j coefficients less and less (the coefficients will increase to their least squares estimates), and so the model is becoming more and more flexible which provokes a steady increase in variance.

d. **Repeat (a) for (squared) bias.**

Steadily decrease. As we increase s from 0, we are restricting the B_j coefficients less and less (the coefficients will increase to their least squares estimates), and so the model is becoming more and more flexible which provokes a steady decrease in bias.

e. **Repeat (a) for the irreducible error.**

Remain constant. By definition, the irreducible error is independent of the model, and consequently independent of the value of s .

8.4.5 Solution :

There are two common ways to combine these results together into a single class prediction. One is the majority vote approach discussed in this chapter. The second approach is to classify based on the average probability. In this example, what is the final classification under each of these two approaches ?

- **With the majority vote approach, we classify X as Red as it is the most commonly occurring class among the 10 predictions (6 for Red vs 4 for Green).**

- With the average probability approach, we classify as Green as the average of the 10 probabilities is 0.45.