

ISLR Chapter 3 Exercises

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Conceptual Exercises

Question 1

Describe the null hypotheses to which the p-values given in Table 3.4 correspond. Explain what conclusions you can draw based on these p-values. Your explanation should be phrased in terms of sales, TV, radio, and newspaper, rather than in terms of the coefficients of the linear model.

Solution:

The null hypotheses to which these p-values correspond to is if the true regression coefficients are zero. Note that there is nothing said about a specified significance levels. We will not state that some coefficients are “significant” vs “non-significant”. However, the regression results suggest that for every \$1000 increase in television, radio, and newspaper advertising, there will be an average change in sales by 46, 189, and -1 units, respectively.

Question 2

Carefully explain the differences between the KNN classifier and KNN regression methods.

Solution:

KNN regression is a regression method used to estimate a functional form for a given dataset. It does this by identifying K training observations that are closest to x_0 (represented by N_0) and then estimates $\hat{f}(x_0)$ by the following formula: $\hat{f}(x_0) = \frac{1}{K} * \sum_{x_i \in N_0} y_i$.

KNN classification is a classification algorithm used to classify observations into different classes within the dataset. The algorithm assigns the observation to the class corresponding to the most common class of its neighboring points.