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ISLR ch3 (1, 2, 5, 6, 11, 12, 13, 14)

3.1) The null hypothesis is that the coefficients for TV, radio, and newspaper are zero. Which would mean that the none of these three predictors has an effect on the sales. The p-values for both TV and radio are small, whereas the p-value for newspaper is quite large (and the coefficient – which is quite close to zero – is actually negative). Of the three predictors, $1,000 spent on TV advertising and/or $1000 spent on radio advertising is predicted to increase sales by 46 units and/or 189 units respectively. Newspaper advertising doesn’t appear to have an effect, BUT it’s not clear from table 3.4 whether the effect is negligible because newspaper advertising is ineffective, or because newspaper advertising occurs in conjunction with TV and/or radio advertising (thus $ put into newspaper mirrors $ put into radio) and the effect on newspaper advertising is seen in the effect the model shows for radio advertisement.

3.2) For a KNN regression you are taking the k nearest input values and using those to compute an average output. Each yi is thus an average of the k neighbors. For a KNN classifier you are taking the k nearest outputs to classify the output at that point (the output is a categorical variable). So yi becomes the most prevalent of the y’s for the k neighbors.

3.5) Not sure of the algebra to multiply xi by beta-hat. And I’m guessing the ai is r (the correlation coefficient) or some form of r. And looking at the solutions on-line, I’m not able to parse the i-prime (despite Masano’s explanation) and I don’t follow where the k came from in their algebraic simplification. But I am reminded of (in the statement in the book “fitted = linear combination of response) the KNN method of regression…

3.6) , when the formula for beta-1 simplifies to 0/0 and the formula for beta-0 simplifies to y-bar.

3.11a) There is a significant difference in the slope (it’s really unlikely that the true slope is 0 since p<2x10^-16). The coefficient of the x term is 1.9939 … which is real close to the known slope of 2.

3.11b) The coefficient of the y term is 0.38138.

3.11c) WAIT … shouldn’t the coefficient of the y term for x~y be close the ½??? Confused. But when I make the error term smaller (e.g. 0.25\*rnorm(100)) then I get closer to coefficients that are approx. 2 and approx. ½. And I’m still confused.

3.12) Since the numerator of the beta\_hat formula (3.38) is the same whether you do y~x or x~y then the regression of y on x will be the same as the regression of x on y when the denominators are the same. When the sum of the squares of both the y’s and the x’s is the same.