

Regression class exercise

Suppose a large consumers products company wants of measure the effectiveness of different types of advertising media in the promotion of its products. Specifically, two types of advertising media are to be considered: radio and television advertising and newspaper advertising (including the cost of discount coupons). A sample of 22 cities with approximately equal populations is selected for study during a test period of one month. Each city is allocated a specific expenditure level for both radio and television advertising and newspaper advertising. The sales of the product (in thousands of dollars) and also the levels of media expenditure during the test month are analyzed with the following results:

SUMMARY OUTPUT

<i>Regression Statistics</i>	
Multiple R	0.89927324
R Square	0.80869235
Adjusted R Square	0.78855471
Standard Error	158.904126
Observations	22

	RadioTV	Newspaper
Minimum	0	0
Maximum	70	45

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	2	2028032.69	1014016.34	40.1582344	1.5013E-07
Residual	19	479759.901	25250.5211		
Total	21	2507792.59			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	156.430435	126.757856	1.23408867	0.23221727	-108.87689	421.737759
RadioTV	13.080681	1.75937368	7.43485086	4.8886E-07	9.39826837	16.7630935
Newspaper	16.7952781	2.96337792	5.66761262	1.8307E-05	10.5928549	22.9977013

- Which of the variables should be labeled “response?”
- Which of the variables should be labeled “explanatory?”
- What is the multiple regression equation?
- Interpret the slope estimate for the Newspaper advertising variable.

- e. Predict average Sales for a city in which radio and television advertising is \$20,000 and newspaper advertising is \$20,000. Is this extrapolation?

- f. How much variation in Sales is accounted for by the two explanatory variables?

- g. Is there evidence of a significant relationship between Sales and the two X variables at $\alpha = 0.05$?

- h. Give a 95 percent confidence interval for the true slope associated with the radio and television advertising variable.

- i. At $\alpha = 0.05$, determine which of the explanatory variables makes a significant contribution to the regression model.

- j. Compute the standard error of the estimated regression.