David Lowe

EDA #5

1. For any profitable company, sales directly impact the success of the company. How much a company is selling can be used as an indicator of the overall health of the company. Each department within a company has a tie to sales, and therefore needs to have some kind of focus on how their products are packaged, paid for, and promoted. Understanding the sales trends, and being able to forecast sales can help a company plan many aspects of internal and external influences in the company. If sales can be predicted, a company can optimize spending in certain products, incentivize sales at different time periods, and influence their present and future clients to make better buying decisions.
2. To forecast sales, it is important to know sales over time, and also include factors that cause peaks or drops in the company’s sales. This dataset includes the sales (in $1,000’s) of each week over the course of a year (52 weeks). To enhance the study, the data includes whether a holiday occurred in the given week. Figure 2 shows the trend over time of the weekly sales. Blue diamonds represent weeks with a holiday, and the red dotted line is a smoothed curve of the sales across the weeks. Sales seem to have a general upward trend as the weeks increase in the year. While there are many “jagged” groups of weeks, where sales go up and then down again, generally the points seem heavily related to the last points, indicating that sales between weeks are not entirely independent. Notably, all weeks with a holiday show some kind of upward spike, indicating that weeks with a holiday do, in fact, have higher sales.
3. Since prediction (forecasting) is our goal, we need an analysis that allows us to predict with some amount of accuracy the sales, given the week. The independence assumption in the observed sales totals does not hold true. This precludes the option of linear regression. However, time-series analysis and other correlated response analysis can provide a way to model sales across time. These types of analysis use the correlated sales between weeks to predict future points. From such analysis we can give a forecast of sales across time, which can then influence the business decisions of a company.
4. I don’t know any techniques for analyzing correlated data besides time series. There must be another way to do regression with correlated data.

Figure 1: Sales by Week

