Chapter Project

Home Sweet Home: Using Linear Regression to Analyze and Predict Home Prices

An important problem in real estate is determining how to price homes to be sold. There are so many factors—size, age, and style of the home; number of bedrooms and bathrooms; size of the lot; and so on—which makes setting a price a challenging task. In this project, we will investigate the relationships among typical characteristics of homes and home prices, identify key variables related to pricing, and build linear regression models to predict prices based on property characteristics. Our analysis will be based on the Mount Pleasant Real Estate Data (available on stat.hawkeslearning.com). This data set includes information about 245 properties for sale in three communities in the suburban town of Mount Pleasant, South Carolina, in 2017.

Data

The data can be found at stat.hawkeslearning.com **Data Sets > Mount Pleasant Real Estate Data.**

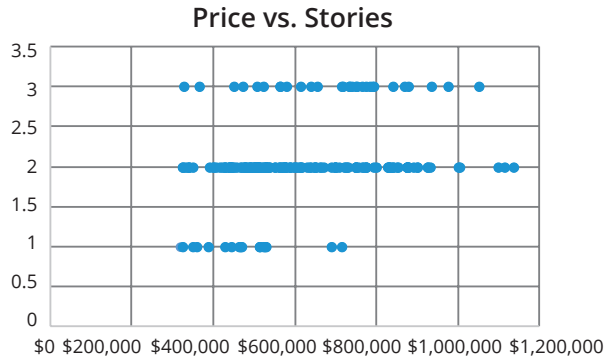
Phase 1: Data Preparation.

1. Download the Mount Pleasant Real Estate Data from stat.hawkeslearning.com and open it with Microsoft Excel.
2. To ensure the data contains comparable properties, eliminate duplexes and properties whose prices are outliers. What limitations does this impose on our analysis?
3. The statistical tools from the current chapter focus on numeric data, so eliminate non-numeric variables from the data. Does this remove potentially useful information?
4. Are there any redundant variables we could eliminate?

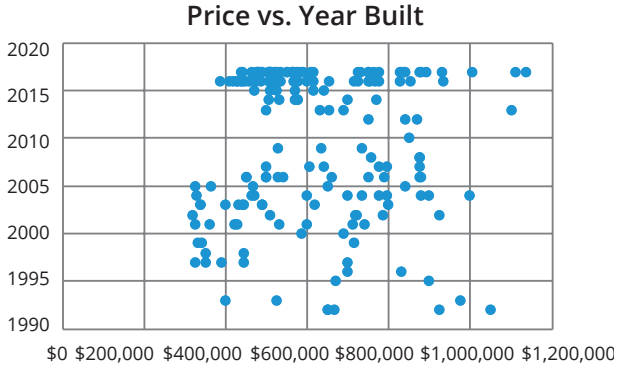
Phase 2: Discovering Relationships

5. How strongly does each remaining variable correlate to the price?
6. Which variable correlates most strongly with price?
7. Are any variables weakly correlated with price? Practically speaking, why do you think this is true?
8. Do scatter plots reveal any nonlinear pattern between price and the weakly correlated variables?

a.



b.



Phase 3: Constructing Predictive Models.

Enable the Analysis ToolPak add-in to Excel.
The regression tool will be used.

9. Find the regression line $\hat{y} = b_0 + b_1 x$ predicting home price by the variable most highly correlated to it. Assess the fit of the line in terms of error and the proportion of variation explained by the model.

10. For which properties do the model's predictions have the greatest errors? What is an intuitive reason for this?