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# Overview

Now that we're familiar with simple linear regression models with one continuous predictor, and ANOVA models with one categorical predictor, we're going to explore more complex models. Rarely will models with only one predictor be adequate to answer our research questions. Multiple regression and multiple factor ANOVA will enable us to better understand which variables are related to the response variable while controlling for the effects of the other variables in the model.

For example, imagine you're studying the effect of inactivity on weight gain. It's likely people who exercise less will gain more weight over a period of time. However, if we include diet into the model, will exercise maintain a significant relationship with weight gain after controlling for the other variable? Is it possible that diet is sufficient to explain weight gain, or is there some type of underlying interaction between the two predictors? Is it possible the effect of inactivity on weight gain depends on the type of diet?

In the context of the Ames housing data, perhaps additional variables other than lot area can help explain the variability in sale price. Perhaps the combination of lot area and basement area together prove to be a better fitting model than a simple linear regression model.

We'll start by expanding the one-way ANOVA model to a two-factor analysis of variance and then extend simple linear regression to multiple regression with two predictors. After you understand the concepts of two-way ANOVA and multiple linear regression with two predictors, you'll have the skills to fit and interpret models with many variables.





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