GENERAL ASSEMBLY

INTRODUCTION TO MODELING

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AGENDA

1. Data Science Process & Modeling

2. Linear Regression

DATA SCIENCE PROCESS

1. Define problem.
2. Gather data.
3. Explore data.
4. Model with data.
5. Evaluate model.
6. Answer problem.

MODELING

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  - How do we simplify?
    - Making assumptions about how things behave.
    - Taking into account only really important factors.

MODELING

"Essentially, all models are wrong, but some are useful."

– George Box, 1987

MODELING

WHY DO WE MODEL?

- Prediction
  - How long does it take me to get to work?
  - How much money is a 29-year-old DSI alum expected to make?

- Inference
  - What is the effect of sex on income?
  - How much more money can I be expected to make in a year?

MACHINE LEARNING ALGORITHMS

- **Machine learning** is a term we use to describe getting computers (machines) to learn without needing to be explicitly programmed.

- There are many different machine learning algorithms we'll cover in the class - from linear regression to neural networks!

MACHINE LEARNING ALGORITHMS

TERMINOLOGY

- $\boldsymbol{X}$: our data, the independent/explanatory variables we use to predict $\boldsymbol{Y}$.
- $\boldsymbol{Y}$: our data, the dependent variable we want to predict.
- $\boldsymbol{\widehat{Y}}$: our predicted values of $\boldsymbol{Y}$.

MODELING GOALS

1. Use observed values of $\boldsymbol{X}$ and $\boldsymbol{Y}$ to model relationship between them.

2. Build model that makes $\boldsymbol{Y}$ and $\boldsymbol{\hat{Y}}$ as close as possible.

3. Use observed values of $\boldsymbol{X}$ and existing model to make predictions $\boldsymbol{\hat{Y}}$.