

Regression Analysis

Cyrus Mohamamdian

Chapman University
mohammadian@chapman.edu

April 16, 2018

Overview

- 1 Housekeeping
- 2 Logic of Inferential Statistics
- 3 Logic of Inferential Statistics
- 4 Linear Regression Equation
- 5 Assumptions of Linear Regression
- 6 When do we use linear regression in social sciences?
- 7 When do we use linear regression in social sciences?

- Prompt for optional homework 5 will be sent out via email wednesday
- Last week for programming and statistics, laptops no longer mandatory starting next week.

Logic of Inferential Statistics

There exists some **population**. Within that population, there's some true value of a **parameter** (such as a mean) that we're interested in. We rarely have access to the entirety of that population data, so we usually rely have a subset of that population, known as a **sample**.

The idea of drawing conclusions about the values of parameters of a population based on samples of that population is a process known as **inference**. Thus, **inferential statistics** is the branch of statistics concerned with estimating population parameters from sample data. **Hypothesis tests** are our way of making testable propositions about the population values whose data we have but only a finite sample of.

Logic of Regression Analysis

Regression analysis explores the relationship between a quantitative response variable (dependent variable) and one or more explanatory variables (independent variables)

Linear Regression Equation

$$Y = \beta_1 + \beta_2 X + \epsilon,$$

Where, β_1 is the intercept and β_2 is the slope. Collectively, they are called regression coefficients. ϵ is the error term, the part of Y the regression model is unable to explain.

Assumptions of Linear Regression

- Linear relationship
- Normally distributed
- Little or no multicollinearity
- No auto-correlation
- Homoscedastic data

When do we use linear regression in social sciences?

- Often used in observational studies (cannot establish causation on its own)
- Survey research
- Prediction and forecasting

Regression Explainer

<https://www.youtube.com/watch?v=KsVBBJRb9TE>