DSFA

Spring 2021

Lecture 27

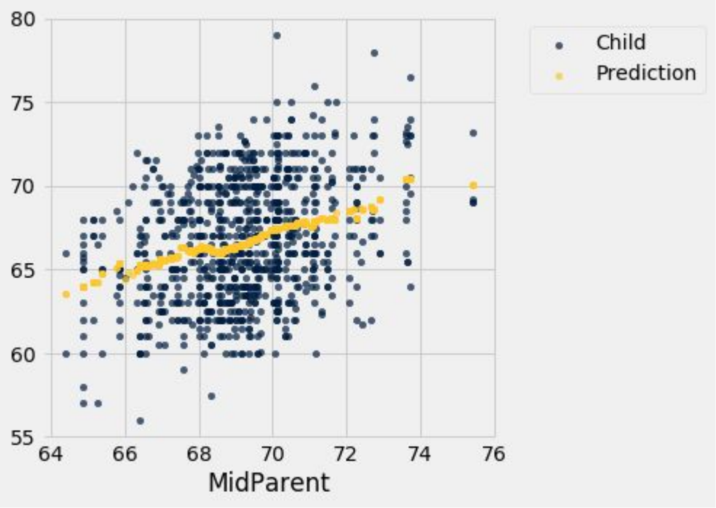
Correlation

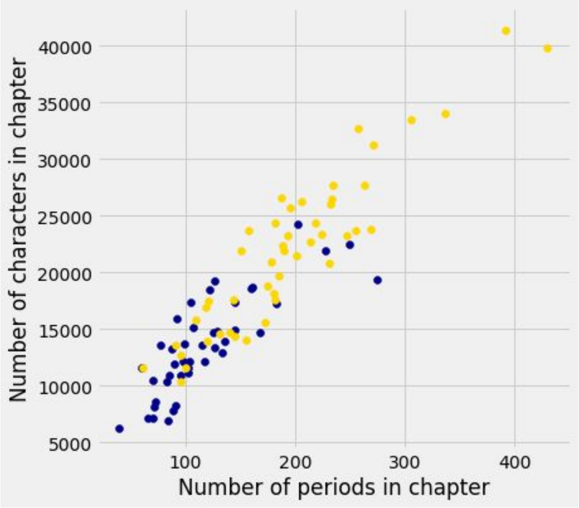
Announcements

- Project 2, Part 2, due Friday 5:59PM
- Prelim 2, April 20, 8:30PM-10PM in Kennedy 116 (here) for Ithaca-resident students
    - Coverage from Lecture 12 - Lecture 26 (Monday)
    - Review session on Saturday 3:30PM-5:30PM, room TBA
    - Review sheet and sample exam posted on Canvas.
    - NB: The sample exam is not one I wrote, and is likely to be somewhat different than what I will do.
    - Table of functions included again, allowed a double-sided sheet of notes you make yourself

Prediction

- Guess outcomes in the future, based on available data
- Our simple goal: predict value of one variable based on another

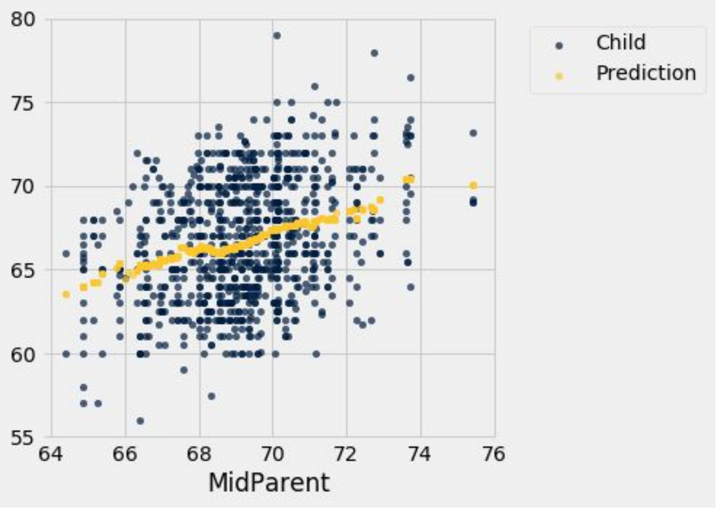


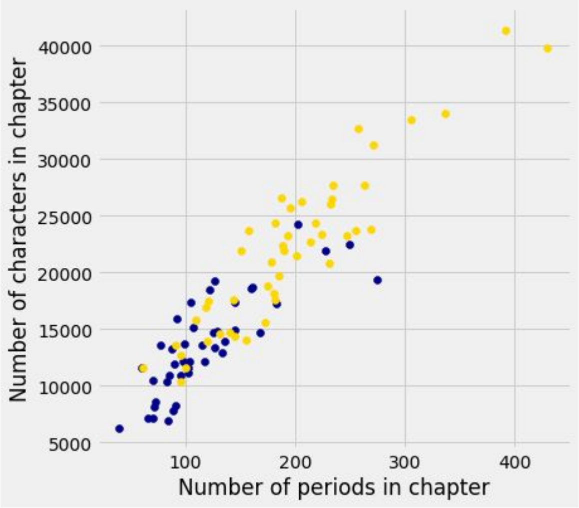


(Demo)

Prediction

If we have a line describing the relation between two variables, we can make predictions





Relation Between Two Variables

Visualize then quantify

- Any discernible pattern?
- Simplest kind of pattern: Linear? Non-linear?

(Demo)

The Correlation Coefficient *r*

- Developed by Karl Pearson (1857-1936) based on work of Francis Galton (1822-1911)
- Measures linear association
- $-1 \leq r \leq 1$
  - $r = 1$: scatter is perfect straight line sloping up
  - $r = -1$: scatter is perfect straight line sloping down
- $r = 0$: No linear association; *uncorrelated*

(Demo)

Definition of *r*

Correlation Coefficient (*r*)   =

average of	(array) product of	x in standard units	and	y in standard units

Measures how clustered the scatter is around a straight line