Topic 1: Introduction to Forecasting

ECON 4753 — University of Arkansas

Prof. Kyle Butts

Fall 2024

Welcome to Forecasting (Econ 4753)

Who am I?

- Kyle Butts, Ph.D.; please call me Kyle
- Graduated from University of Colorado Boulder
- Research:
  - → Econometrics and Causal Inference
  - → Housing economics (e.g. zoning laws and landords)

Classroom Norms

1. All **questions are appreciated**.
   → I *always* have time to answer them.
2. If you can not **stay off the internet during class**, do not come to class.
   → I do not take attendance and it is not fair to other students.
3. This class has **coding exercises** in R.
   → Bring your laptop so you can participate
   → We will introduce R, but you will need to put in some time outside of class to practice.
   → Coding is becoming increasingly valuable for your career; it is a competitive advantage on the job market.

Course Materials

Coding Software

You will need to download *two* programs:

1. Install R from `https://cloud.r-project.org/`.
2. Install Positron (or RStudio) from `https://github.com/posit-dev/positron/releases`.

Your first assignment will be to download the software and compile an `.Rmd` file.

Course Materials

Textbooks

Both textbooks are available for free online:

1. Gareth, J., Daniela, W., Trevor, H., & Robert, T. (2013). “An introduction to statistical learning: with applications in R (2nd edition)”. Spinger.
2. Hyndman, R. J., & Athanasopoulos, G. (2018). “Forecasting: principles and practice (3rd edition)”. OTexts.

We will also have some readings from Nate Silver’s book which I’ll post snippets for you:

- Silver, N. (2012). “The signal and the noise: Why so many predictions fail-but some don’t”. Penguin.

Assignments

1. There will be a set of assignments in this course roughly following each Topic.
   → Assignments will have a mixture of free-response questions and coding exercises
2. Two midterms and one final:
   → Midterms are non-cumulative; final is cumulative

Grading

TBD

Roadmap

Motivation

Key elements of forecasting

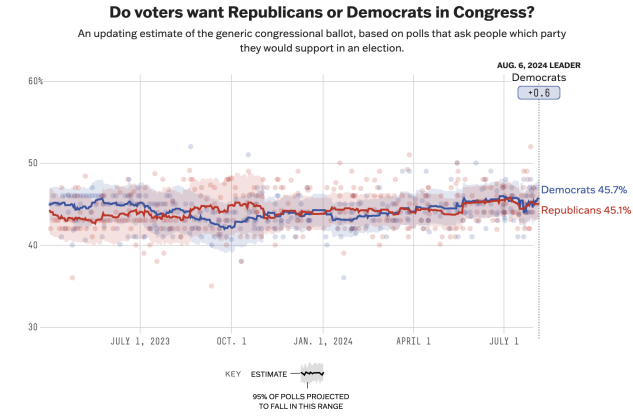
Forecasting is the use of data to make predictions about an uncertain/unobserved outcome

Typically, it is a mix of two *important components*

1. An estimate, usually a number or a set of numbers that summarize the prediction
2. A measure of uncertainty, reflecting how variable we think our estimate is
   → Want to communicate to stakeholders how confident in our estimate we are

Let's look at some examples and try to identify forecasts and their measures of uncertainty (if any)

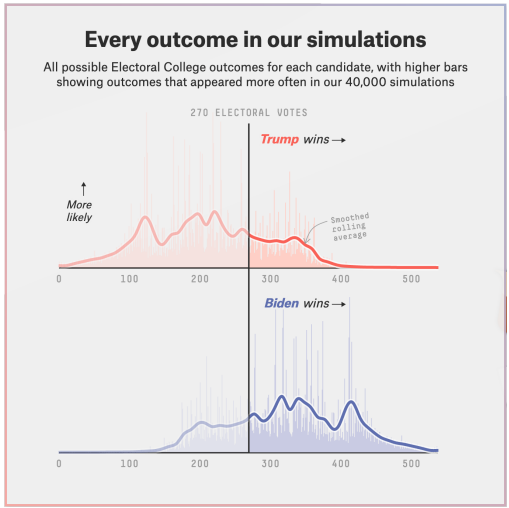
Election Forecasting



Source:

Nate Silver's Blog

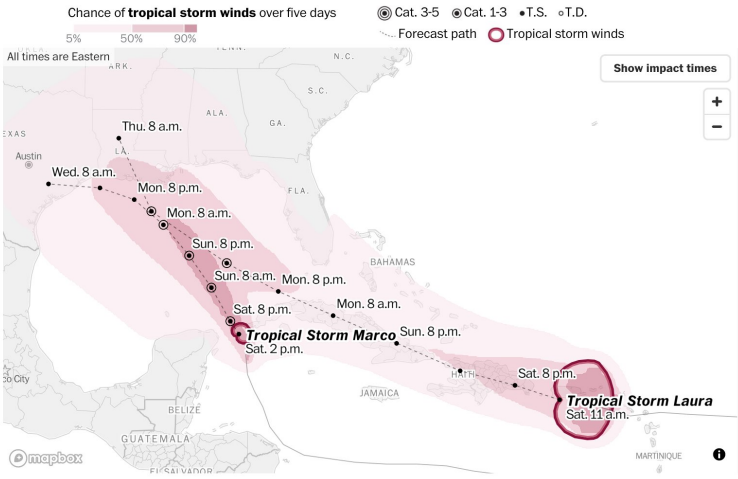
Election Forecasting



Source:

538 2020 Election forecase

Weather Predictions

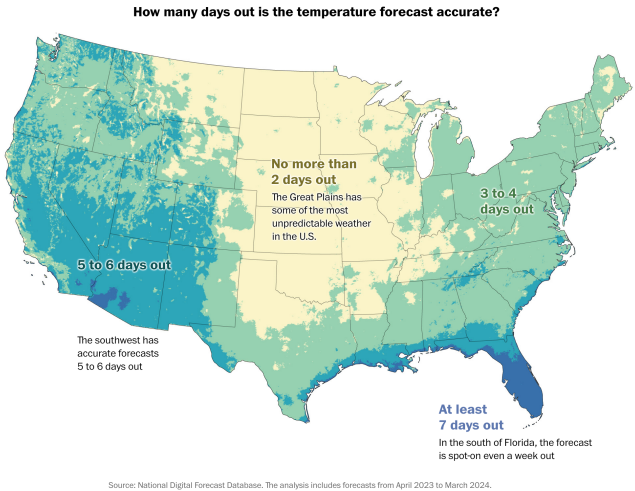


Source: National Weather Service. Note: Impact lines represent the earliest reasonable arrival time of tropical storm winds.

Source:

Washington Post

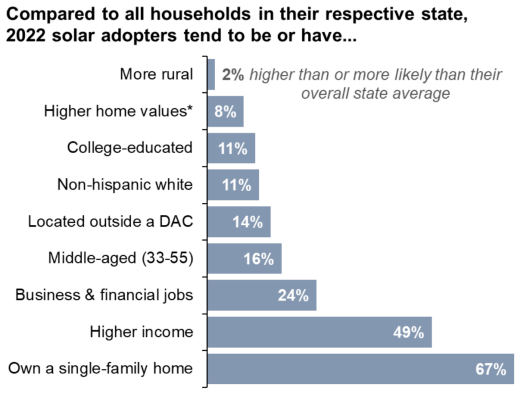
Weather Predictions



Source:

Washington Post

Business Analytics

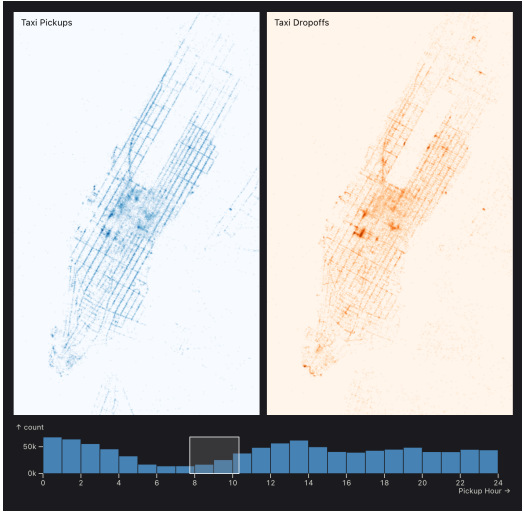


Notes: The percentages were calculated by comparing PV adopters to all households in their respective state. The only exception is for home value, where, for reasons of data availability, the comparisons are to all households in the same county.

Source:

Lawrence Berkeley Lab

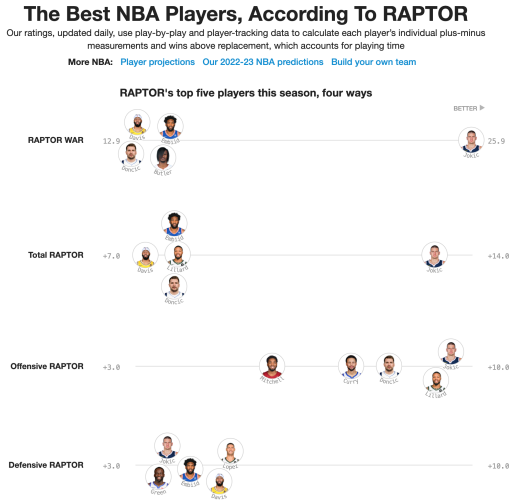
Business Analytics



Source:

Mosaic Dashboard

Sports Analytics



Source:

538 Player Ratings Dashboard

Next Topic

The next topic will review:

- Algebra skills that will be required in the course
- Review material from your introductory statistics class

We will cover the material realtively quickly; ultimately, it is your job to make sure you are up to date with this material

- Come to office hours if you want to review with me in more detail