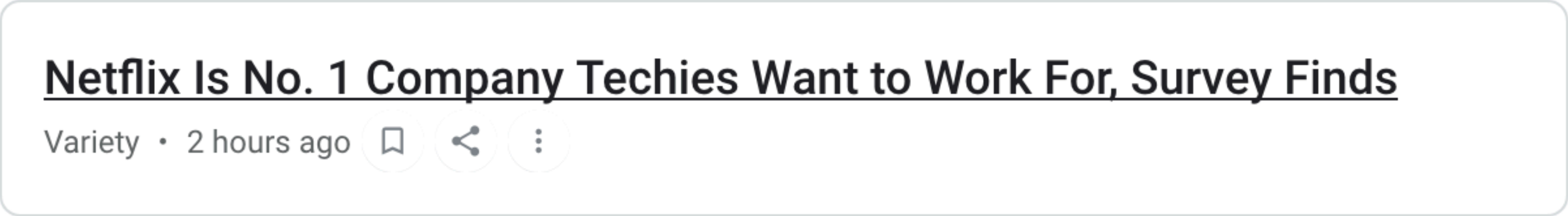
190F Foundations of Data Science

Fall 2018

Lecture 13

Sampling

Announcements



Netflix Is No. 1 Company Techies Want to Work For, Survey Finds

Variety • 2 hours ago

Netflix took the No. 1 spot on Hired’s 2018 survey of tech workers ranking the companies they’d most like to work for, moving up from fifth place on the job site’s 2017 survey. That put the streamer ahead of Google (#2), Elon Musk’s Tesla (#3) and SpaceX (#4), Airbnb (#5) and Apple (#6). The survey polled 2,200 tech workers in the U.S., Canada and the U.K.

Distributions

Probability Distributions

- Consider a random quantity with various possible values (e.g., the value of a coin flip or a dice roll).
- The **probability distribution** of this random quantity specifies the probability associated with each possible value.
- In simple cases, the probability distribution can be worked out mathematically. Simulating the random quantity can be useful in complex cases.

The Empirical Distribution

- Empirical = “Based on observations”
- Observations can be from repetitions of an experiment that generates (or simulates) values of a random quantity.
- The **empirical distribution** of a set of observed values specifies the proportion of observations that take each possible value.

Law of Averages

If a chance experiment is repeated many times,
independently and under the same conditions,
then the proportion of times that an event occurs
gets closer to the theoretical probability of the event

As you increase the number of rolls of a die, the proportion of times you see the face with five spots gets closer to 1/6

Sampling

Sampling a Population

- Deterministic sample:
    - Sampling scheme doesn’t involve chance

- Probability sample:
    - Before the sample is drawn, you have to know the selection probability of every group of people in the population
    - Not all individuals have to have equal chance of being selected

(Demo)

Sample of Convenience

- Example: sample consists of whoever walks by
- Just because you think you're sampling "at random", doesn't mean you are.
- If you can't figure out ahead of time
  - what's the population
  - what's the chance of selection, for each group in the population

  then you don't have a random sample.
- **But why is it important for samples to be random?**

Large Random Samples

If the sample size is large,

then the empirical distribution of a uniform random sample

resembles the distribution of the population,

with high probability

Probability & Simulation

Calculation

Roll a fair die 4 times.

What is P(get at least one 6)?

(Demo)