Bayes Theorem

Examples, Exercises

$$P(A|B) = \frac{P(B|A)P(A)}{P(B)}$$

Kahnemann, Thinking, Fast and Slow

- A cab was involved in a hit-and-run accident at night. Two cab companies, the Green and the Blue, operate in the city. You are given the following data:
- 85% of the cabs in the city are Green and 15% are Blue. A witness identified the cab as Blue. The court tested the reliability of the witness under the circumstances that existed on the night of the accident and concluded that the witness correctly identified each one of the two colors 80% of the time and failed 20% of the time. What is the probability that the cab involved in the accident was Blue rather than Green?

Ted Mosby’s Driving Gloves Quote

Lily: Oh no, not the driving gloves.
Ted: In 99.9% of highway accidents, the driver was not wearing gloves.
Lily: Because they’re stupid, they don’t help you drive better, that’s why no one wears them.
Ted: Then why is it called.. the glove compartment?
How I Met Your Mother Season 9 Episode 1: “The Locket”

Stereotypes, Fallacies

- The proportion of Green voters who cycle to work is similar in Holland and Germany. Is the reversal probability, i.e. how likely is someone to vote green if you know that he/she cycles to work, similar?
- Let's say the proportion of the true right wing in the US is about 5%. Let's further assume that of those 90% voted for Trump. How bearable then is the often-heard reverse conclusion that 90% of all Trump voters are right-wing extremists.

Bayes Theorem, Covid Testing

- The overall **sensitivity** of the rapid antigen test was **65.3%** (95% confidence interval [CI] 56.8-73.1), the **specificity** was **99.9%** (95% CI 99.5-100.0). In asymptomatic individuals, the sensitivity was 44.0% (95% CI 24.4-65.1).
- P(Covid given positive test) = ?
- P(no Covid given negative test) = ?