BAYES' THEOREM

Judge Kavanaugh vs. Prof. Blasey Ford

The issue is concerned with the conditional probability Prob[G | B] where the event G, the sexual assault of Ford by Kavanaugh, took place, given that Ford said it took place.

It follows that Prob[B | G] concerns the truthfulness of Ford, i.e., the probability that Ford gave testimony that an assault took place, given that an assault did take place. Similarly, Prob[B | ~G] is the probability that Ford was either mistaken or lying. Note: Prob[B | G] = 1 - Prob[B | ~G]

Analysis

Prob[G] = probability of a sexual assault = Prob[~G] = 0.5 (Complete uncertainty about outcome)

Prob[B | G] = .8 (80% chance of Ford being truthful) Prob[B | ~G] = .2 (Mistaken or lying)

Prob[G | B] = {(.5)(0.8)} / [{(.5)(0.8)} + {(.5)(.2)}] = 0.8

Observe when outcomes are equally uncertain – a "diffuse prior" – the probability of the outcome is fully determined by the "likelihood" of Ford being truthful.

Say there is some other "prior" information: 1) appearance that Kavanaugh is not being truthful in testimony; 2) claims by other individuals of similar behavior in other situations leading to:

Prob[G] = .6 and Prob[~G] = .4

Prob[G | B] ={(.6)(0.8)} / [{.6)(0.8) + {(.4)(.2)}] = 86%

The Party Example Did Kavanaugh commit a sexual assault at the party?

Having discovered that Ford attended the party, what is the probability the Kavanaugh committed a sexual assault at the party?

Prob[A] = Prob[~A] = Probability that Kavanaugh attended the party = .5

Prob[S | A] = .9 Probability of a Ford sexual assault if Kavanaugh was at the party
Prob[S | ~A] = .5 Probability of a Ford sexual assault if Kavanaugh not at the party (she was assaulted but mistaken about who it was)

Prob[A | S] = Probability that Kavanaugh attended the party and committed the assault
= {(.5)(.9)} / [{(.5)(.9)} + {(.5)(.5)}] = 64%