Q1) You are at a baseball game as a batter steps to the plate against a new relief pitcher. The batter hits home runs on 6% of fastballs, 3% of curveballs, and 1% of sliders. The relief pitcher throws fastballs 50% of the time, sliders 30% of the time, and curveballs the remaining 20%. As the pitcher winds up to deliver the first pitch of the at bat, a group of fans walks directly through your line of sight to go grab refreshments, forcing you to miss seeing the pitch that the batter drove over the wall for a home run. What are the chances that the ill-fated pitch was each of the three types the pitcher may have thrown?

Answer:

Solved using Bayes Theorem

P(HR | Fastball) = 0.06
P(HR | Curveball) = 0.03
P(HR | Slider) = 0.01

P(Fastball) = 0.50
P(Curveball) = 0.20
P(Slider) = 0.30

Give the information we have to solve for:

P (Fastball | HR) , P (Curveball | HR) and P (Slider | HR)

Using Bayes Theorem:

P (Fastball | HR)
= [P (HR | Fastball) * P (Fastball)] / P (HR)

= [P (HR | Fastball) * P (Fastball)] / [P (HR | Fastball) * P (Fastball) + P (HR | Slider) * P (Slider) + P(HR | Curveball) * P (Curveball)]
= (0.06*0.50)/ (0.06*0.50 + 0.01*0.30 + 0.03*0.20)
= 0.03 / (0.03 + 0.003 + 0.006)
= **0.7692**

Similarly,

P (Curveball | HR) = **0.0769**
P (Slider | HR) = **0.1538**