

CS 5060 HWK 4

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1 Part 1

The topic for this question is ice hockey goalies.

1.1 Hypothesis

The introduction of math, geometry, and probability in goal tending has greatly improved the consistency and performance of goalies.

1.2 Expertise

My current expertise informs me that my hypothesis is likely correct because the act of covering the most area of a goal is highly dependent on geometry and consistency is largely tied with save probability.

2 Part 2

B - vampires exist A - Sparkle like a diamond

$$P(B) = 0.05 \tag{1}$$

$$P(B^c) = 0.95 \tag{2}$$

$$P(A|B) = 0.7 \tag{3}$$

$$P(A|B^c) = 0.03 \tag{4}$$

$$P(B|A) = \frac{P(A|B)P(B)}{P(A|B)P(B) + P(A|B^c)P(B^c)} \tag{5}$$

$$P(B|A) = \frac{(0.7)(0.05)}{(0.7)(0.05) + (0.03)(0.95)} = 0.5512 \tag{6}$$

3 Part 3

3.1 1

The information in the question relates to a prior model of the form:

π	0.15	0.25	0.5	0.75	0.85
$f(\pi)$	0.15	0.15	0.4	0.15	0.15

3.2 2

This calculation was done using the the Bayesian Update python file.

π	0.15	0.25	0.5	0.75	0.85
$f(\pi)$	0.4544	0.4685	0.0770	0.00002	0.00000008

3.3 3

The prior of this problem essentially said the bus is most likely late 50% of the time with a relatively even chance of being other percentages. However, after the data was introduced, the Bayesian update concluded the late percentage was either 15% or 25%. This is because data showed the bus was late roughly 23% (3 over 13) of the time. As a result of data falling between the 15 and 25 percent π values, Li Qiang can assume with a relatively high degree of certainty that the bus is late between 15-25% of the time.