Manarat International University (MIU)

Department of Computer Science and Engineering Mid-term Examination (Summer 2019) Artificial Intelligence (CSE-411)

Problem Set Solutions

- 4 Adult heights can be considered to be normally distributed,
 - a. Adult women have a mean height of 65 inches and a standard deviation of 3.5 inches. What is the probability that a randomly selected adult woman is over 72 inches?
 - b. What is the probability that a randomly selected woman is between 63 and 65 inches?

And Given
$$V = G5$$
, $\sigma = 3.5$

a) $P(h772) = 1 - P(h<72) = 1 - P(h<72) = 1 - P(h<72) = 0.023$

$$= 1 - P(2) = 1 - 0.977 = 0.023$$
b) $P(G3 < h < G5) = P(h < G5) - P(h < G3) = P(G5 - G5) - P(G3 - G5) = P(G5 - G5) - P(G3 - G5) = P(G5 - G5) =$

Following statistics shows preference (like or not) data of 40 student of CSE-40th batch for the tv sitcoms *Friends*, *Big Bang Theory* and *How I Met Your Mother*. Each training example has x₁, x₂ and v where

=0.5-(1-0.7157)=0.26

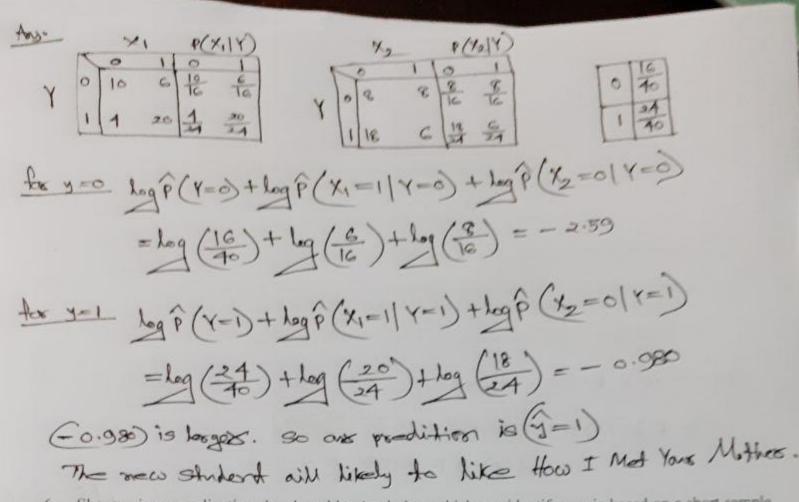
- x₁ is whether or not the student liked Friends,
- x2 is whether or not the student liked Big Bang Theory and
- y is whether or not the student liked How I Met Your Mother.

For the 40 training examples the MLE estimates are as follows:

	Xı	Friends	
Y		0	1
How I Met	0	10	6
Your Mother	1	4	20

Y	X_2	Big Bang Theory	
		0	1
How I Met Your	0	8	8
Mother	- 1	18	6

Md Ibrahim, a new student, likes Friends $(x_1 = 1)$ but not Big Bang Theory $(x_2 = 0)$. What do you predict that he will like How I Met Your Mother?



Shazam is an application developed by Apple Inc. which can identify music based on a short sample played on the device. Based on the frequency of requests it's been getting these days. Shazam has found that:

80% of songs are Hello by Lionel Richie 20% of songs are Can't Get Used to Losing You by Andy Williams

When a request is made, Shazam receives an audio sample that it uses to update its belief. From one particular audio sample (S), Shazam estimates that:

S would have a 50% chance of appearing if Hello were playing.

· S would have a 90% chance of appearing if Can't Get Used to Losing You were playing

What is the updated probability that the song is Hello given the audio sample heard?

 $P(S \mid X_2) = 0.9$ $P(S \mid X_1) = 0.5,$ $P(X_2) = 0.2,$ **Hint**: $P(X_1) = 0.8$, Find P(X1 | S) using Bayes Theorem and Law of Total Probability

My According to the Boyes Theorem we know

$$P(X_{1}|S) = \frac{P(S|X_{1})P(X_{1})}{P(S)}$$
Using Low of Total Pobability to P(S)
$$= \frac{P(S|X_{1})P(X_{1})}{P(S|X_{2})P(X_{2})}P(X_{2}) = \frac{(0.5 \times 0.8)}{(0.5 \times 0.8) + (0.9 \times 0.2)}$$

$$= 0.69$$
Uptaked Pobability that the Sony is [Albo = 0.69]