Vidyavardhini's College of Engineering and Technology

Department of Artificial Intelligence & Data Science

AY: 2024-25

Class:	TE	Semester:	V
Course Code:		Course Name:	AI

Name of Student:	Sainath Khot
Roll No. :	20
Assignment No.:	5
Title of Assignment:	
Date of Submission:	
Date of Correction:	

Evaluation

Performance Indicator	Max. Marks	Marks Obtained
Completeness	5	
Demonstrated Knowledge	3	
Legibility	2	
Total	10	

Performance Indicator	Exceed Expectations (EE)	Meet Expectations (ME)	Below Expectations (BE)
Completeness	5	3-4	1-2
Demonstrated Knowledge Legibility	3	2	1
Legibility	2	1	0

Checked by

Name of Faculty :

Signature :

Date :

AI - 5

Q1 A bag contains 4 white and 6 black while another bag II contains 4 white and 3 black balls. One ball is drawn at random from one of the bags, and it is found to be black. Apply Bayes theorem to find the probability that it was drawn from bag I.

$$\Rightarrow P(A/B) = \frac{P(B/A) \cdot P(A)}{P(B)}$$

Calculate prior probabilities $P(A_1)$ & $P(A_2)$

$$P(A_1) = P(A_2) = 1/2$$

Calculate $P(B/A_1)$ and $P(B/A_2)$.

$$P(B/A_1) = 6/10 = 0.6$$

$$P(B/A_2) = 3/7 =$$

Calculate total probability $P(B)$

$$P(B) = P(B/A_1) \cdot P(A_1) + B(B/A_2) \cdot P(A_2)$$

$$= \left(\frac{6}{10} + \frac{1}{2}\right) + \left(\frac{3}{7} \cdot \frac{1}{2}\right)$$

$$= \frac{36}{70}$$

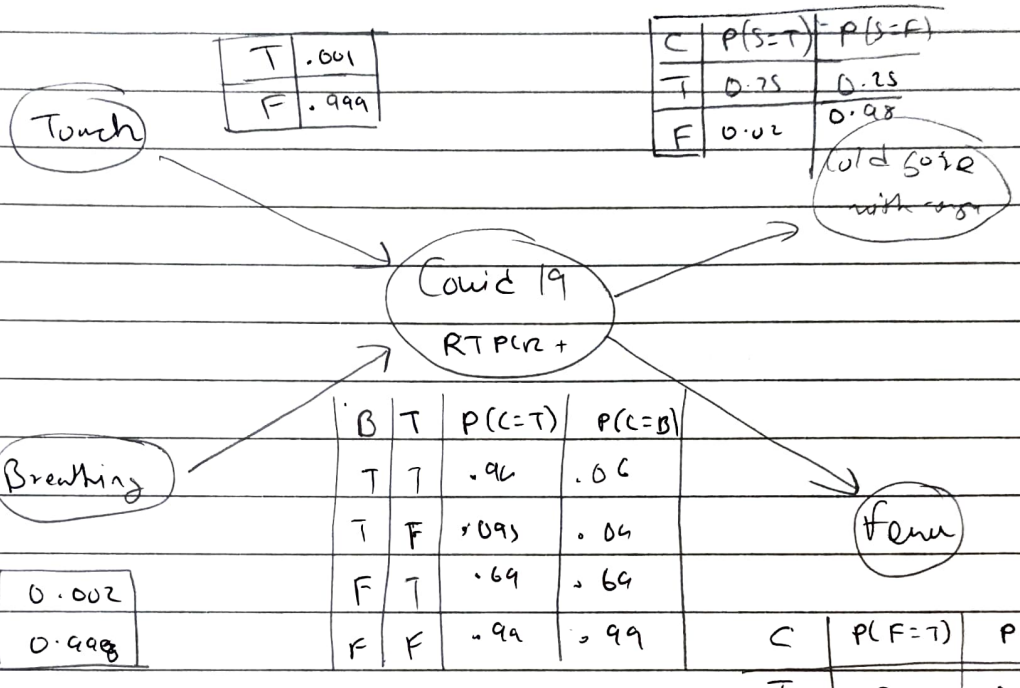
Apply Bayes Theorem

$$P(A_1/B) = \frac{P(B/A_1)\ P(A_1)}{P(B)}$$

$$= \frac{\frac{6}{10} \cdot \frac{1}{2}}{\frac{36}{70}}$$

$$= \frac{7}{12}$$

Q Apply Bayesian Belief Network for find out prob of covid & fever & cold sore with cough but no breathing problem. And not for touching problem.



T	.001
F	.999

C	P(S=T)	P(S=F)
T	0.25	0.25
F	0.02	0.98

B	T	P(C=T)	P(C=B)
T	T	.96	.04
T	F	.095	.04
F	T	.69	.69
F	F	.99	.99

T	0.002
F	0.9998

C	P(F=T)	P(F=F)
T	.91	0.9
F	0.5	0.95

we need to cal

$$P(C_{19} = T/F = T,\ C = T,\ B = F,\ T = F)$$

By using Bayes Theorem

$$P(C_{19} = T/F, C, B, T) = \frac{P(F, C/C_{19} = T) \cdot P(C_{19} = T/B, T)}{P(F, C/B, T)}$$

S1 $P(C_{19} = T / B = F, T = F)$:

$P(C_{19} = T / T = F, B = F) = 0.1$

S2 $P(F = T / C_{19} = T)$:

$P(F = T / C_{19} = T) = 0.91$

S3 $P(C = T / C_{19} = F)$ -

$P(C = T / C_{19} = T) = 0.94$

S4 $P(F = T / C_{19} = F)$ -

$P(F = T / C_{19} = F) = 0.5$

from the CPT for cold sun with cough

$P(C = T / C_{19} = F) = 0.3$

→ Total Probability ⇒ $P(F = T, C = T / B = F, T = F)$:

$P(F, C / B = F, T = F) = P(F, C / C_{19} = T) \cdot P(C_{19} = T / B = F, T = F)$
$+ P(F, C / C_{19} = F) \cdot P(C_{19} = F / B = F, T = F)$

For $C_{19} = T$

$P(F = T, C = T / C_{19} = T) = P(F = T / C_{19} = T) \cdot P(C = T / C_{19} = T)$
$= 0.95 + 0.94$
$= 0.893$

thus

$$P(F=T, C=T / C_{19}=T) \cdot P(C_{19}=T) = (0.89) \cdot (0.1$$
$$= 0.0893$$

for $C_{19}=F$.

$$P(F=T, C=T / C_{19}=F) = P(F=T / C_{19}=F) \cdot P(C=T / C_{19}=F)$$
$$= (0.5) \cdot (0.3)$$
$$= 0.15$$

$$P(C_{19}=F / B=F, T=F) = 0.9$$

thus

$$P(F=T, C=T / C_{19}=F) \cdot P(C_{19}=F) = (0.15)(0.9$$
$$= 0.135$$