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ROLL#: 19F-0916 , 19F-0917

COURSE: AML

ASSIGNMENT#: 03

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Assignment 3

Question 1:
Bayes Theorem.

a) → Test will return a positive for sick person.

$P(P \cap D) = ?$

$= \frac{0.009}{0.01} = 0.9$

→ Positive test, what is probability that you have disease D?

D = Disease
P = +ive
∴ P = positive

$P(\text{Disease}/P) = \frac{P(P|D)}{(P(P))}$

$= \frac{0.009}{(0.009 + 0.001)}$

$= 0.9$

b) A_1 = spam
A_2 = Low
A_3 = high

$P(A_1) = 0.7$
$P(A_2) = 0.2$
$P(A_3) = 0.1$

$P(\text{Spam}/\text{free}) = P(A_1/B) = ?$ (spam, event i.e free)

As we know Following values are not given, so we take it from internet.

$P(B/A_1) = 0.9$ $P(B/A_2) = 0.01$ $P(B/A_3) = 0.01$

If we don't have these value then we can't solve this.

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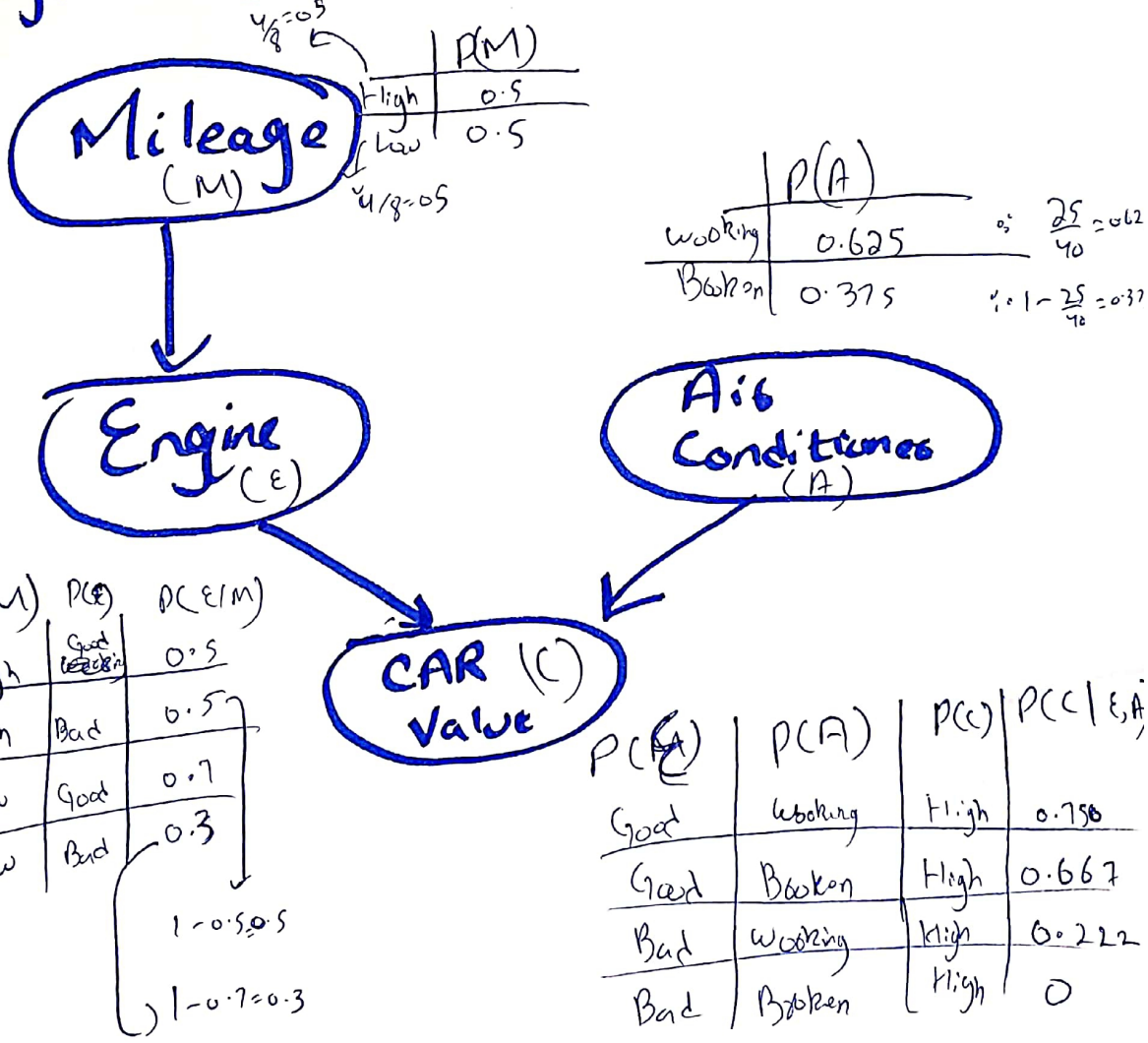
$$P(A_1|B) = \frac{P(B|A_1) \cdot P(A_1)}{P(B|A_1)P(A_1) + P(B|A_2)P(A_2) + P(B|A_3)P(A_3)}$$

$$= \frac{0.9 \times 0.7}{(0.9 \times 0.7) + (0.01 \times 0.2) + (0.01 \times 0.1)}$$

$$= \frac{210}{211} = 0.9952.$$

QUESTION 2:
Bayseian Belief Network.



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QUESTION 4:

Dataset: x_1 x_2 x_3 x_4 $\hat{y}$

$D = \{(1,1,1,+), (1,0,1,-), (0,1,0,-), (0,0,1,-)\}$

$x = (1, 1, 0)$

$$P(c|d) = \frac{P(d|c)\,P(c)}{P(d)}$$

⇓

Formula for Naive bayes classifiers

So making data set in table format:

x_1	x_2	x_3	x_4	
1	1	0	0	
1	0	1	0	
1	1	0	1	
$\hat{y}$	+	−	−	−