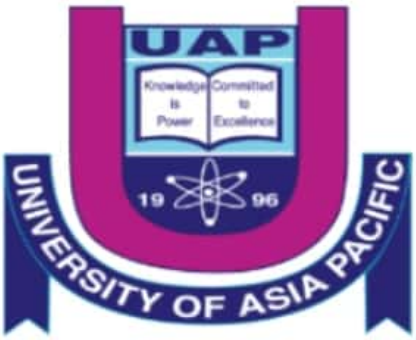

University of Asia Pacific

Department of CSE

Name: Rashik Rahman

Reg ID: 17201012

Year: 4th

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Course Title: Artificial intelligence

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Q1: Ans

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$P(X|Y,Z)$; $X \perp\!\!\!\perp Y|Z$

Query variable — hidden variable — evidence variable

i) Query variable: The variable which's probability is needed to know

ii) Hidden variable: The variable that is irrelevant to query variable and independent from it, thus can be ~~deducted from the~~ excluded from the equation

iii) ~~Eve~~Evidence variable: The variable based on which we calculate the probability of query variable. It is a given event ~~whi~~ based on it query variable's probability is calculated

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(2)

Q.2 : Ans

Satun-day	Sunday	Probability
rain	rain	A = 1 - B = 1 - 0.021 = 0.979
rain	sun	B = 21/1000 = 0.021
sun	rain	C = √21 / 100 = 0.046
sun	sun	D = 1 - C = 1 - 0.046 = 0.95

Let,

X_1 = Saturday

X_2 = Sunday

X_3 = Monday

Need to calculate $P(X_3 = rain)$

Given,

$P(X_1 = sun) = 0.7$

$P(X_1 = rain) = 1 - 0.7 = 0.3$

From Markov chain law we get,

$$P(X_2 = sun) = P(X_2 = sun \mid X_1 = sun)\, P(X_1 = sun) + P(X_2 = sun \mid X_1 = rain)\, P(X_1 = rain)$$

$$= 0.95 \times 0.7 + 0.021 \times 0.3$$

$$= 0.665 + 0.0063 = 0.6713$$

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$$P(X_2 = \text{rain}) = P(X_2 = \text{rain} \mid X_1 = \text{sun})\, P(X_1 = \text{sun}) + P(X_2 = \text{rain} \mid X_1 = \text{rain})\, P(X_1 = \text{rain})$$

$$= 0.046 \times 0.7 + 0.979 \times 0.3$$

$$= 0.032 + 0.294$$

$$= 0.3257 = 0.326$$

$$P(X_3 = \text{rain}) = P(X_3 = \text{rain} \mid X_2 = \text{sun})\, P(X_2 = \text{sun}) + P(X_3 = \text{rain} \mid X_2 = \text{rain})\, P(X_2 = \text{rain})$$

$$= 0.046 \times 0.6713 + 0.979 \times 0.326$$

[As the given condition of A, B, C, D is true for all X_t, X_{t-1}]

$$= 0.031 + 0.319$$

$$= 0.35$$

So the probability of Monday being rainy is 35%.

Ans.

[N.B: Due to my isolation state and exam time couldn't manage black ball pen thus writting with blue gell pen]