Name: Harsha Keerthipati Assignment -8

Id: 1001374263

Task 1

(A) Let M-Sensor in Maine

T- Daily high ≥ 80 degrees

$P(M) = 0.05 \quad P(\neg M) = 0.95$

$P(T/M) = 0.2 \quad P(T/\neg M) = 0.9$

To find $P(M/\neg T)$

$< P(M/\neg T) \quad P(\neg M/\neg T) T >$

$= \alpha < P(\neg T/M) P(M) \quad P(\neg T/\neg M) P(\neg M) >$

$= \alpha < 0.8 \times 0.05 \quad 0.1 \times 0.95 >$

$= \alpha < 0.04 \quad 0.095 >$

$= < 0.2963 \quad 0.7037 >$ $\alpha = \frac{1}{0.135}$

$P(M/\neg T) = 0.2963$

29.63% Probability Sensor is in Maine

(B) $P(T_2/\neg T_1) = \frac{P(\neg T_2 \cap \neg T_1)}{P(\neg T_1)}$

$P(\neg T_1) = P(\neg T_1/M) P(M) + P(\neg T_2/\neg M) P(\neg M)$

$P(\neg T_2 \cap \neg T_1) = P(\neg T_2 \cap \neg T_1/M) P(M) + P\left(\frac{\neg T_2 \cap \neg T_1}{\neg M}\right) P(\neg M)$

Name: Harsha Keerthipati
Id: 1001374263

$= P(\neg T_2/M)\,P(\neg T_1/M)\,P(M) + P(\neg T_2/\neg M)\,P(\neg T_1/\neg M)\,P(\neg M)$

$= 0.8 \times 0.8 \times 0.05 + 0.1 \times 0.1 \times 0.95$

$= 0.0415$

$P(\neg T_2/\neg T_1) = \frac{0.0415}{0.135} = 0.3074$

(C) $P(\neg T_3 \cap \neg T_2 \cap \neg T_1)$

$= P(\neg T_3 \cap \neg T_2 \cap \neg T_1/M)\,P(M)$

$+ P(\neg T_3 \cap \neg T_2 \cap \neg T_1/\neg M)\,P(\neg M)$

$= P(\neg T_3/M)\,P(\neg T_2/M)\,P(\neg T_1/M)\,P(M)$

$+ P(\neg T_3/\neg M)\,P(\neg T_2/\neg M)\,P(\neg T_1/\neg M)\,P(\neg M)$

$= 0.8 \times 0.8 \times 0.8 \times 0.05$

$+ 0.1 \times 0.1 \times 0.1 \times 0.95$

$= 0.0256 + 0.00095 = 0.02655$

Rough
0.0256
0.00095
0.02655

Task 2
(A) $P(A, B_1, B_2, B_3 \ldots B_{10})$

A → 5 values

B → 7 values

joint Prob - 5×7^{10} numbers

$- 5 \times 7^{10} - 1$ numbers

(B) Conditional Probability

$$P(A, B_1, B_2, B_3, \ldots B_{10}) = P(B_1/A)\, P(B_2/A) \ldots P(B_{10}/A) P(A)$$

we know,

$P(B_1/A)$ needs $5 \times (7-1) = 30$ values

$P(A)$ needs $5-1 = 4$ values.

So total $30 \times 10 + 4$

$= 300 + 4$

$= 304$ values.

Task 5

(A) Markovian blanket of node L

G, P, Q, K, M

(B) $P(A, F) \Rightarrow P(F, A)$

$= P(F/A)\, P(A)$

$= 0.8 \times 0.8$

$= 0.64$

0.8
0.8
64
00
0.64

(C) $P(M, 7C/H) = \dfrac{P(M, 7C, H)}{P(H)}$

$P(M, 7C, H) = P(M, H, 7C)$

$= P(M/H)\, P(H/7C)\, P(7C)$

$= 0.1 \times 0.1 \times 0.4 = 0.004$

$P(H) = P(H/C) P(C) + P(H/7C) P(7C)$

$= 0.6 \times 0.6 + 0.1 \times 0.4$

Name: Harsha Keesthipati

Id: 1001374263

$= 0.36 + 0.4$

$= 0.40$

$P(M, 7C/H) = \frac{0.004}{0.40}$

$= 0.01$ //.