CSE 422 : Artificial Intelligence

Theory Assignment 3

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section : 08

Answer to the Question no: 1

Here given,

covid-19 global prevalence 0.02

$\therefore P(\text{covid 19}) = 0.02$

not covid = $P(\overline{\text{covid-19}}) = 0.98$

now,

~~positive test positive or P(T|covid)~~

here sensitivity = 75% or 0.75

& specificity = 80% or 0.80

$\therefore$ positive + Test positive, $P(T \mid \text{covid-19}) = 0.75$

Test negative + negative, $P(\overline{T} \mid \overline{\text{covid-19}}) = 0.8$

Test positive + negative, $P(T \mid \overline{\text{covid-19}}) = 0.2$

according to naeve bayes theorem,

having covid-19 & tested positive,

$$P(\text{covid-19} \mid T_1, T_2, T_3) = 0.75 \times 0.75 \times 0.75 \times 0.02$$

$$= 0.0084375$$

and,

not having covid-19 & tested positive,

$$P(\overline{\text{covid-19}} \mid T_1, T_2, T_3) = 0.98 \times 0.2 \times 0.2 \times 0.2$$

$$= 0.00784$$

∴ Probability of having covid-19 of that patient,

$$P(\text{covid-19} \mid T) = \frac{0.0084375}{0.0084375 + 0.00784}$$

$$= 0.5184$$

∴ 0.5184 or 51.84% is the probability of having covid-19.

[Ans]