Quiz 4

Ans. to the ques. no-1:

ⓐ Let's assume,

A = participation (in movement)

B = Injured

C = Preparation (for final)

D = Decision (course drop)

$$P(B|A) = \frac{P(B \cap A)}{P(A)}$$

$$= \frac{1/10}{6/10}$$

$$= \frac{1}{6}$$

$$= 0.1667$$

ⓑ $P(\sim D = \text{No drop} \mid A = \text{Participate} \cap B = \text{Injured} \cap C = \text{Average})$

$$P(\sim D \mid A \cap B \cap C) = \frac{P(A \cap B \cap C \mid \sim D)\ P(\sim D)}{P(A \cap B \cap C)}$$

Here, $P(A \cap B \cap C) = \frac{0}{10}$ ⇒ There is no single combination given that can satisfy the condition. So, it raises a 'Zero Probability problem' of ~~Naive~~ Bayes Theorem.

We can solve this by applying the Naive Bayes Theory.

Now,

$$P(A \cap B \cap C \mid \sim D) = P(A|\sim D) * P(B|\sim D) * P(C|\sim D)$$

$$= \frac{2}{5} * \frac{4}{5} * \frac{2}{5}$$

$$= 0.128$$

So,

$$P(A \cap B \cap C | \sim D) * P(\sim D) = 0.128 * \frac{5}{10}$$

$$= 0.064$$

Now,

$$P(A \cap B \cap C) = P(A \cap B \cap C \cap D) + P(A \cap B \cap C \cap \sim D)$$

$$= P(A \cap B \cap C | D) * P(D) + P(A \cap B \cap C | \sim D) * P(\sim D).$$

$$P(A \cap B \cap C | D) = P(A | D) * P(B | D) * P(C | D).$$

$$= \frac{4}{5} * \frac{1}{5} * \frac{1}{5}$$

~~P(A~~

$$= 0.032.$$

So, $P(A \cap B \cap C | D) * P(D) = 0.032 * \frac{5}{10}.$

$$= 0.016$$

Here, $P(A \cap B \cap C) = P(A \cap B \cap C | D) * P(D) + P(A \cap B \cap C | \sim D) * P(\sim D)$

$$= 0.016 + 0.064$$

$$= 0.08$$

Finally, $P(\sim D | A \cap B \cap C) = \frac{0.064}{0.08}$

$$= 0.8$$