Day 4

Thursday, December 14, 2023 7:48 AM

freshman, S, SE, others

mutually exclusive : only one

exhaustive : must be in one

- Definition
- 3 Terms
- 3 Definition
- 2 terms : m. E / E.
- Calculation : "or" / "U"

Special Rule of addition

$P(A \cup B) = P(A \text{ or } B)$

either A or B

General Rule of addition

$P(A \cup B) = P(A \text{ or } B)$

$P(A \overset{or}{\cup} B) = P(A) + P(B) - P(A \overset{and}{\cap} B)$

$P(A \overset{and}{\cap} B) = P(A) \cdot P(B|A) = P(B) \cdot P(A|B)$

if $P(A|B) = P(A)$ or $P(B|A) = P(B)$

$P(A \overset{and}{\cap} B) = P(A) \cdot P(B)$

$P(A \text{ or } B)$

$P(A^c \overset{and}{\cap} B^c) = P(A^c) \cdot P(B^c)$

$P(A^c | B^c) = P(A^c)$

NotA NotB

$P(F|NT) = 40\%$: Fail the course if she doesn't have a tutor.

$P(F|T) = 10\%$: Fail w/ a tutor

$P(T) = 50\%$: Find a tutor



$P(F) =$

Total Probability

$P(F) = P(T \cap F) + P(NT \cap F)$

$= P(T) \cdot P(F|T) + P(NT) \cdot P(F|NT)$

either or

$= 50\% \times 10\% + 40\% \times 50\% = 25\%$

$P(T|F) = ?$

$P(T|F) = \frac{P(F|T) \cdot P(T)}{P(F)} = 0.2$

0.1 0.5 0.25

Bayes Theorem

$P(A|B) \longleftrightarrow P(B|A)$

$P(A \cap B) = P(A) \cdot P(B|A) = P(B) \cdot P(A|B)$

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

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

$$P(T|F) = \frac{P(F|T) \cdot P(T)}{P(F|T) \cdot P(T) + P(F|NT) \cdot P(NT)}$$

$$P(A|B) = \frac{P(B|A) \cdot P(A)}{P(B|A) \cdot P(A) + P(B|A^c) \cdot P(A^c)}$$

$P(\text{Correct}) = 0.99$

$P(\text{wrong}) = 0.01$

$$P(D|+) = \frac{P(+|D) \cdot P(D)}{P(+)}$$