Conditional Probability and Bayes' Theorem

Conditional Probability

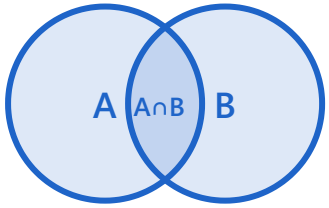
$$P(A|B) = P(A \cap B) / P(B)$$

Probability of A given B has occurred

Multiplication Rule

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

Visual Representation



Independence: X ⊥ Y

$$P(X|Y) = P(X)$$

Bayes' Theorem

$$P(A|B) = P(B|A)P(A) / P(B)$$

Prior	→	Likelihood	→	Posterior
$P(A)$		$P(B\|A)$		$P(A\|B)$

Applications

- Updating beliefs with new data
- Medical diagnosis and testing
- Spam filtering and classification

ML Foundation

Bayesian regression and inference