

Probability Distributions - Discrete and Continuous

Discrete Distributions

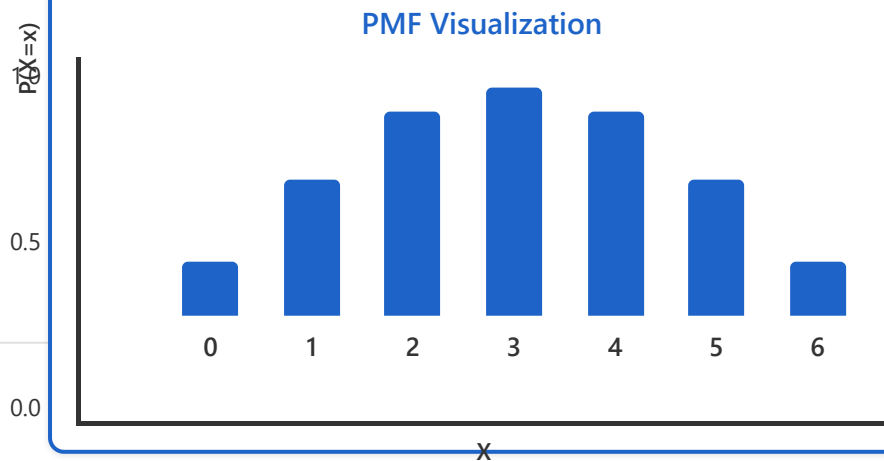
Probability Mass Function (PMF)

$$P(X = x)$$

Probability of specific values

Examples

- **Bernoulli:** Coin flip
- **Binomial:** n trials
- **Poisson:** Rare events



Continuous Distributions

Probability Density Function (PDF)

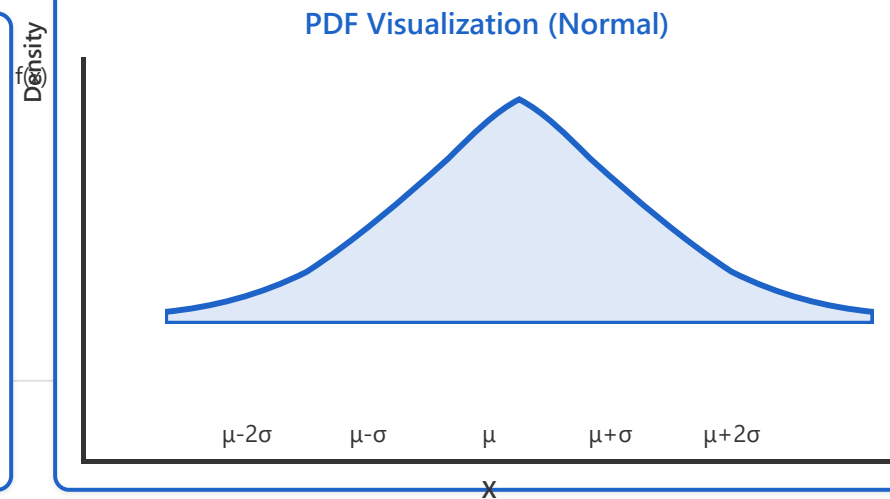
$$f(x)$$

$$P(a \leq X \leq b) = \int_a^b f(x)dx$$

Normal Distribution

$$X \sim N(\mu, \sigma^2)$$

Bell-shaped curve



Standard Normal Distribution

ML Impact

$Z \sim N(0, 1)$ - Used for standardization

Errors in regression often assumed normal

Enables statistical inference