Probability

Types of probability distribution

Discrete Distributions:

Uniform Distribution:
- All outcomes are equally likely.
- Every value in the range has the same probability of occurring.
- Example: Rolling a fair six-sided die.

Bernoulli Distribution:
- Describes a single experiment with two possible outcomes: success and failure.
- Parameterized by the probability of success, often denoted as p.
- Example: Flipping a coin where success might be getting heads.

Binomial Distribution:
- Describes the number of successes in a fixed number of independent Bernoulli trials.
- Characterized by two parameters: the number of trials (n) and the probability of success in each trial (p).
- Example: The number of heads obtained when flipping a coin multiple times.

Poisson Distribution:
- Models the number of events occurring in a fixed interval of time or space.
- Parameterized by the average rate of occurrence (λ).
- Example: Number of phone calls received by a call center in a given hour.

Continuous Distributions:

Normal Distribution:
- Often referred to as the bell curve.
- Symmetric around the mean.
- Describes many natural phenomena.
- Characterized by mean (μ) and standard deviation (σ).
- Example: Heights or weights of people in a population.

Student's-T Distribution:
- Similar to the normal distribution but with heavier tails.
- Used when sample sizes are small and population standard deviation is unknown.
- Parameterized by degrees of freedom.
- Example: T-distribution is commonly used in hypothesis testing when sample sizes are small.

Chi-Squared Distribution:
- Used in hypothesis testing and confidence interval estimation.
- Result of summing the squares of independent standard normal random variables.
- Parameterized by degrees of freedom.
- Example: Used in testing goodness of fit of observed data to theoretical models.

Logistic Distribution:
- Describes growth processes where growth rate decreases over time and has lower and upper bounds.
- S-shaped curve.
- Often used in modeling population growth and in logistic regression.
- Example: Growth of a population in a limited environment.

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