Welcome

to our

P r e s e n t a t i o n

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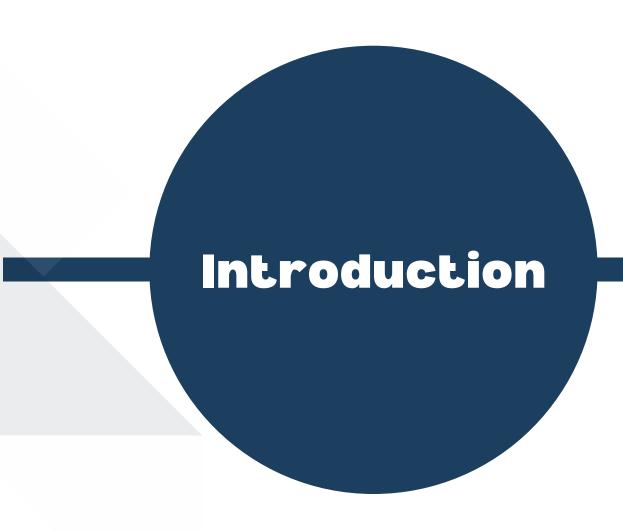Hrishikesh Sarker Partho – 0242220005101118

Presented to:

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Topic

Importance of Statistics in Computer Science

Introduction

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Introduction

Statistics is the discipline that concerns the collection, organization, analysis, interpretation, and presentation of data.

Statistics serves as the backbone, empowering computer scientists to extract meaning from data, design intelligent algorithms, and make informed decisions. In this presentation, we'll explore five key facets showcasing the indispensable role of statistics in the realm of computer science.
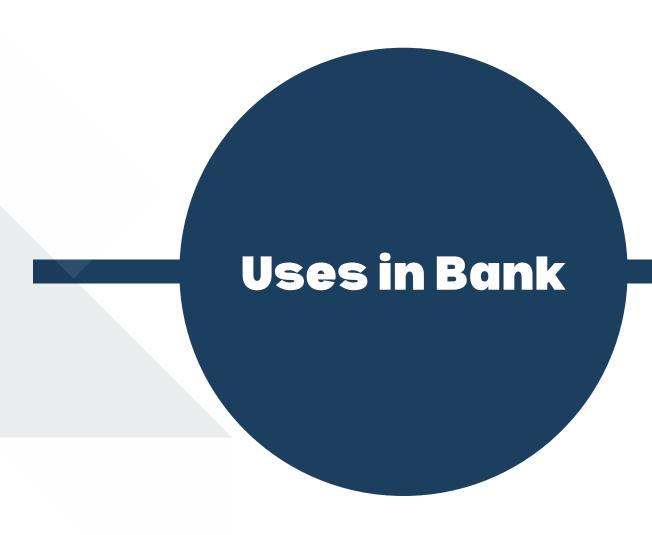
Quality Assurance and Testing

Statistical methods play a crucial role in quality assurance and testing of software systems. Techniques like regression testing, A/B testing, and defect analysis rely on statistical analysis to assess performance and reliability.

Performance Testing:

- Performance testing involves evaluating the responsiveness, scalability, and stability of a software system under various load conditions.

Importance: Statistical analysis of performance testing results helps developers optimize system performance, allocate resources efficiently, and ensure that the software product can handle expected workloads and user demands without degradation in performance or reliability.
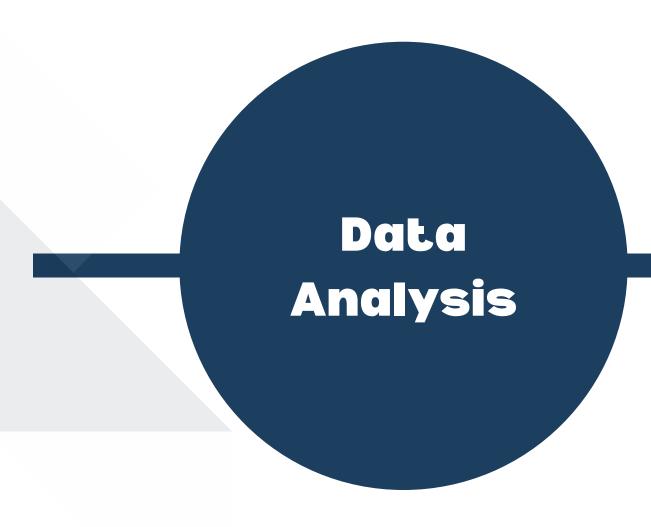
Bank

- **Risk Management:** Statistical analysis helps banks assess the creditworthiness of borrowers, allowing them to make informed lending decisions and minimize the risk of defaults. Techniques like credit scoring and loan-to-value (LTV) ratio calculations leverage statistics for risk assessment.

- **Fraud Detection:** Statistical models are used to identify unusual patterns in transactions, potentially indicating fraudulent activities. This helps banks protect their customers and prevent financial losses.

Bank

- **Market Research:** Banks use statistics to analyze customer demographics, spending habits, and market trends, enabling them to develop targeted marketing campaigns and tailor products and services to specific customer segments.

- **Regulatory Compliance:** Banks are required to adhere to various regulations, and statistical reporting plays a vital role in ensuring compliance. Banks use statistics to generate reports on loan performance, capital adequacy, and other metrics as mandated by regulatory bodies.

Data Analysis

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Data Analysis

- Data analysis is fundamental in computer science, providing crucial insights for decision-making, optimization, and performance improvement.
- Descriptive statistics and exploratory data analysis techniques offer a comprehensive understanding of datasets.
- Predictive modeling leverages statistical methods to forecast trends and outcomes based on historical data.

Descriptive Statistics

- Mean
- Median
- Mode
- Standard Deviation
- Central Tendency

Exploratory Data Analysis

- Histogram
- Box Plot
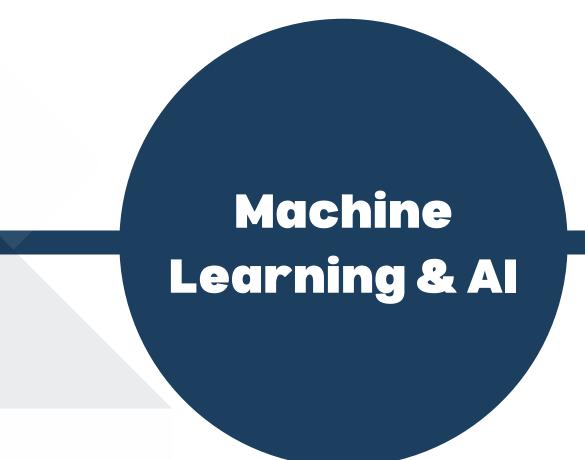
Data Analysis

Predictive Modeling:
- Foundation for forecasting future outcomes using regression, time series analysis, and machine learning algorithms.
- Enables decision-makers to anticipate trends and make proactive decisions based on data insights.

Importance:
- Enables data-driven decision-making, minimizing reliance on intuition or guesswork.
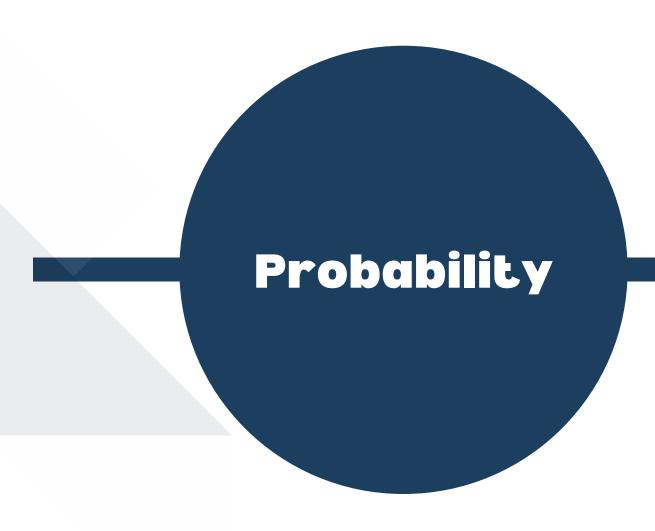- Optimizes algorithms and improves system performance, leading to enhanced efficiency and reliability.

Machine Learning

Data Exploration and Cleaning: "Statistics provides tools for analyzing, visualizing, and summarizing data, revealing patterns, trends, and potential biases. This helps prepare and clean the data, ensuring its quality for machine learning models."

Feature Engineering: Statistical techniques help create informative features from raw data, which are essential for model training. This process involves selecting relevant features, transforming them, and handling missing values.

Hypothesis Testing: Statistical tests help evaluate the effectiveness of machine learning models. They assess if observed patterns are statistically significant or simply due to random chance.

Probability Theory
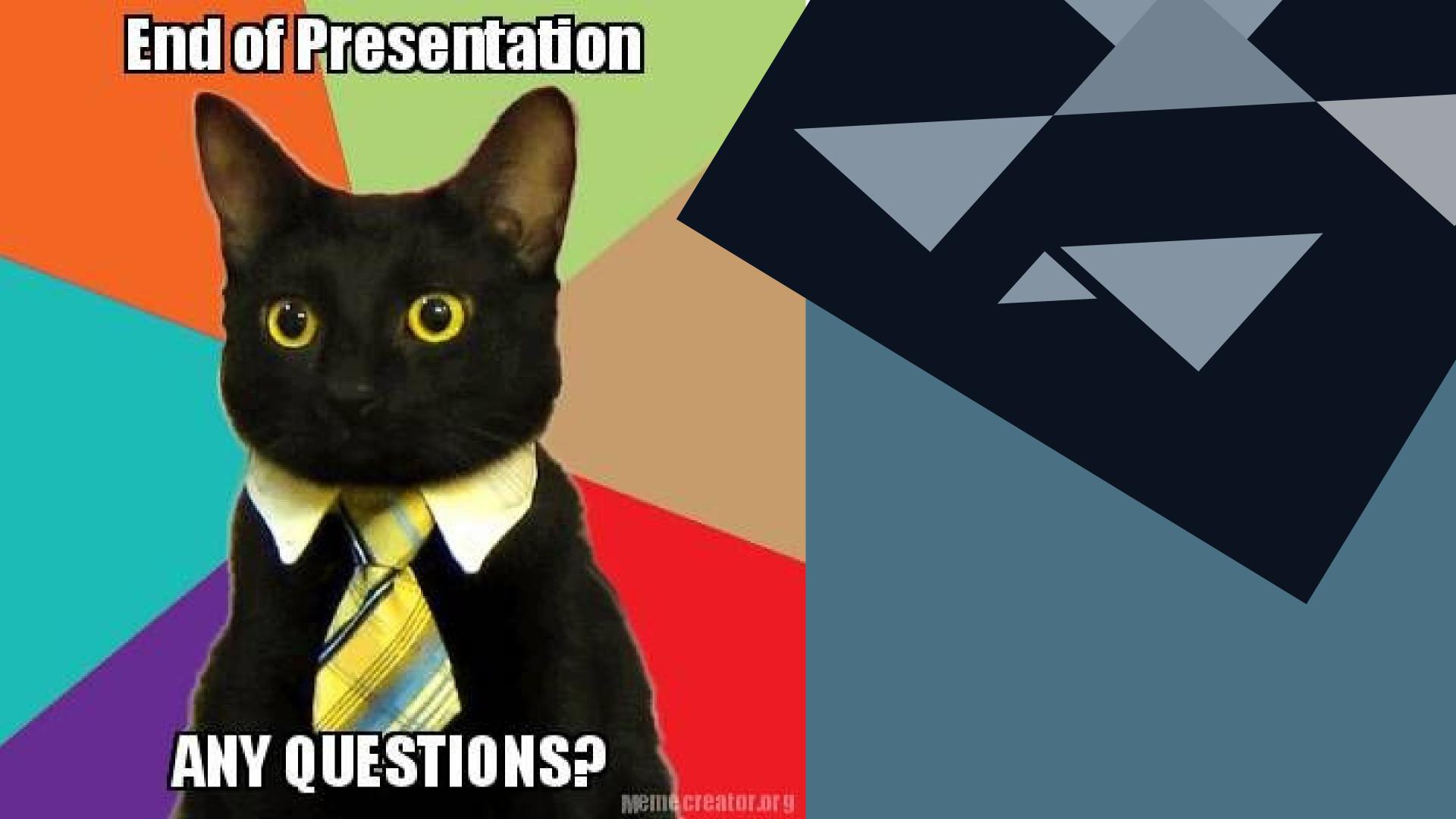
Probability Theory Overview:
- Probability theory, a branch of statistics, provides the foundation for modeling uncertainty and randomness in computer science.
- It enables the quantification of uncertainty and the prediction of outcomes in various applications.

Applications in Computer Science:
- Cryptography
- Gaming Algorithms
- Network Protocols
- Optimization Problems

Conclusion

In conclusion,, statistics is essential to computer science and serves as its foundation. Statistical principles enable researchers, developers, and decision-makers to extract insights, anticipate outcomes, and enhance systems, including data analysis and machine learning algorithms. Combining computer science and statistical approaches transforms industries, spurs creativity, and improves the effectiveness and dependability of technical developments. Accepting the significance of statistics guarantees solid solutions, knowledgeable choices, and ongoing advancement in the constantly changing field of computer technology.

Thank You

For Your Attention