



# SAI RAJESWARI INSTITUTE OF TECHNOLOGY

(UGC – Autonomous)


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An ISO 9001:2015 Certified Institution | Recognised by UGC under section 2(f) of UGC Act 1956  
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## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

### DATA SCIENCE


DATA SCIENCE IS AN INTERDISCIPLINARY ACADEMIC FIELD(S) THAT USES STATISTICS, SCIENTIFIC COMPUTING, SCIENTIFIC METHODS, PROCESSING, SCIENTIFIC VISUALIZATION, ALGORITHMS AND SYSTEMS TO EXTRACT OR EXTRAPOLATE KNOWLEDGE AND INSIGHTS FROM POTENTIALLY NOISY, STRUCTURED, OR UNSTRUCTURED DATA.



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**Data Engineering**


Data engineering refers to the building of systems to enable the collection and usage of data. This data is usually used to enable subsequent analysis and data science, which often involves machine learning.



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**Statistics**


Statistics is a fundamental pillar for extracting meaningful insights from complex datasets. It makes acquiring inferences from enormous amounts of data easier.



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**Visualization**


Data visualization is the graphical representation of information and data. By using visual elements like charts, graphs, and maps, data visualization tools provide an accessible way to see and understand trends, outliers, and patterns in data.



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**Domain expertise**


Domain knowledge is a thorough understanding of a particular field, such as healthcare or finance, acquired through experience and education.



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**Advanced computing**

Advanced computing and data science is a field that combines advanced computing technologies with data science to address challenges in the digital age.



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**Mathematics Expertise**

Mathematics provides a foundation for understanding algorithms, analyzing computational complexity, and designing efficient solutions. Mathematical concepts like logic, set theory, and discrete structures are fundamental to programming and problem solving.

**Prepared By**  
**Dr.G.Ramasubba Reddy**  
**Professor CSE**



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## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

**Artificial Intelligence & Machine learning**

**Pattern Recognition**  
 Pattern Recognition in AI and ML is the ability of computers to identify and classify patterns in data. It involves learning from examples or finding patterns without labels. Common applications include image recognition, speech recognition, and fraud detection.

**Automation**  
 Automation is the use of technology to perform tasks with little or no human intervention. It increases efficiency, reduces errors, and lowers costs.  
 Types:  
 Industrial Automation, Office Automation and home Automation

**Neural Network**  
 Neural Networks are a type of machine learning model inspired by the human brain. They consist of interconnected nodes (neurons) organized in layers, which process data to recognize patterns and make predictions.  
 Input, Output and Hidden layers.

**Algorithm**  
 An algorithm is a step-by-step procedure or formula for solving a problem or performing a task. In computing and mathematics, algorithms are used to process data, perform calculations, and automate reasoning.  
 Applications: Used in software development, data analysis, AI, and everyday problem-solving.

**Artificial Intelligence**  
 Artificial Intelligence (AI) is technology that allows computers to perform tasks that require human-like intelligence, such as understanding language and recognizing patterns.  
 Types:  
 - Narrow AI  
 - General AI  
 Techniques:  
 - Machine Learning: Learning from data  
 - Natural Language Processing (NLP)  
 Understanding human language.  
 AI is applied in fields like healthcare, finance, and robotics.

**Machine learning**  
 Machine Learning (ML) is a branch of artificial intelligence that enables computers to learn from data and make predictions without being explicitly programmed.  
 Types:  
 - Supervised Learning  
 - Unsupervised Learning  
 - Reinforcement Learning  
 Applications:  
 Used in image recognition, spam detection, and recommendation systems.

**Problem Solving**  
 Problem Solving is the process of identifying a challenge, analyzing it, and finding effective solutions.  
 Define the Problem: Understand the issue.  
 Analyze: Gather information and identify causes.  
 Generate Solutions: Brainstorm possible fixes.  
 Evaluate Options: Assess pros and cons.  
 Implement: Put the chosen solution into action.  
 Review: Evaluate the outcome.

**Data Mining**  
 Data mining is a process that uses artificial intelligence (AI) and machine learning (ML) to find patterns and relationships in large data sets. It's a popular technique that can be used in many industries, including healthcare, marketing, and retail.

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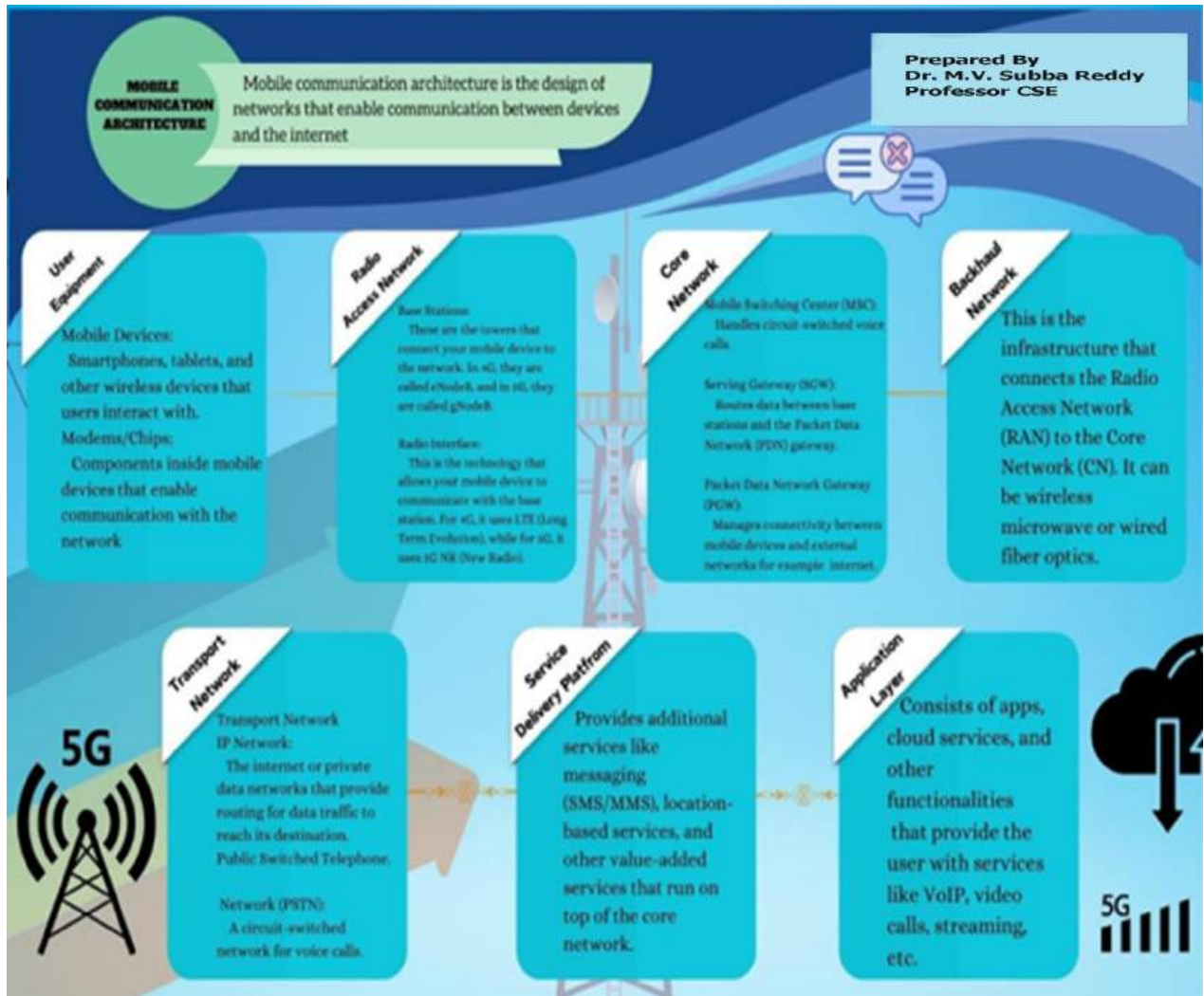
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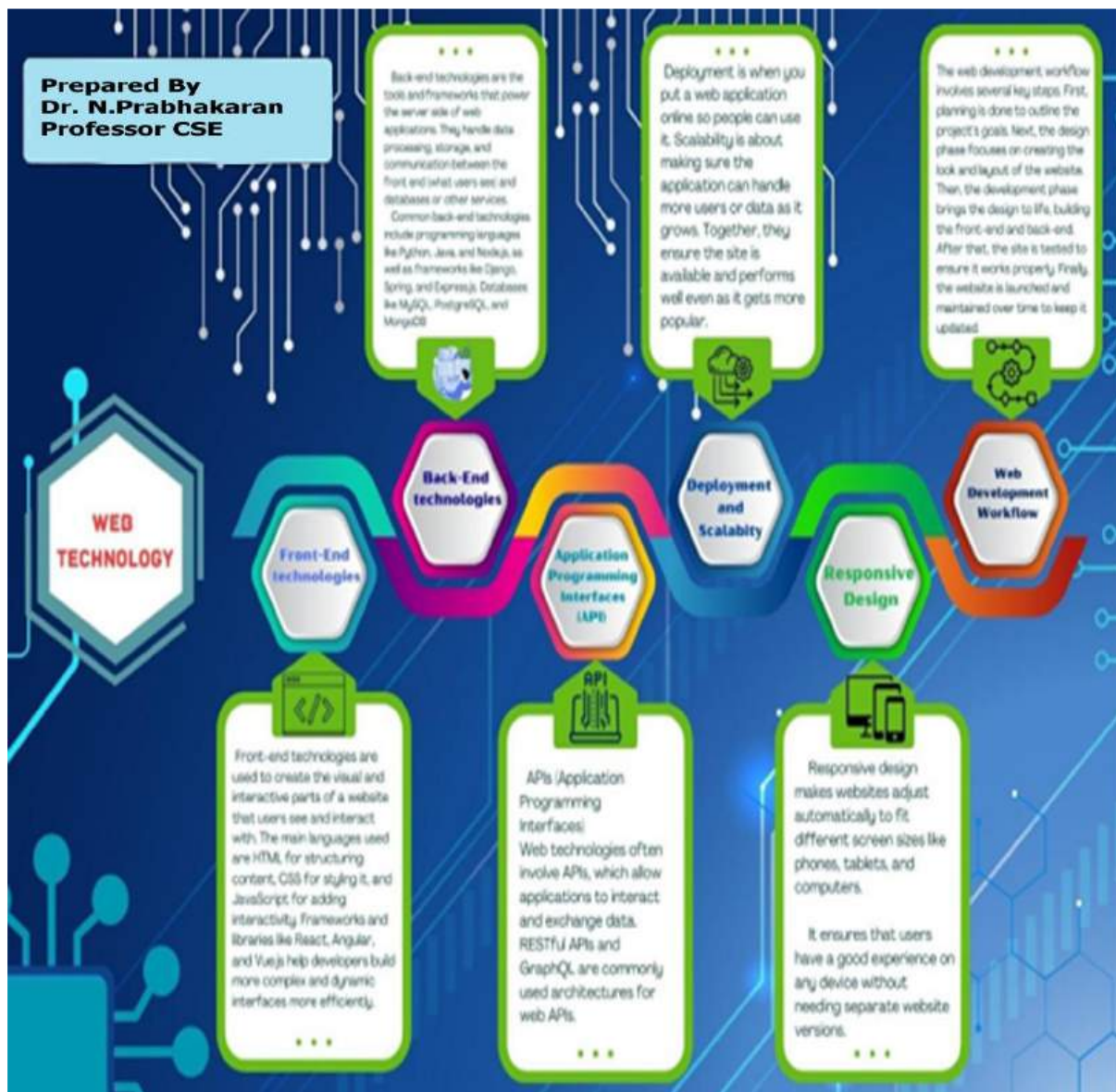
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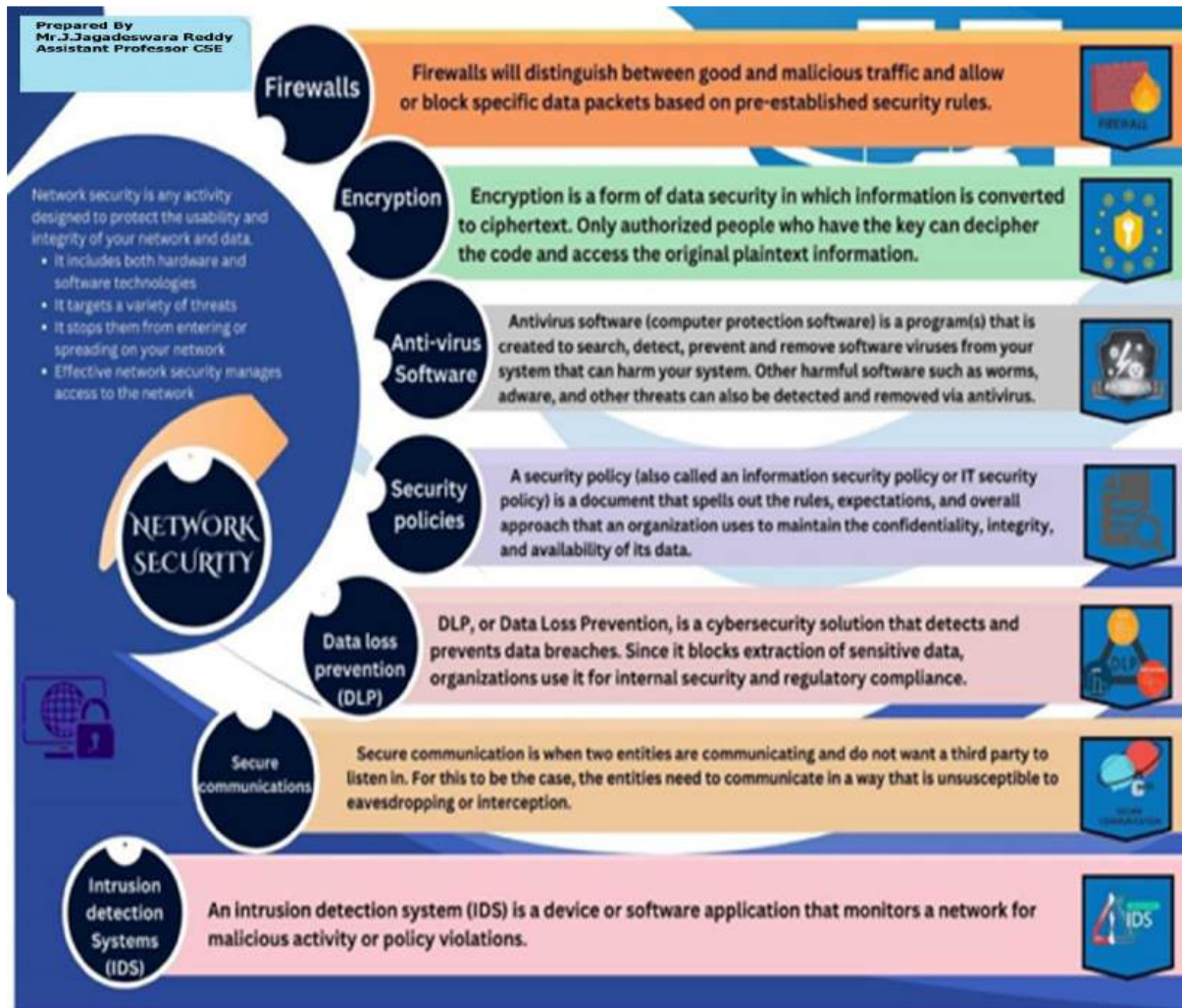
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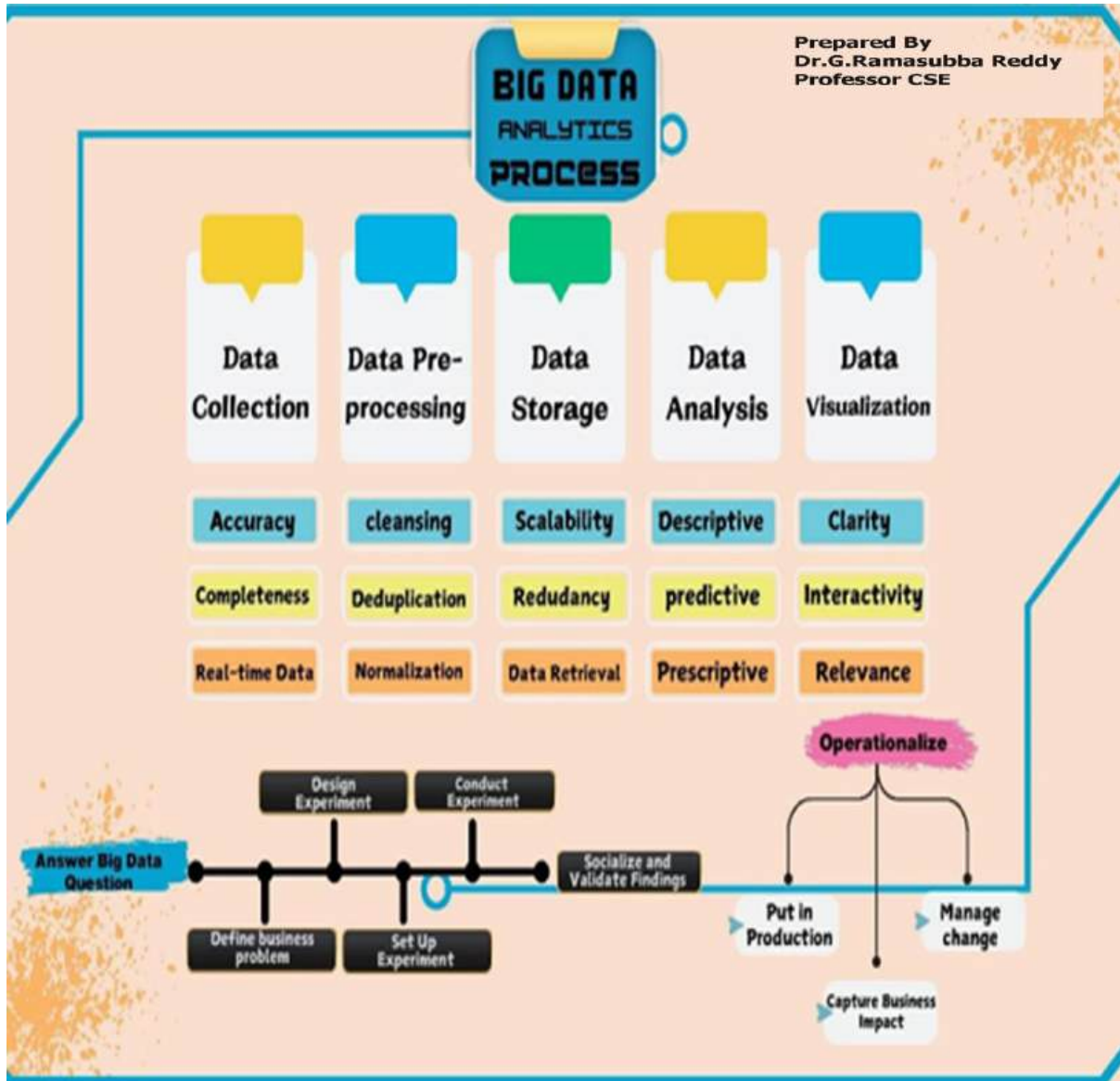
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**DBMS**

**Database Management System**

A Database Management System (DBMS) is software that enables the creation, management, and manipulation of databases. It provides tools for storing, retrieving, updating, and managing data efficiently while ensuring data security and integrity. DBMS supports multiple users and allows for data organization and querying using languages like SQL.

**Types of Database**

- Hierarchical
- Network
- Relational (RDBMS)
- Object-Oriented

**Types of SQL**

- MySQL
- PostgreSQL
- Microsoft SQL Server
- Oracle

**KEY FUNCTIONS**

- Data Storage & Retrieval
- Multi-user support
- Data Security & Integrity

**Components of Database Management System**

- Hardware
- Software
- Data
- Database Access Language

**Data Model**

- Hierarchical
- Relational
- Object Oriented
- Flat
- Document
- Network
- Entity-Relationship
- Semi-Structured
- Key Value
- Column-Family

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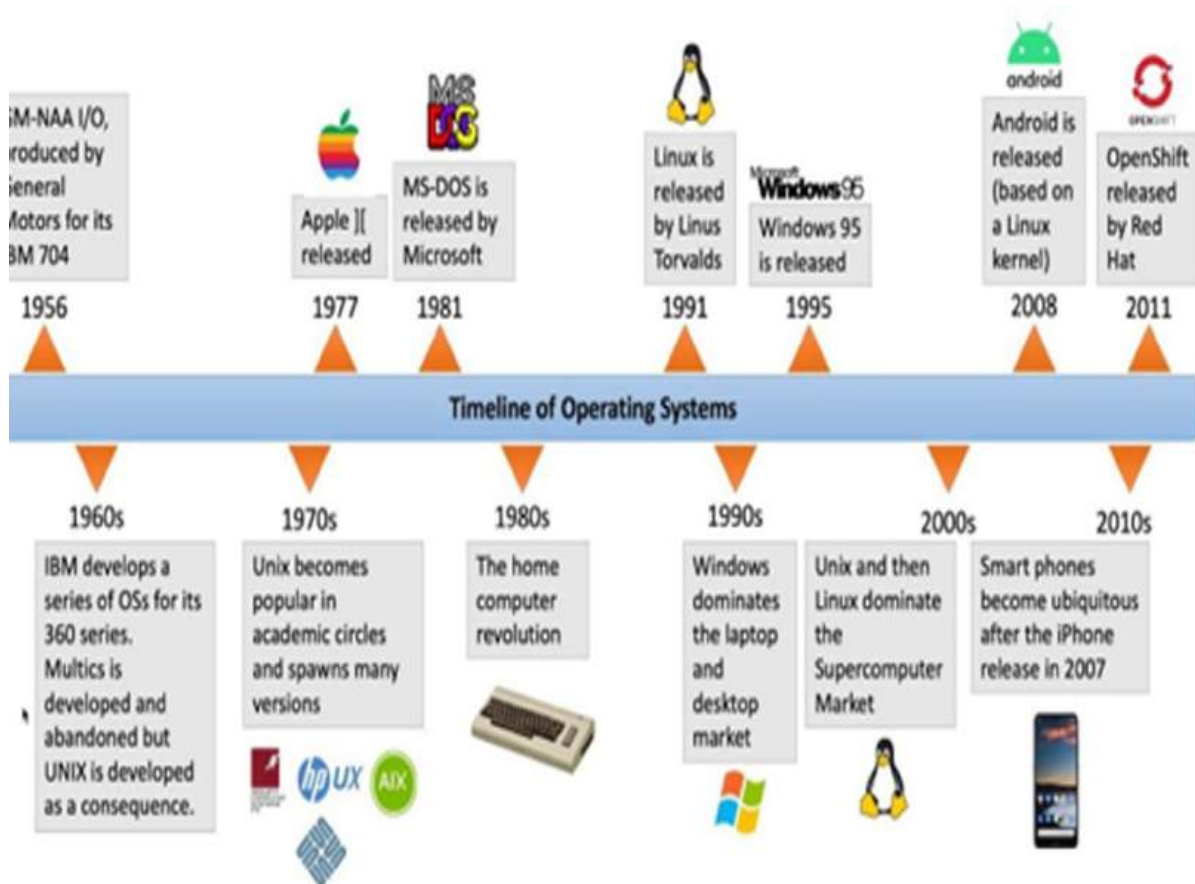
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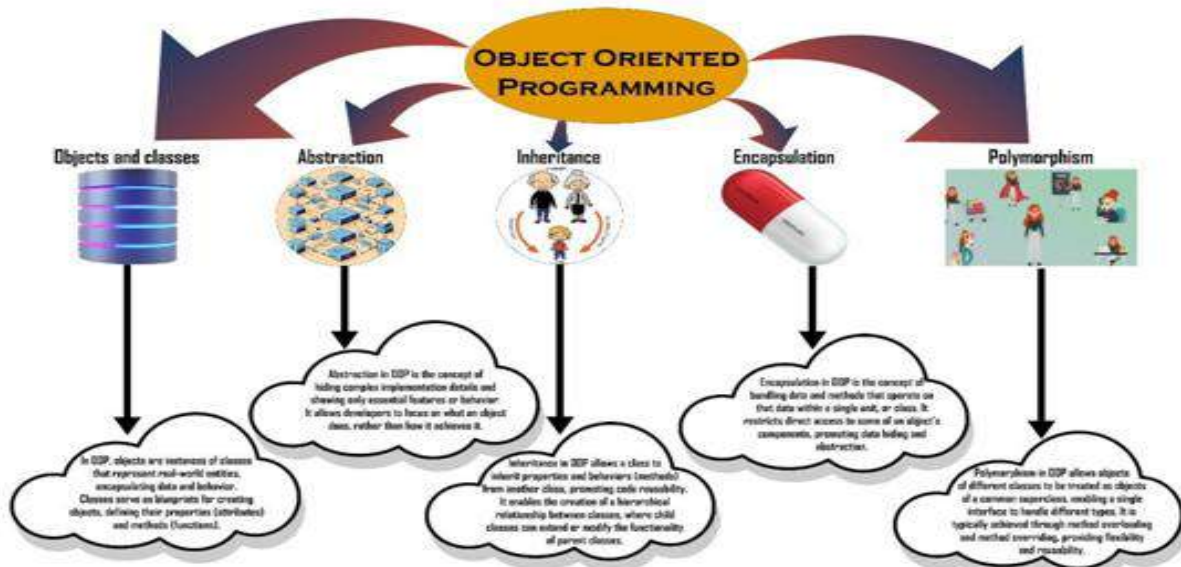


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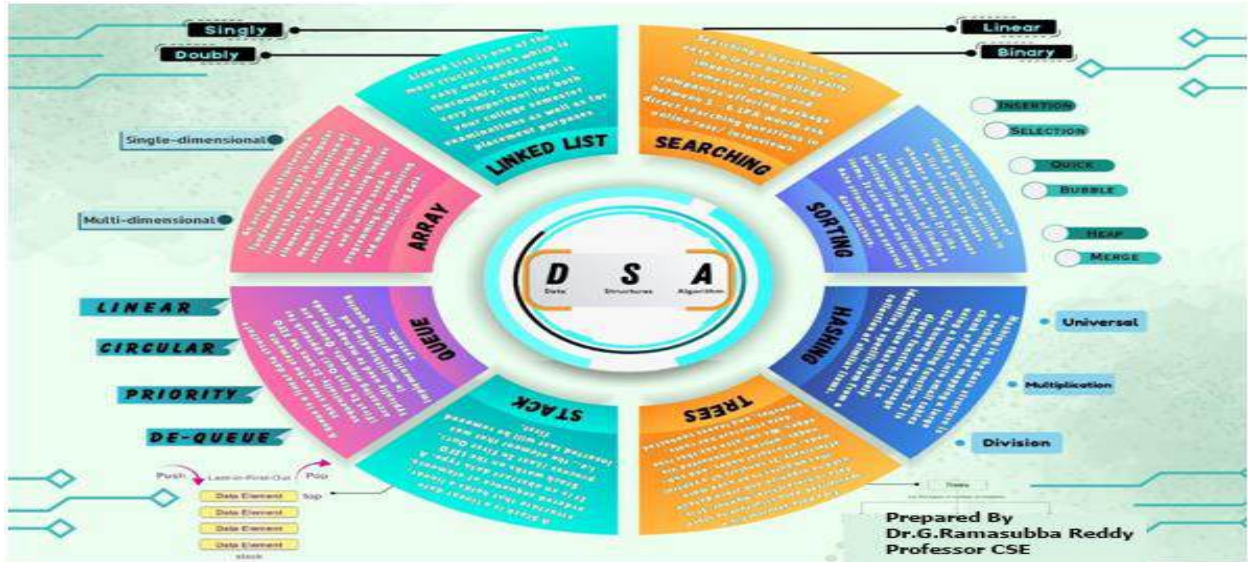
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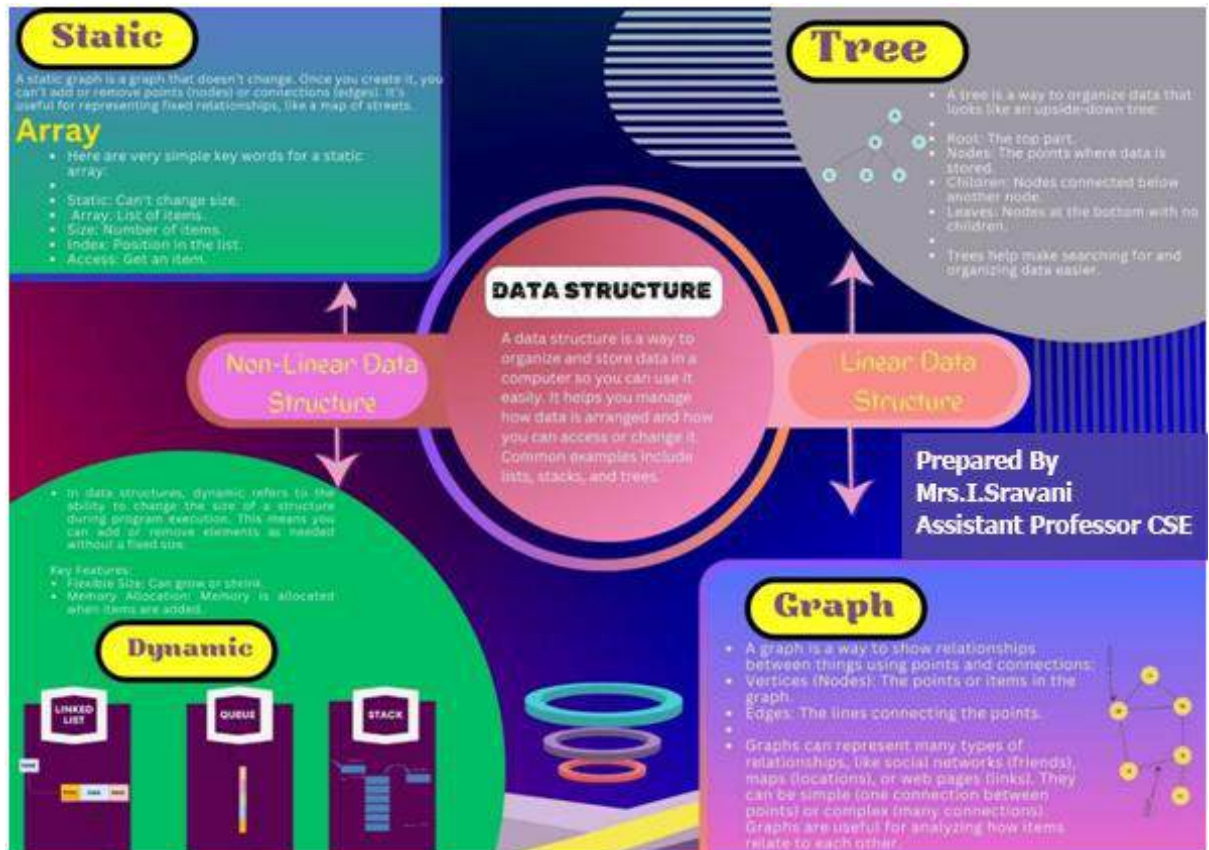
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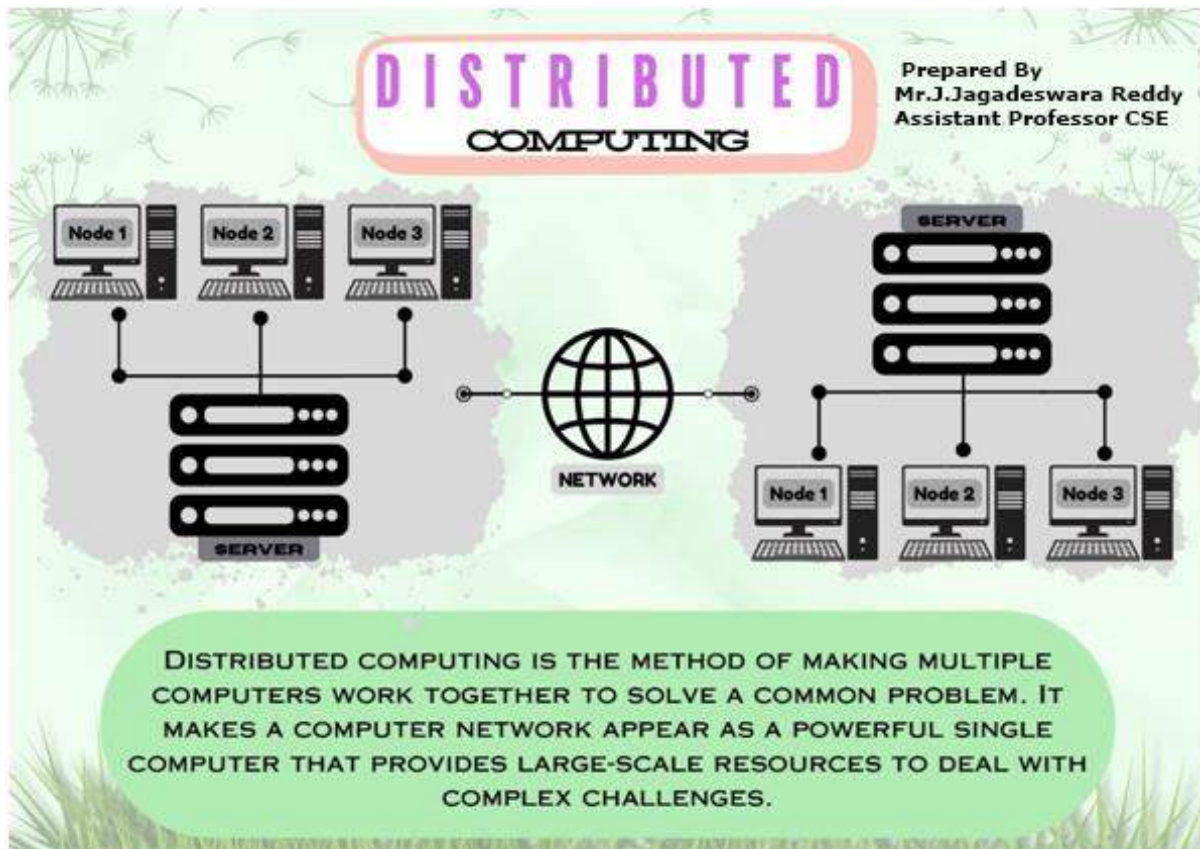
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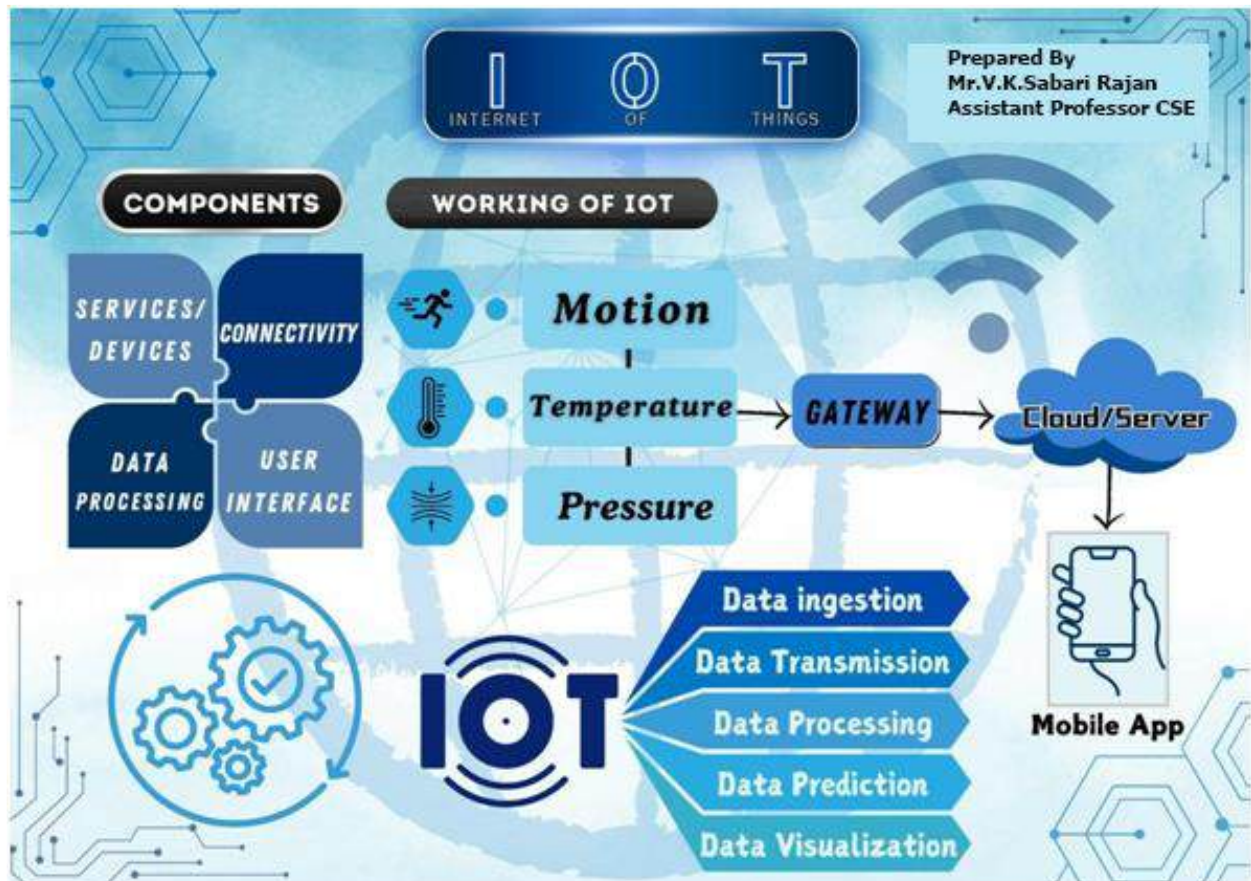
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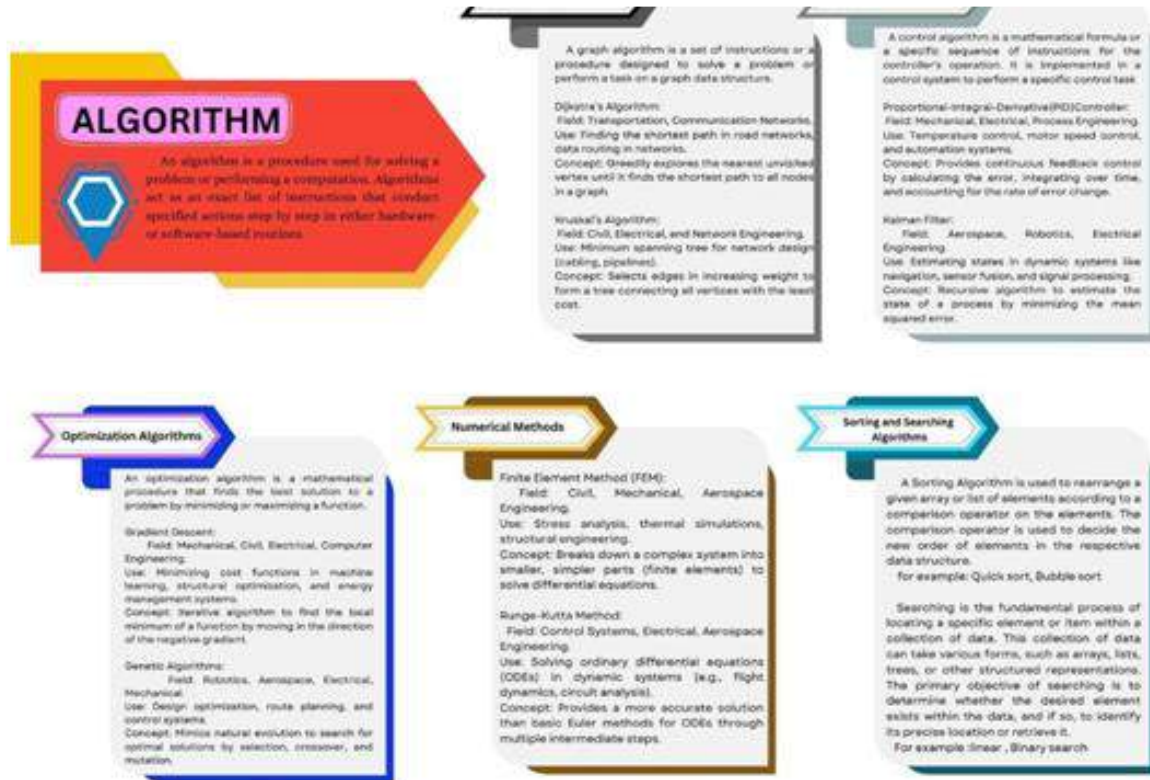
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