# Unit 10

Data Warehouse

- A data warehouse is a centralized repository for storing and managing large amounts of data from various sources for analysis and reporting.

- Data warehousing typically involves transforming and integrating data from multiple sources into a organized format.

- It is optimized for fast querying and analysis, enabling organizations to make informed decisions .

Introduction to DATA WAREHOUSING

DATA WAREHOUSING PROCESS
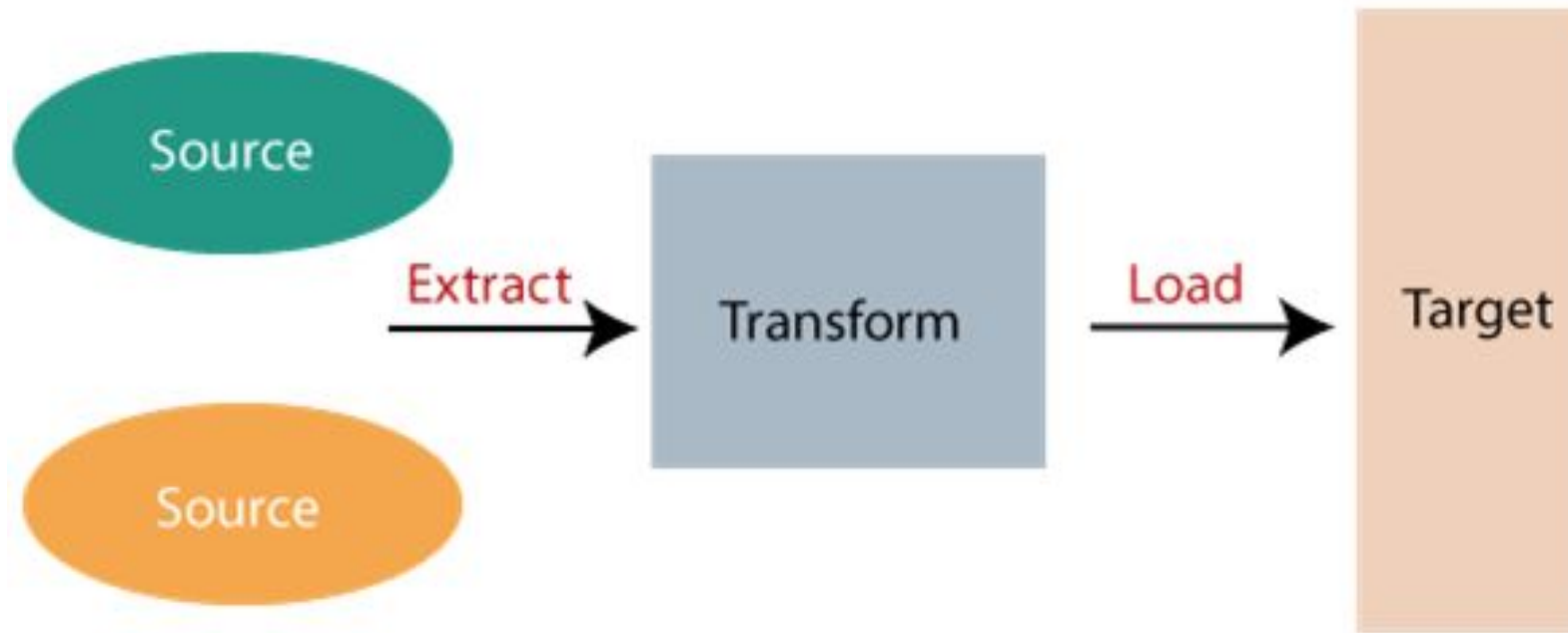
Data Warehousing Process

Need for data warehouse

- An ordinary database can store MBs to GBs of data that too for a specific purpose. For storing data of TB size, the storage is shifted to data warehouse. Besides this a transactional database doesn't offer itself to analytics. To effectively perform the analytics, an organization keeps a central data warehouse to closely study its business by organizing, understanding and using its historical data for making strategic decisions and analyzing trends.

Characteristics of data warehouse

1. Subject oriented

► A data warehouse is a subject oriented as it delivers information about a theme instead of organizations current operations. Data warehousing process is proposed to handle with a specific theme which is more defined.

2. Data security

• Data warehousing provides robust data securities features like access controls, data encryption, and data backups which ensure the data is secure and protected from unauthorized access.

3. Integrated

- Integration means founding a shared entity to scale the all similar data from different databases. A data warehouse is built by integrating data from various sources of data such that a relational database.

4. Data transformation

- Data warehousing includes a process of data transformation, which involves cleaning, filtering, and formatting data from various sources to make it consistent and usable.

Benefits of data warehouse

1. Better business analytics

- Data warehouse plays an important role in every business to store and analysis of all the past data and records of the organization which can increase understanding and analysis of data.

2. Faster queries

- The data warehouse is designed to handle large queries that's why it runs queries fast than database.

3. Improved data quality

- In the data warehouse that you gathered data from different sources is being stored and analyzed it does not interfere with or add data by itself so quality of data is maintained.

4. Historical insight

- The warehouse contains all your historical data which contains details about the business so that one can analyze it at any time and extract insights from it.

Applications of data warehousing

- Data warehousing can be applied anywhere where we have a huge amount of data and we want to see statistical results that help in decision making.

1. Social media websites

- The social networking webs like Facebook, twitter etc. are based on analyzing large data sets. These sites gather data related to members, groups, locations etc., and store it in a single central repository.

2. Banking

- Most of the banks these days use warehouses to see the spending patterns of account/ cardholders. They use this to provide them with special offers and deals, etc.

3. Government

- Government uses a data warehouse to store and analyze tax payments which are used to detect tax thefts.

Advantages of data warehousing

1. Intelligent decision making

- With centralized data in warehouses, decisions can be made quickly and intelligently.

2. Historical analysis

- Predictions and trends are made easier by storing past data.

3. Data quality

- Guarantees data quality and consistency for trustworthy reporting.

4. Scalability

- Capable of managing massive data volumes and expanding to meet changing environments.

Disadvantages of data warehousing

1. Cost

- Building a data warehouse can be expensive, requiring significant investments in hardware, software and personnel.

2. Complexity

- Data warehousing can be complex and businesses may need to hire specialized personnel to manage the system.

3. Time consuming

- Building a data warehouse can take a significant amount of time, requiring businesses to be patient and committed to process.

4. Data integration challenges

- Data from various sources can be challenging to integrate and maintain data accuracy.

Data Mining

▶ Data mining is the process of searching and analyzing a large batch of raw data in order to identify patterns and extract useful information .

▶ Data mining is primarily used to discover and indicate relationships among the data sets.

▶ It can help them to develop more effective marketing strategies, increase sales, and decrease costs.

► Data mining is the extraction of previously unknown, valid, novel and understandable information of patterns from data in repositories or sources.

Data Mining

Importance of Data Mining

1. Insight Discovery

▶ Data mining helps uncover valuable insights and patterns within large datasets that may not be apparent through traditional analysis methods.

2. Decision Making

▶ It assists in making informed decisions by providing predictive models and trends based on historical data, enabling organizations to anticipate future outcomes.

3. Risk Management

► By analyzing historical data, data mining can identify potential risks and fraud patterns, allowing organizations to mitigate these risks effectively.

4. Customer Relationship Management

► Data mining helps in understanding customer behavior, preferences, and needs, enabling personalized marketing strategies, improved customer service, and enhanced customer satisfaction.
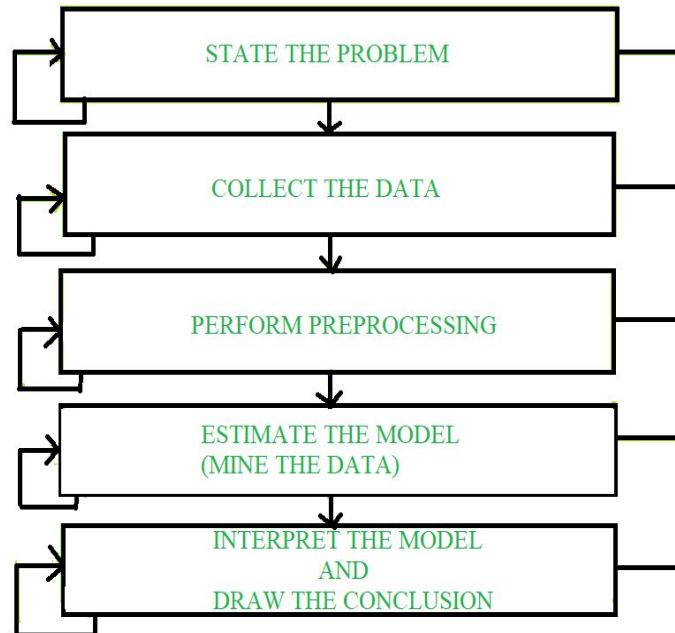
History and Origins of Data Mining

► The late 1980s and early 1990s saw the emergence of data warehousing, business intelligence, and analytics technologies, which improved organization's capacity to evaluate the expanding volumes of data they were producing and gathering.

► In 1995, the first International Conference on Knowledge Discovery and Data mining was held in Montreal, Canada.

► The event was sponsored by the Association for the advancement of Artificial Intelligence, which also held the conference annually for the next three years.

► Since 1999, the Special Interest Group for Knowledge Discovery and Data Mining within the associations for Computing Machinery has primarily organized the ACM SIGKDD conference.

Data Mining Process

▶ The general experimental procedure adapted to data mining problem involves following steps:

STATE THE PROBLEM

COLLECT THE DATA

PERFORM PREPROCESSING

ESTIMATE THE MODEL
(MINE THE DATA)

INTERPRET THE MODEL
AND
DRAW THE CONCLUSION

Process of Data Mining

1. State problem and formulate hypothesis

▶ In this step, a modeler often creates a set of variables for an unknown dependency and, as a first guess, if possible a general classification of this relationship.

▶ The first phase calls for the combined knowledge of a data mining model and an application area.

▶ In actuality, it always entails a through exchange of information between an application expert and a data mining experts.

2. Collect data

► This step cares about how information is generated and picked up. Generally, there are two distinct possibilities.

► The primary is when data generation process is under control of an expert (modeler). This approach is understood as a designed experiment.

► The second possibility is when expert cannot influence data generation process. This is often referred to as observational approach.

3. Data preprocessing

► In the observational setting, data is usually "collected" from prevailing databases, data warehouse, and data marts.

► Outliners are unusual data values that are not according to most observations.

► Commonly, outliers result from measurement errors, coding, and recording errors.

► Data preprocessing includes several steps like variable scaling and differing types of encoding .

4. Estimate model

► The selection and implementation of acceptable data mining technique is that main task during this phase.

► This process is not straightforward. Usually, in practice, implementation is predicated on several models, and selecting simplest one is a further task.

5. Interpret model and draw conclusions

▶ In the most part, data mining models tend to aid in decision making. Because it is likely that people will base their decisions on complex "black box" models, these models must be understandable in order to be useful.

▶ Simple models are typically less accurate but easier to understand.

▶ Using high dimensional models, modern data mining techniques should produce extremely accurate findings.

Advantages of Data mining

1. Marketing/Retailing

► Data mining can benefit the direct marketers by providing precise and helpful trends regarding their target customer's purchase habit.

2. Banking/Crediting

► The areas of financial companies such as credit documentation and loan records can be benefited from data mining.

3. Customer Identification

► There are different customers in a market. They all have their unique identity. Their fundamental behavior and traits differ. As a result, it is easier to comprehend their preferences with the right methodology.

4. Detecting Criminal Activity

► Government and other institutions can use market analysis data to identify criminals. For instance, the data can be structured to make4 it easier to analyze a customer's prior transactions.

Disadvantages of Data Mining

1. Privacy Issues

► As the organizations gather the data of their customers. They might sell or leak the information to gain personal benefits from the information which has grown the concern about personal privacy.

2. Technical Knowledge

► They each have a distinctive algorithm and design. Selecting the appropriate tool will only be possible with the required technical knowledge

3. Expensive
► Data is an expensive procedure. For instance, businesses need to hire more staff and technical experts to ensure that data mining is done properly. Advanced data mining software is necessary for firms but it may be expensive.
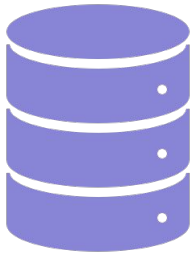
4. Accuracy
► Even though data mining has created a framework for simple data collection with its techniques, its accuracy is still constrained. Making decisions can be complicated by erroneous information that has been acquired.

Conclusion

▶ The concept of data mining is becoming increasingly popular as a business information management tool where it is expected to reveal knowledge structures that can guide decisions in condition of limited certainty.

▶ I would like to conclude that data mining can be used for many purposes but it should not be used carelessly because there may be unwanted or illegal use of it which may result in the financial downturn of a particular person or an organization.
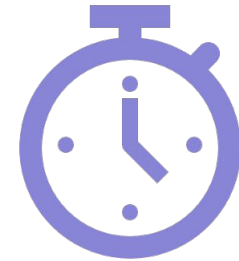
Data warehousing

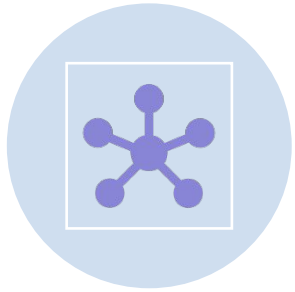The method of organizing and compiling data into database.

Collaborates data from several sources to ensure data accuracy, quality, and consistency.

Designed to supply real-time information.

1

Features of Data warehousing

Integrated

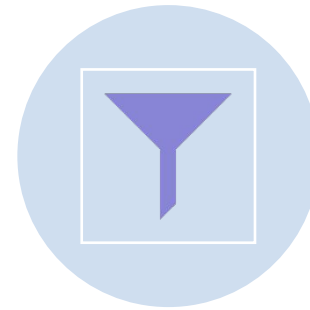Time-variant

Non volatile

Subject oriented

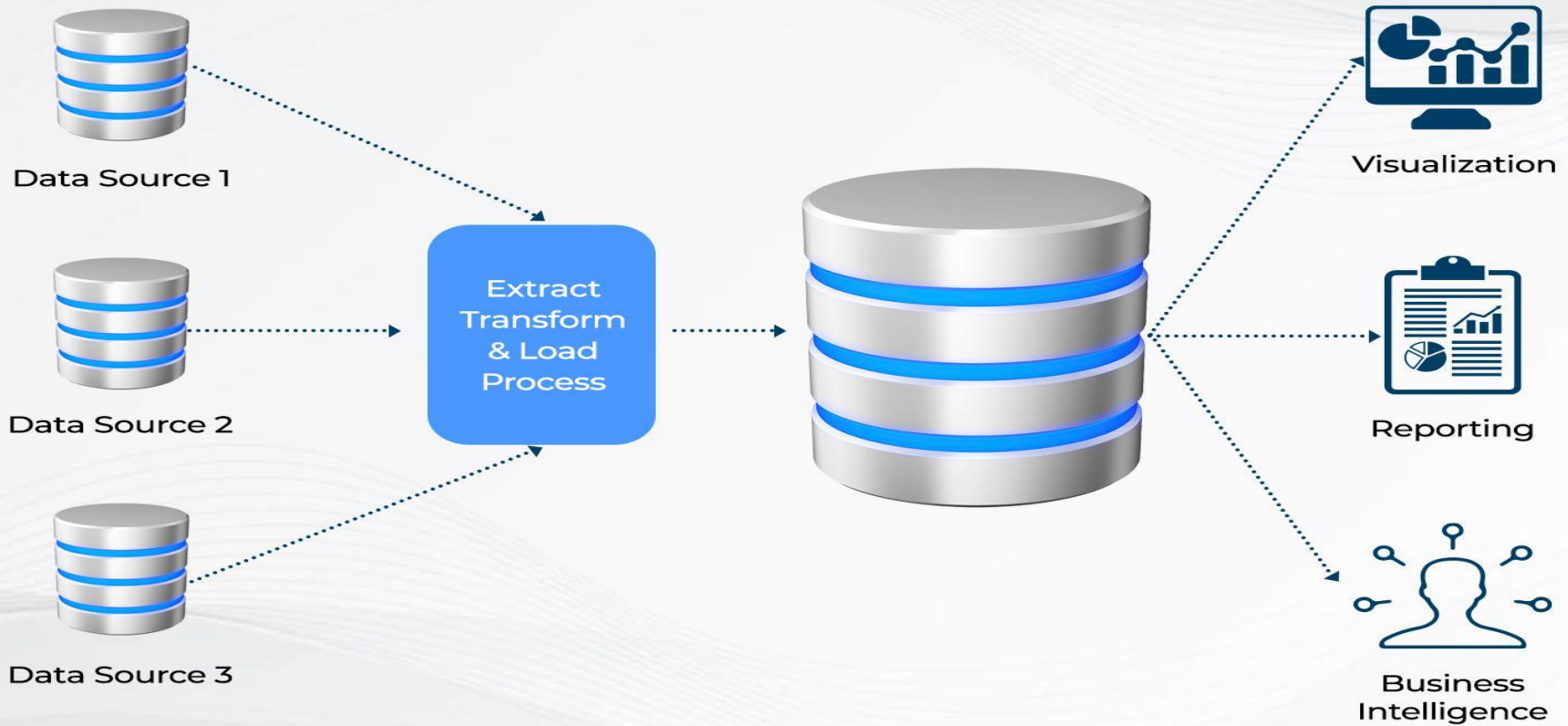# Process of Data warehousing

EXTRACTION OF DATA

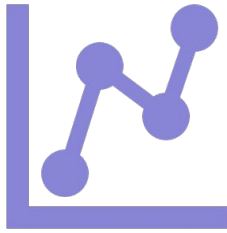CLEANING OF DATA

CONVERSION OF DATA

STORING OF DATA IN A WAREHOUSE

3

Data mining

Process of uncovering patterns and other valuable information from large data sets.

Uses method from machine learning, statistics, and database systems.

Uses data to evaluate future probabilities and develop actionable analysis.

5

Data mining process

Set the business objective

Data preparation

Model building and pattern printing

Evaluation of results and implementation of knowledge

Data mining applications

Sales forecasting

Inventory management

Fraud detection

Education

Big Data

Big Data

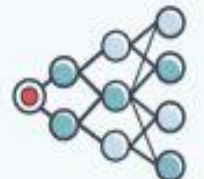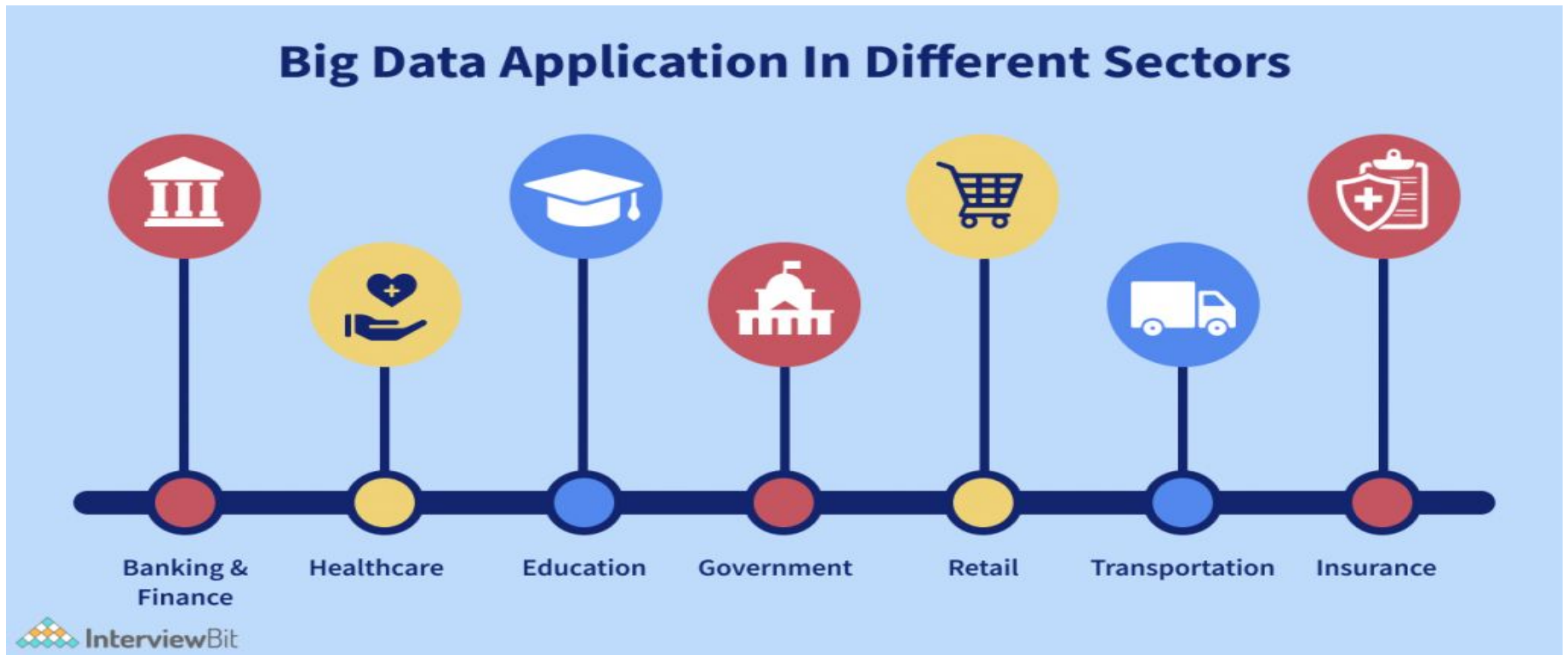- Big data is defined as data with a higher variety that arrives at a faster rate and in larger volumes.

- Big data is simply larger, more complex data sets, particularly from recently discovered data sources.

- These data sets are so large that they just cannot be handled by conventional data processing software.

- They gives you access to more information, which enables you to obtain you more thorough answers.

Big Data

- The three Vs are another name for this:

    a. Volume
        - In big data, volume refers to the vast quantity of information generated from diverse sources.
        - The main factor that determines whether a piece of data is considered "big" is its volume, which indicates its quantity and breadth.

    b. Velocity
        - Velocity in big data signifies the rapid pace at which data is gathered from various sources like computers, networks, social media, and mobile devices.
        - Fast data flow proves its potential by showing how rapidly data is generated and processed to satisfy needs.

    c. Variety
        - Variety in big data encompasses structured, semi-structured, and unstructured data types, sourced from various internal and external channels.
        - It entails the inflow of fresh data that is categorised as structured, semi-structured, or unstructured and comes from both internal and external sources.

Applications of Big Data

Big Data Application In Different Sectors

Banking & Finance | Healthcare | Education | Government | Retail | Transportation | Insurance

InterviewBit

Big data challenges and limitations

1. Budget Requirment
2. New Data Center Work Loads
3. Data Quality Assurance
4. Performance of Data
5. The Storage Bluge
6. Mastery in Analytics

1. Budget Requirement

Because of the high costs of talent, software, infrastructure, and continuous maintenance, large data placement is limited by limited resources, which hinders innovation and insights. To optimise resources and maximise value within budgetary limits, effective planning and prioritisation are crucial.

2. New Data Center Workloads

The term "new data centre workloads" describes the rising stress that big data projects and their increasing volume and complexity of data are placing on data centre infrastructure. In order to ensure effective data handling and analysis, these needs include processing, storage, and administration requirements that might put a strain on available resources and call for scalability and optimisation initiatives.

3. Data Quantity Assurance

Big data presents a difficulty in terms of ensuring the accuracy and reliability of large datasets because of the possibility of biases and mistakes. This calls for strict data governance and quality assurance procedures.

4. Performance of Data

Big data performance limits are issues with efficiently processing and analysing massive datasets , which can lead to delays and impede real-time insights. These limitations could hinder real-time analytics, and overall system responsiveness, which may affect the capacity to extract useful information and timely insights from data.

5. The Storage Bluge

Big data storage bulge raises issues with cost, scalability, performance, data preservation, and management complexity. To overcome these constraints, effective solutions like data lifecycle management and cloud storage are required.

6. Mastery in Analytics

Lack of skills, complexity of tools, need for lifelong learning, and multidisciplinary knowledge requirements are the main causes of the barriers to analytics ability.

Data science

- The study of data to derive important business insights is known as data science.

- It analyze massive volumes of data.

- It is a multidisciplinary technique that blends ideas and methods from computer engineering, artificial intelligence, statistics, and mathematics.

- This analysis helps data scientists to ask and answer questions like what happened, why it happened, what will happen, and what can be done with the results.

What are Process of data science?

- Asking the right questions and exploring the data.

- Modeling the data with various algorithm.

- Finally communicating and visualizing the results.
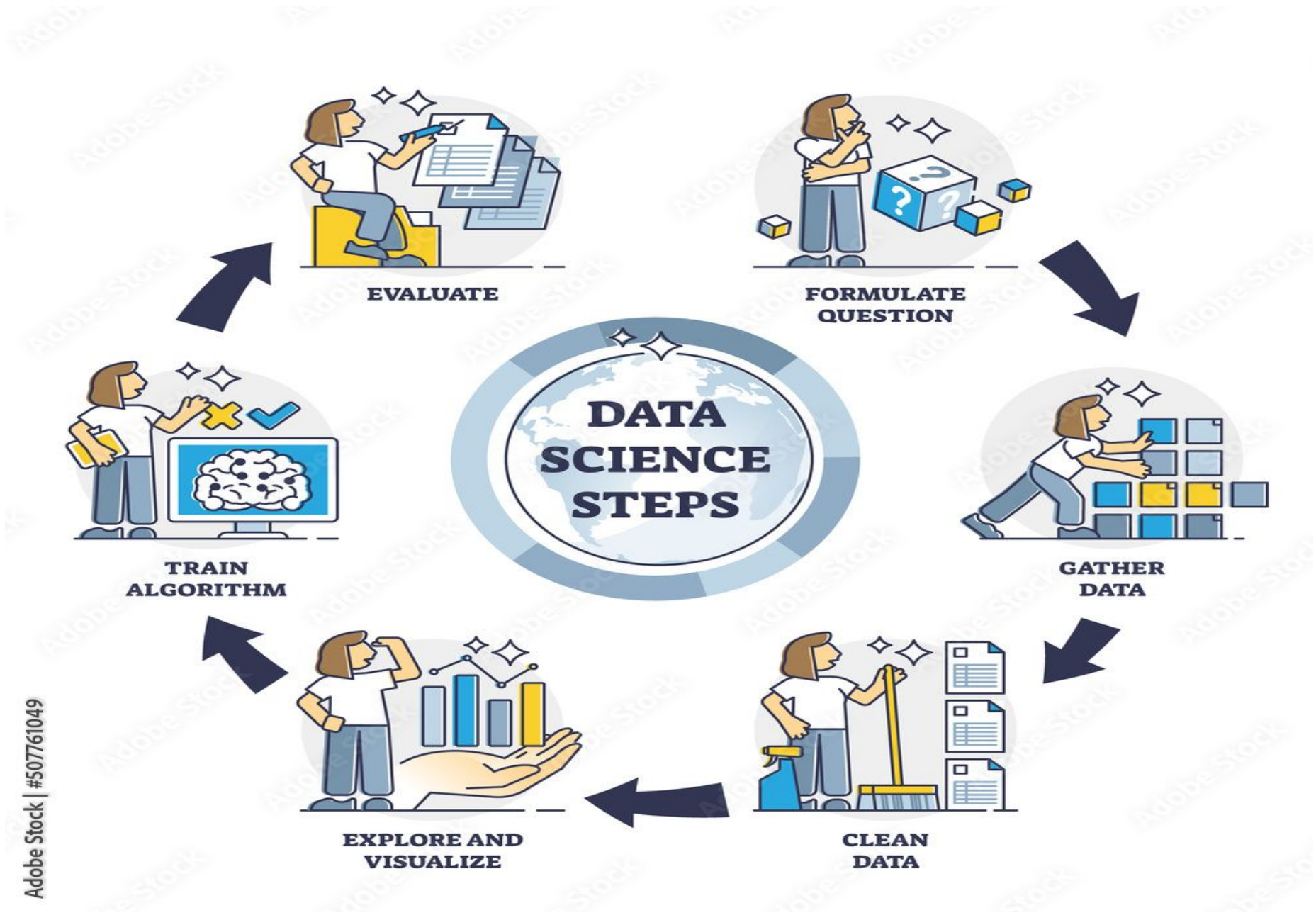
Necessary conditions for data science

The 3 traits of the data scientist are:

- curiosity

Only when you ask questions,you will have the better understanding of the business problems.
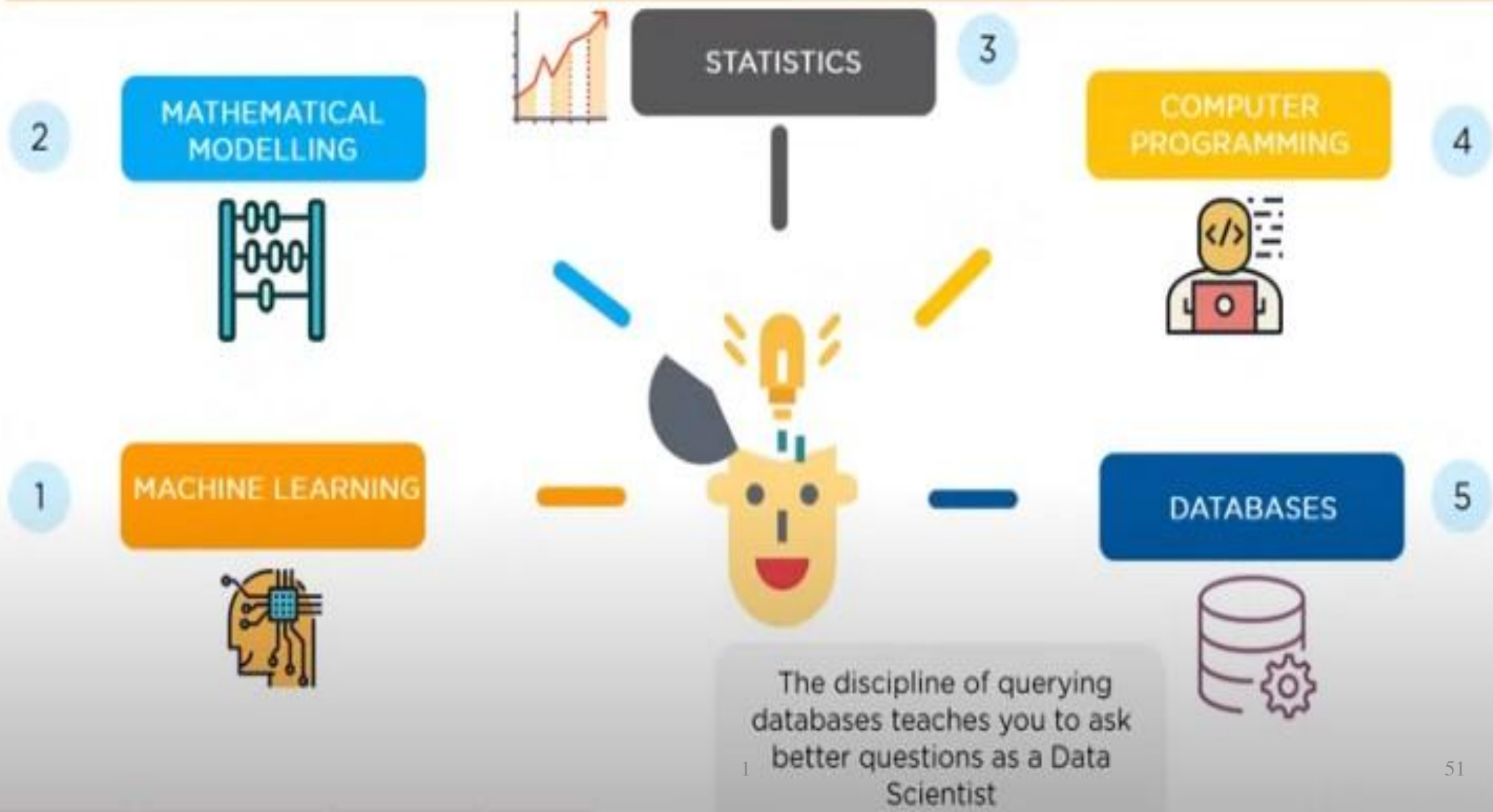
- Common sense

- Communication skills

To identify new way to solve a problems and to detect the priority problems.

The data scientist need to communicate their findings to the team to act upon the insights.

STATISTICS

MATHEMATICAL MODELLING

2

COMPUTER PROGRAMMING

4

MACHINE LEARNING

1

DATABASES

5

3

The discipline of querying databases teaches you to ask better questions as a Data Scientist

1. **Machine learning:**
   Machine learning is the backbone of the data science.It is one of the many ways that data science uses to find solutions to the problems.

2. **Mathematical modeling:**
   Modeling is the part of the machine learning in the way but we need to be good at identifying what are the algorithms, which are more suitable to calculate the given problems and what model are use and how do we train this models.

3. **Statistics:**
   Statistics is foundational to Data Science, to extract knowledge and obtain better results from the data.

4.   Computer programing:
   You should know at least one programming language, preferably Python for data modelling.

5.   Database :
   The discipline of querying databases teaches you to ask better questions as a Data Scientist.

Difference between Big Data and Data Science

Aspect	Big Data	Data Science
Definition	Handling lots of different kinds of information.	Using smart tools to find useful stuffs in data.
Focus	Managing and organizing huge amount of information efficiently.	Extracting meaningful insights and predictions from data.
Purpose	To help businesses and scientists understand big piles of data.	To make predictions and decisions from data.
Tools and technologies	Spark,NoSQL databases.	Python,Databrick.

Aspect	Big Data	Data Science
Scope	It covers everything from collecting data like tweets,sensor reading.	It explores and understand data like trends, interesting patterns.
Skills required	Expertise in computing database management, data engineering.	Skills in statistics, machine learning, domain knowledge.
Data Variety	Deals with **Structured**(employees database), **Semi-structured**(URL,IP address) and **Unstructured** data(social media posts).	Finds important stuff like number, pictures collected from different sources like apps, websites.
Scale	Deals with massive datasets that traditional methods can't handel.	Works with both large and small datasets.
Innovation	In data management, technology infrastructure(servers, storage systems).	In problem solving, data-driven applications across industries(education, healthcare).

Introduction of AI

- Intelligence: The capacity to learn and solve problems.

- Artificial Intelligence is a field of computer science which aims to make computer systems that can mimic human intelligence.

- AI is the simulation of human intelligence by machines.

- Artificial Intelligence is the capacity of the computer a robot to accomplish operations frequently carried out by intelligent people.

History of AI
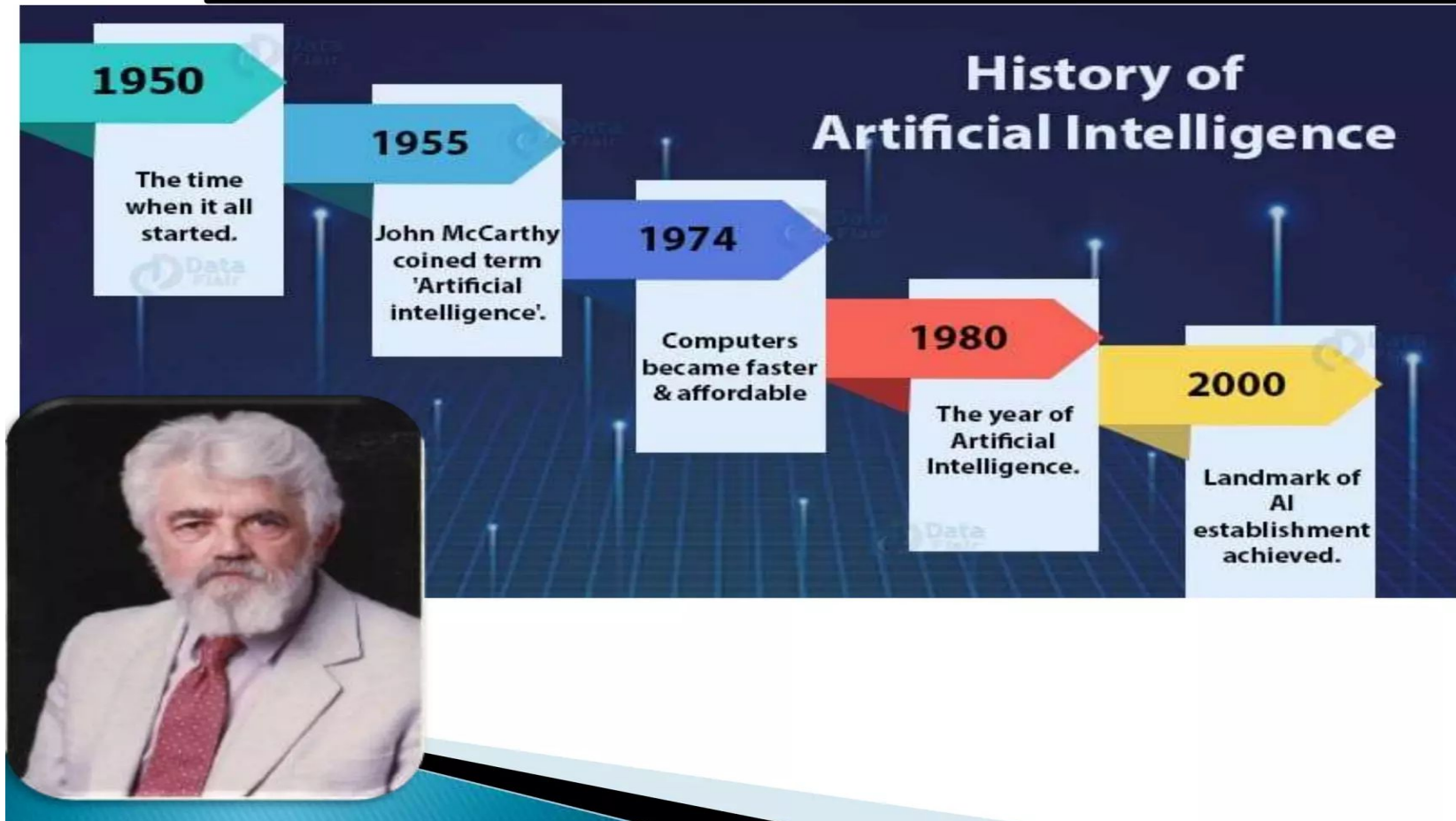
```
                    Artificial Intelligence


        Based on                        Based on
       Capabilities                   Functionalities

         Narrow AI                    Reactive Machines

         General AI                   Limited Memory

         Strong AI                    Theory of mind

                                      Self Awareness
```

Based on Capabilities

1.Narrow AI:

- Narrow AI is a type of AI which is able to perform a dedicated task with intelligence.The most common and currently available AI is Narrow AI in the world of Artificial Intelligence.

- Narrow AI cannot perform beyond its field or limitations, as it is only trained for one specific task. Hence it is also termed as weak AI. Narrow AI can fail in unpredictable ways if it goes beyond its limits.

- Some Examples of Narrow AI are playing chess, purchasing suggestions on e-commerce site, self-driving cars, speech recognition, and image recognition.

2. General AI:

- General AI is a type of intelligence which could perform any intellectual task with efficiency like a human.

- The idea behind the general AI to make such a system which could be smarter and think like a human by its own.

- Currently, there is no such system exist which could come under general AI and can perform any task as perfect as a human.

- The worldwide researchers are now focused on developing machines with General AI.

3. Strong AI:

- Super AI is a level of Intelligence of Systems at which machines could surpass human intelligence, and can perform any task better than human with cognitive properties. It is an outcome of general AI.

- Some key characteristics of strong AI include capability include the ability to think, to reason,solve the puzzle, make judgments, plan, learn, and communicate by its own.

- Super AI is still a hypothetical concept of Artificial Intelligence. Development of such systems in real is still world changing task.

Based on Functionalities
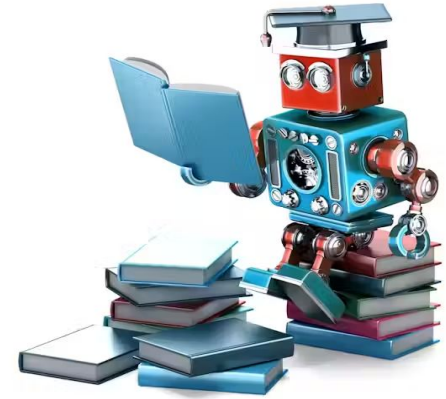
1. Reactive Machines

- Reactive machines are AI systems that have no memory and are task specific , meaning that an input always delivers the same output.
- Does not have memory or the ability to learn from past experiences.
- Examples include simple robots, automated systems, and basic AI assistants.
- They are limited in complexity compared to more advanced AI systems.
- Commonly used in industrial automation, basic robotics, and simple decision-making processes.

2. Limited Memory

- Has some memory capacity, but it is limited compared to humans.

- Can store a limited amount of information about past experiences.

- Uses this limited memory to make decisions and improve performance over time.

- Examples include some types of AI assistants, recommendation systems, and basic game-playing AI.

- Limited memory systems can learn from experience but are constrained by the amount of information they can retain.

3. Theory of mind

- This is currently the third level of AI and understands the needs of other intelligent entities.

- Machines aim to have the capability to understand and remember other entities' emotions and needs and adjust their behavior based on these.

- This capability is like humans in social interaction.

4. Self Awareness

- It is referred to as the ability of an artificial system to possess consciousness or self-perception.

- Achieving self-awareness in AI involves going beyond pattern recognition and rule-based decision-making to a point where AI systems can comprehend their actions and intentions.

Advantages

- Streamlining
- Saving time
- Eliminating biases
- Automating repetitive tasks
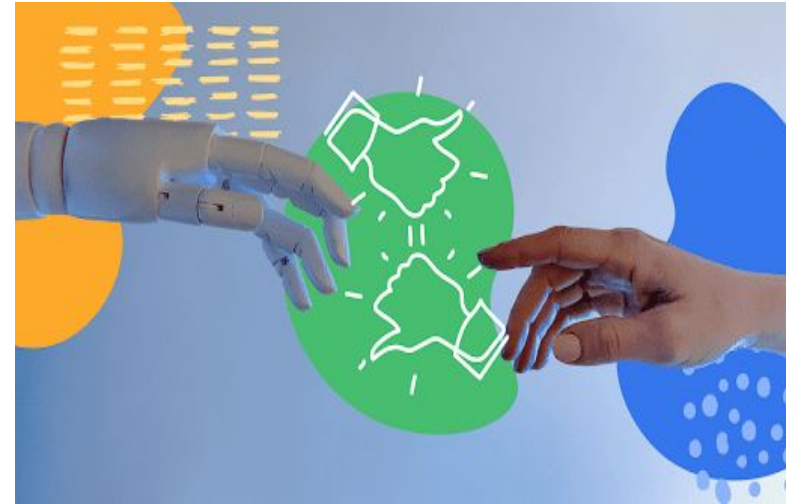
Disadvantages

- Costly implementation
- Potential human loss
- Lack of emotion and creativity

Machine Learning

❏ Machine learning (ML) is a branch of artificial intelligence(AI) and computer science that focuses on the using data and algorithms to enable AI to imitate the way that humans learn, gradually improving its accuracy.

❏ Machine learning is much similar to data mining as it also deals with the huge amount of the data

❏ It allows computers to evolve behaviors based on empirical data.

❏ Machine learning uses data to detect various patterns in a given dataset.

❏ It can learn from past data and improve automatically.

❏ It is a data-driven technology.

Classification of Machine Learning

Supervised Learning

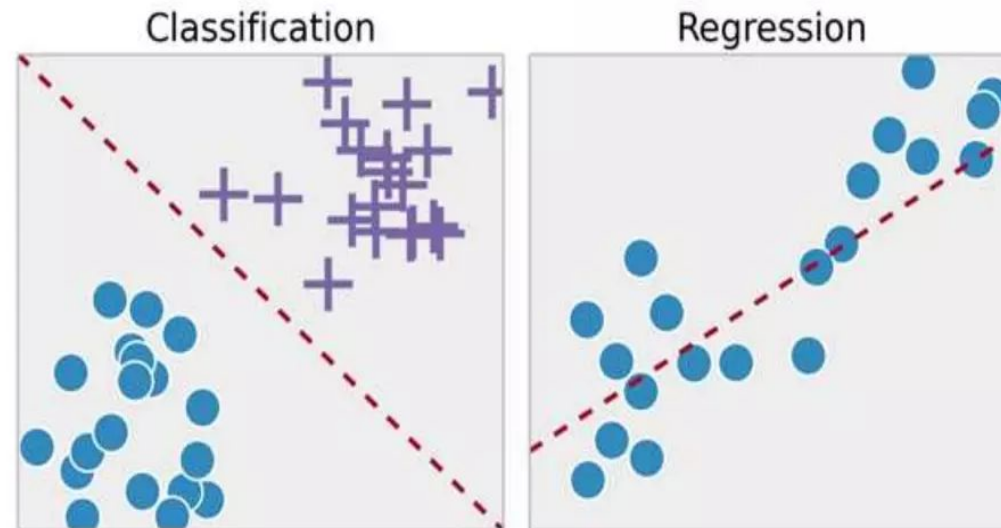Reinforcement Learning

Unsupervised Learning

1. Supervised Learning

- ❏ Sample labeled data are provided to the machine learning system for training, and the system then predicts the output based on the training data.

- ❏ The system uses labeled data to build a model that understands the datasets and learns about each one.

- ❏ After the training and processing are done, we test the model with sample data to see if it can accurately predict the output.

- ❏ The mapping of the input data to the output data is the objective of supervised learning.

- ❏ Spam filtering is an example of supervised learning.

- ❏ Supervised learning can be grouped further in two categories of algorithms:
  - ○ Classification
  - ○ Regression

Types of Supervised learning
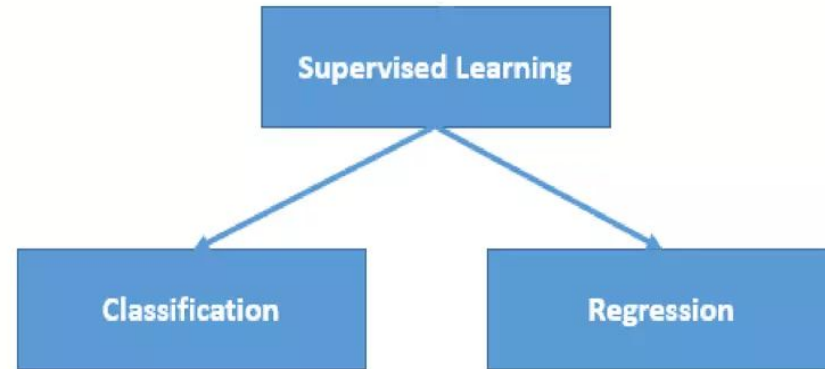
Classification separates the data, Regression fits the data

2. Reinforcement Learning

❏ Reinforcement learning is a feedback-based learning method, in which a learning agent gets a reward for each right action and gets a penalty for each wrong action.

❏ The agent learns automatically with these feedbacks and improves its performance.

❏ In reinforcement learning, the agent interacts with the environment and explores it.

❏ The goal of an agent reward points, and its performance.

❏ The robotic dog, learns the movement of example of Reinforcement learning.

3. Unsupervised Learning

❏ Unsupervised learning is a learning method in which a machine learns without any supervision.
❏ The training is provided to the machine with the set of data that has not been labeled, classified, or categorized, and the algorithm needs to act on that data without any supervision.
❏ The goal of unsupervised learning is to restructure the input data into new features or a group of objects with similar patterns.
❏ In unsupervised learning, we don't have a predetermined result. The machine tries to find useful insights from the huge amount of data.
❏ It can be further classified into two categories of algorithms:
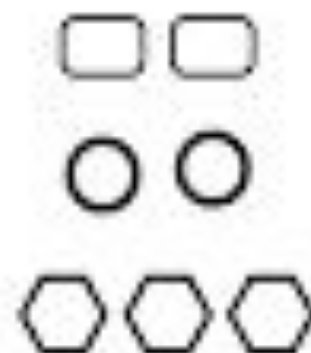
  ○ Clustering

  ○ Association

Unsupervised Learning

Unlabelled Data → Machine → Results

Advantages and Disadvantages of Machine Learning

Advantages

- Automation
- Scope of Improvement
- Enhanced Experience in Online Shopping and Quality Education
- Wide Range of Applicability

Disadvantages

- Data Acquisition
- Time and Resources
- Results Interpretations
- High Error Chances
- Elimination of Human Interface
- Changing Nature of Jobs
- Highly Expensive
- Research and Innovations

Applications of Machine Learning

- **Human Resource Information Systems:** In short, it is also called an HRIS System, and it is used for identifying the best candidates for an open position using machine learning models to filter the applications

- **Business Intelligence:** In short, it is called BI. Machine Learning is used by vendors in their software to search potentially important anomalies and patterns of data points.

- **Customer Relationship Management:** The Machine Learning model used by the CRM software analyzes prompt sales members responding to important messages first and email.

- **Virtual Assistants:** Smart assistants usually combine unsupervised and supervised learning machine learning models to decipher supply context and natural speech.

- **Self-Driving cars:** Algorithms based on the Machine Learning model are used to drive the car.
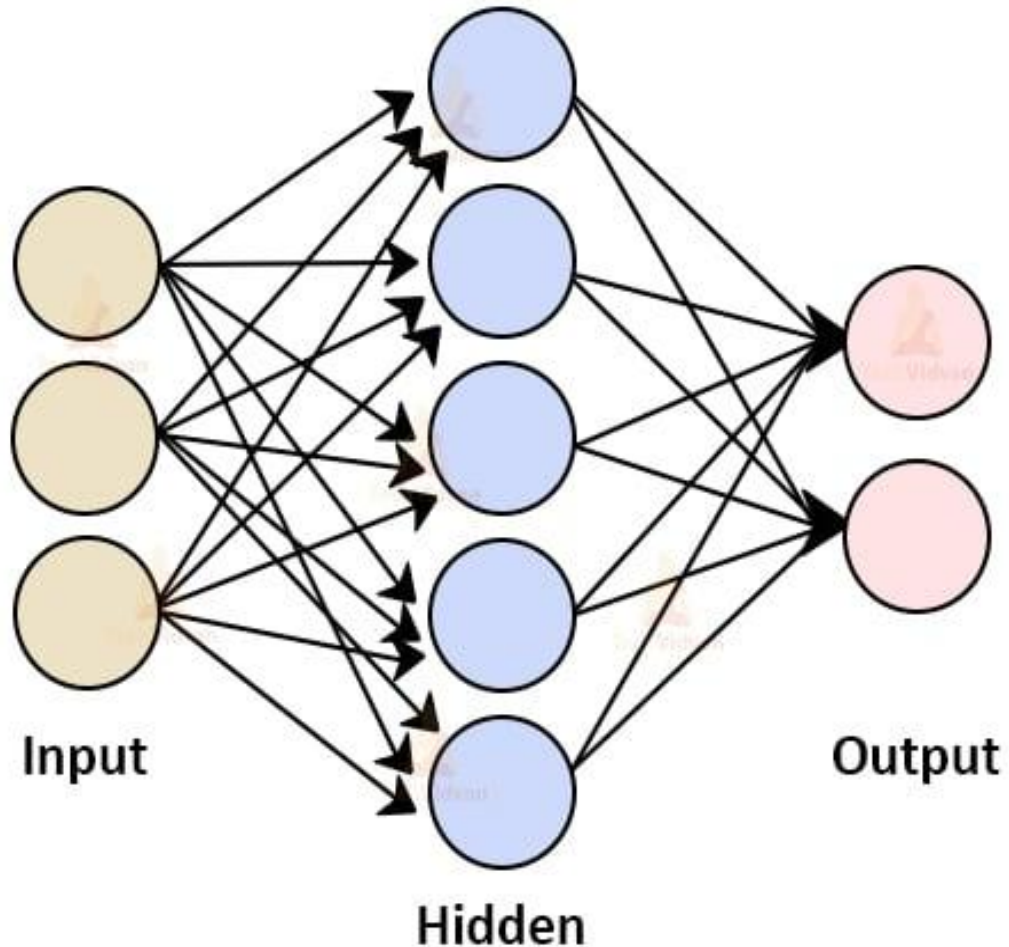
ARTIFICIAL NEURAL NETWORKS AND CLOUD COMPUTING

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Bishal Tamang

Riyendra Maharzan

BIM 1st Semester (Section A)

Introduction to Artificial Neural Networks

Architecture of Artificial Neural Network

Input

Hidden

Output

An artificial neural network (ANN) is a computational model inspired by the neural structure of the human brain. It processes information by replicating the way biological nervous systems work, making it a powerful tool for solving complex problems.

Basics of Cloud Computing

Basics of Cloud Computing

Scalability

Cloud computing allows for easy scalability, enabling companies to expand or reduce their computing resources according to their needs.

Basics of Cloud Computing

Scalability

Cloud computing allows for easy scalability, enabling companies to expand or reduce their computing resources according to their needs.

Cost-Effectiveness

Organizations can save

money by paying only for

the resources they use,

Basics of Cloud Computing

Scalability

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Cost-Effectiveness

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Benefits of Using Cloud Computing for Artificial Neural Networks

Scalability

Flexible Resources

The scalability of cloud computing allows ANNs to access additional resources when solving complex problems.

Benefits of Using Cloud Computing for Artificial Neural Networks

Scalability

Flexible Resources

The scalability of cloud computing allows ANNs to access additional resources when solving complex problems.

Applications of Artificial Neural Networks in Cloud Computing

1. Predictive Analytics

   Helps in making forecasts and predictions based on large datasets.

2. Image Recognition

   Enables the detection and categorization of objects within images.

3. Natural Language Processing

   Used for processing and analyzing human language data.

Challenges and Limitations of Using Artificial Neural Networks in Cloud Computing

1. **Data Privacy Concerns:**

   Data security and privacy issues are critical when implementing ANN solutions in cloud environments.

2. **Complexity of Configuration:**

   Setting up and maintaining complex ANN architectures in cloud platforms can pose challenges for organizations.

3. **Resource Intensiveness:**

   Training and running large-scale ANNs require significant computational resources, leading to high costs.

Case Studies of Successful Implementations

Healthcare

Cloud –hosted ANNs are improving diagnostic accuracy and personalized treatment recommendations.

Financial Services

ANNs in the cloud are enhancing fraud detection and risk analysis capabilities.

E-commerce

Utilizing cloud-based ANNs for personalized product recommendations and customer behavior analysis.

Conclusion and Future Prospects

1. **Integration of AI and Cloud:**

   AI and ANN-based applications will become more tightly integrated with cloud platforms, enhancing their capabilities.

2. **Advancements in Cloud Security:**

   Emphasis will be placed on future strengthening the security measures to address privacy concerns and protect sensitive data.

3. **Edge Computing and AI:**

   AI models will move closer to the edge of the network, enabling real-time processing and reducing dependency on centralized cloud resources.

INTRODUCTION

❖ Green computing is also called green information technology, green IT or sustainable IT.

❖ It is the practice of designing,manufacturing,using and disposing the computing resources with no or minimum impact on environment.

❖ Green computing, or sustainable computing, is the practice of maximizing energy efficiency and minimizing environmental impact in the ways computer chips, systems and software are designed and used.

❖ The objectives of green computing are: to decrease the use of dangerous chemicals, maximize energy efficiency throughout the product's   lifecycle.

❖ The goal is to <u>reduce the environmental impact of IT operations.</u>

IMPORTANCE

❖ To use computer resources lot of natural resources is consumed for computer manufacturing:raw material,for computer running: electronic power and for computer disposal: natural resources which adversely impact on environment.

❖ The importance of green computing is that the computer resources is used efficiently and effectively with less threatening influence on environment.

HISTORY

❖ The term <u>"Green Computing"</u> was probably coined shortly after the '**Energy Star**' program began way back in 1992.

❖ One of the first results of green computing was the **"Sleep mode"** function of computer monitors.

Benefits of green IT

Reduces waste and emissions, contributing to a healthier planet	Encourages use of energy-efficient technology that can save money	Enables compliance with laws and regulations	Improves brand perception with customers and partners	Helps recruit and retain employees	Spurs innovative solutions to environmental problems

1. Implementation Cost

Although green computing is cost effective in the long term, implementing a green computing system, it takes lots of time and research, all that costs plenty of money. This makes the technology more expensive than the average model.

2. Maintenance

Besides implementation, the maintenance of a green computing system is considered to be highly difficult that can be costly as well as time consuming.

3. IT Knowledge

In order for using the green IT infrastructure, IT experts who has well knowledge about the technology needs to be deployed. Those experts are rare to find, and if found they need to be paid plenty of money.

4. Security Leaks

When using a green computing system, there are some serious concerns regarding security. The employee who work under companies that practice green computing regularly exchange their workstations and other devices. This eventually opens up many security leaks such as hacking. Therefore, the companies have to take necessary measures for avoiding such problems.

VIRTUAL COMPUTING

INTRODUCTION

❖ Virtual computing, also known as **virtualization,** is a technology that allows multiple operating systems to run simultaneously on a single physical computer.

❖ Virtual computing is the idea that one physical computer can act like many computers which enables users to remotely access a computer from their local device.

HISTORY

❖ The concept of virtualization is generally believed to have its origins in the late 1960s and early 1970s.

❖ The concept of virtual machine was invented by IBM as a method of time-sharing extremely expensive mainframe hardware.

❖ **Scalability:**

Virtualization is highly scalable. It lets you easily create additional resources as required by many applications,such as by adding extra servers all on an as needed basis and without any significant investments in time or money.

❖ **Testing and Development:**

One of the significant benefits of virtual computing is their usefulness in testing and development environments. With the virtualization technology, developers can create machines that mimic the production environment without needing physical hardware.

❖ **Enhanced Resource Utilization:**

Virtual servers provide better resource utilization via virtualization technology. This technology divides physical server resources to allocate them to multiple virtual machines. This improves resource efficiency, increases server capacity optimization, and reduces waste of valuable resources for organizations.

COMPONENTS:

- ❖ Hypervisor

- ❖ Virtual CPU

- ❖ Virtual Memory

- ❖ Virtual Network Storage

- ❖ Virtual disk

❖ **Hypervisor:**

This is the software that creates and runs virtual machines. It allows multiple operating systems to run on a single physical machine.

❖ **Virtual CPU:**

Each virtual machine is allocated a portion of the physical CPUs processing power.

❖ **Virtual Memory:**

The hypervisor allocates a portion of the physical memory to each virtual machine.

❖ **Virtual Network Interface:**

Virtual machines have their own virtual network interfaces, allowing them to communicate with other virtual machine and the physical network.

❖ **Virtual Disk:**

Virtual machines have virtual disks that are stored as files on the physical storage devices. These virtual disks act as the hard drive for the virtual machine.

THANKYOU!!!!!

Introduction

Block chain is a method of recording information that makes it impossible or difficult for the system to be changed, hacked, or manipulated.

Blockchain is a decentralized digital ledger technology that records transactions across multiple computers in a way that is transparent, secure, and resistant to modification. Each transaction is grouped into blocks, which are linked together in a chronological chain, forming a permanent and immutable record of transactions.
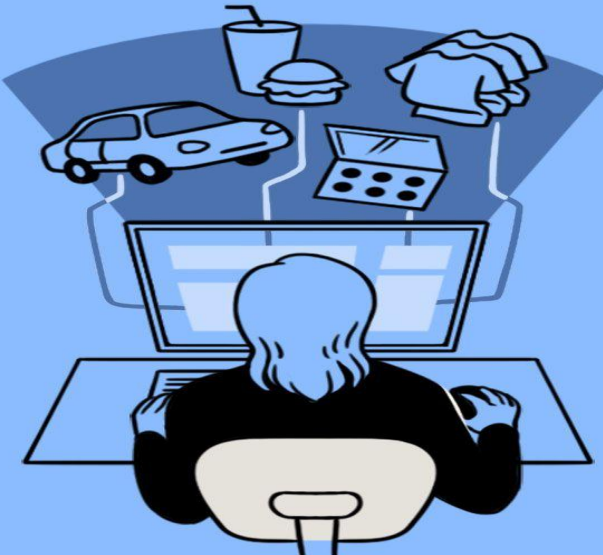
Application of block chain

- ❖ Social media
- ❖ Artificial Intelligence
- ❖ Banking
- ❖ Cyber Security
- ❖ Healthcare
- ❖ Government
- ❖ Supply Chain
- ❖ Real estate and lot
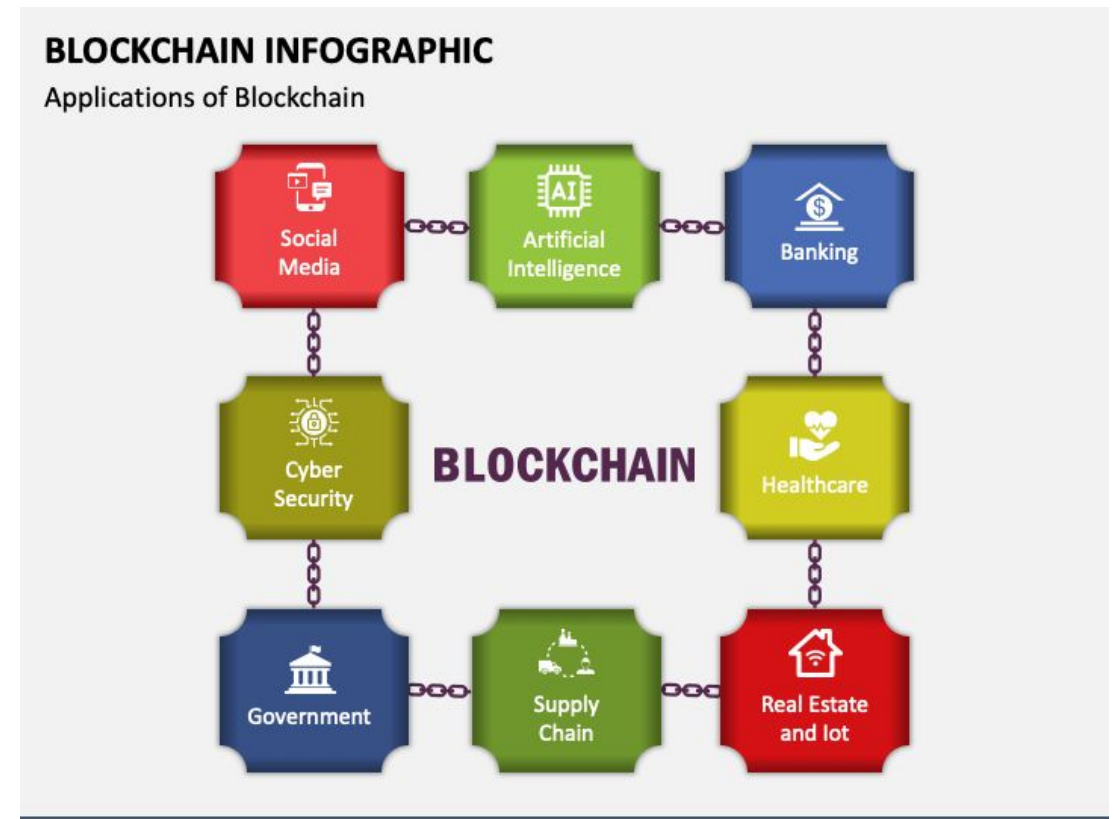
Importance of the Block chain

- It is an immutable public digital ledger, which means when a transaction is recorded, it cannot be modified

- Due to the encryption feature, Block chain is always secure

- The transactions are done instantly and transparently, as the ledger is updated automatically

- As it is a decentralized system, no intermediary fee is required

- The authenticity of a transaction is verified and confirmed by participants

Digital marketing, also called online marketing, is the promotion of brands to connect with potential customers using the internet and other forms of digital communication

Block chain technology and digital marketing

Blockchain technology is revolutionizing digital marketing by enhancing transparency, security, and efficiency in various processes. Through its decentralized ledger system, blockchain ensures trust and authenticity in data, enabling marketers to track and verify transactions, user interactions, and ad placements with unparalleled accuracy. Smart contracts automate agreements, streamlining payment processes and reducing fraudulent activities. Moreover, blockchain facilitates targeted advertising by providing access to verified consumer data while safeguarding user privacy. As a result, marketers can create more personalized and effective campaigns, fostering stronger customer relationships and driving higher ROI.

Contributions of Block chain in digital marketing

- Securing User Data and Privacy

- Ensuring Ad Transparency and Accountability

- Enhancing Supply Chain Transparency

- Revolutionizing Loyalty Programs

- Enabling Micro transactions and Content Monetization

- Verification of Influencer Marketing

Challenges and Limitations of Implementing Blockchain in Digital Marketing

- **Scalability**: Blockchain can be slow and resource-intensive, limiting campaign speed.

- **Cost**: Implementation and maintenance can be expensive, deterring smaller businesses.

- **Complexity**: Requires specialized knowledge, posing a barrier for many marketers.

- **Regulatory Uncertainty**: Compliance with regulations like GDPR can be challenging.

- **Consumer Adoption**: Lack of understanding and trust may hinder adoption

Limitation

- **Privacy Concerns**: Visibility of transactions may compromise sensitive data.

- **Storage Limitations**: Practicality and cost constraints restrict data storage.

- **Interoperability**: Integration with existing systems may be complex.

- **Energy Consumption**: Proof-of-work algorithms are energy-intensive.

- **User Experience**: Complex interfaces and slow transactions may impact usability.

Conclusion

Blockchain technology offers immense potential for revolutionizing digital marketing. As the technology continues to evolve, it is essential for businesses to stay updated with the latest trends and developments. Embracing blockchain can lead to increased transparency, security, and efficiency in marketing processes, ultimately enhancing customer trust and loyalty.

Thank you.

What is Internet of Things (IoT)?

Introduction:

- Network of physical devices embedded with sensors, software, and connectivity that enables them to connect and exchange data.

- Facilitates communication between devices and the cloud, as well as between the devices themselves.

- For eg; a smart refrigerator, a smart air conditioner, connected security systems

How does IoT work?

Sensors:
- Devices that detect changes environment conditions and convert them into digital signals.

Connectivity:
- Enables devices to communicate with each other and with centralized systems.

Data Processing Units:
- Responsible for processing the data collected by sensors.

User Interfaces:
- Interfaces through which users interact with IoT systems.

Applications:

Smart Home

Healthcare

Agriculture

Industrial Automation

Transportation

Environmental Monitoring

Benefits & Challenges

Benefits:

- Improved Efficiency
- Enhanced Convenience
- Cost Savings
- Improved Safety and Security
- Enabling Innovation

Challenges:

- Security Concerns
- Interoperability Issues
- Scalability
- Energy Efficiency
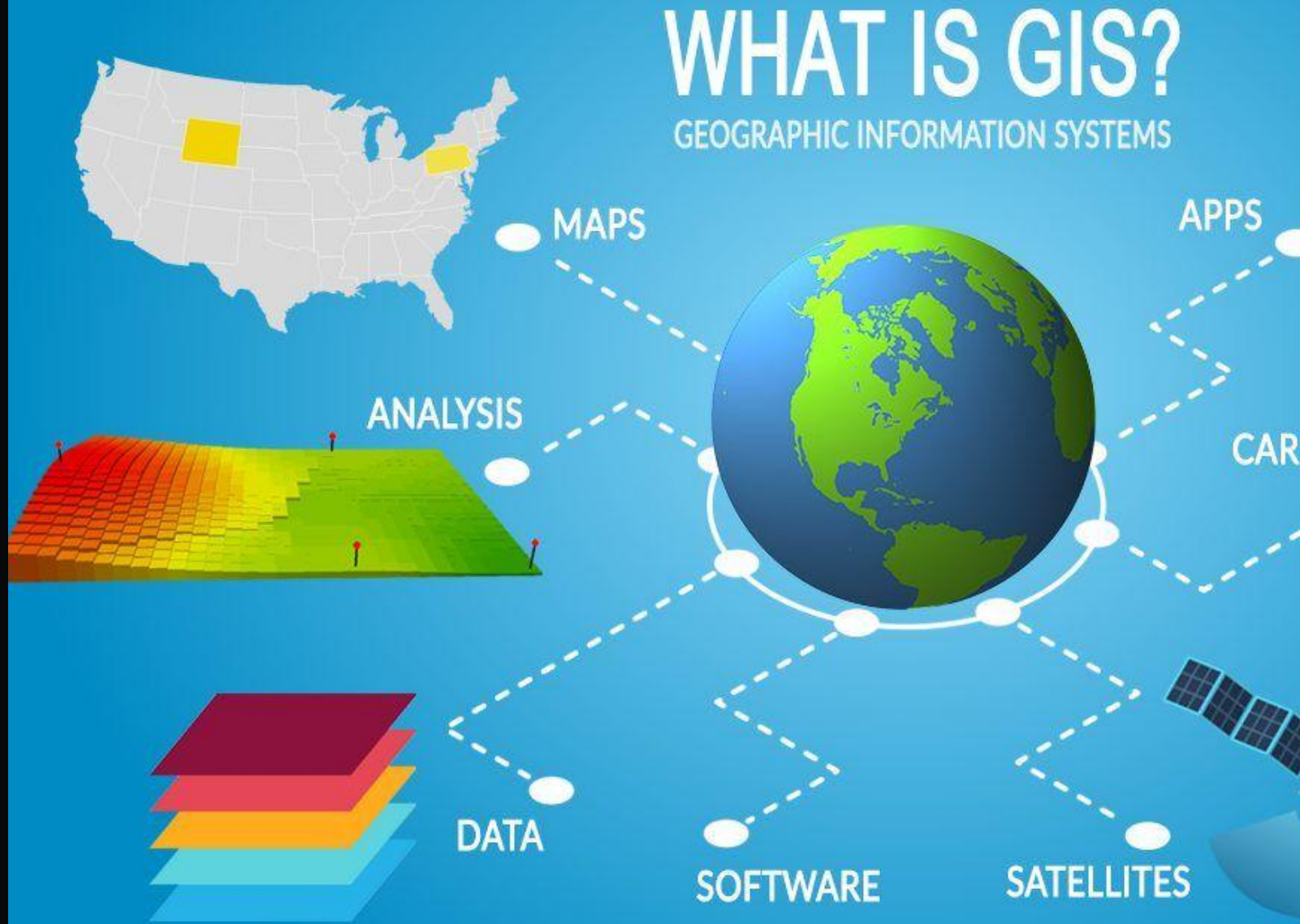
Future Trends:

- Integration with AI and Machine Learning

- Edge Computing

- 5G Technology

- Blockchain Integration

- Ethical and Regulatory Considerations

Geographical Information System

Objectives

- Introduction of GIS
- Principle Of GIS.
- Function Of GIS.
- Components Of GIS.
- Importance Of GIS
- Data Types Of GIS.
- Advantages Of GIS.
- Disadvantages Of GIS.

Introduction

- A computer system capable of assembling, storing, manipulating, and displaying geographically referenced information

- Data identified according to their locations.

- Organized collection of computer hardware, software, geographic data, and personnel

- Efficiently capture, store, update, manipulate, analyze, and display all forms of geographically referenced information.

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Principle

- Data Capture

Data sources are mainly obtained from manual digitization and scanning of aerial photographs, paper maps, and existing digital data sets.

- Database Management and Update

data security, data integrity, and data storage and retrieval, and data maintenance abilities

- Geographic Analysis

The collected information is analyzed and interpreted qualitatively and quantitatively.

- Preparing Result

One of the most exciting aspects of GIS technology is the variety of different ways in which the information can be presented.

Functions

- Data Capture

The input of data into a GIS can be achieved through many different methods of gathering.

- Data Storage

Some data is stored such as a map in a drawer, while others, such as digital data, can be as a hardcopy, stored on CD or on your hard drive.

- Data Manipulation

The digital geographical data can be edited, this allows for many attribute to be added,   edited, or deleted to the specification of the project.

- Query And Analysis

Components

- Hardware

Computer System, Scanner, Printer, Plotter, Flat Board

- Software

GIS software in use are MapInfo, ARC/Info, AutoCAD Map, etc. The software available can be said to be application specific.

- Data

A GIS will integrate spatial data with other data resources and can even use a DBMS, used by most organization to maintain their data, to manage spatial data.

Geographic data and related tabular data can be collected in-house or purchased from a commercial data provider.
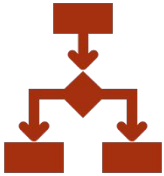
- People

GIS users range from technical specialists who design and maintain.

- Method

The map creation can either be automated raster to vector creator or it can be manually victories using the scanned images.
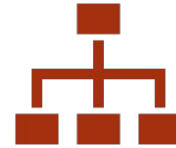
Importance of GIS

Better decision-making

Spatial analysis

Resource management

Understanding complex relationships in data

Data Types

- Vector
  - Points
  - Lines
  - Polygons

- Raster
  - Cell
  - Pixels
  - Elements

Advantages or GIS

- Allows us to view, understand, and visualize data in many ways
- Reveal relationships, patterns, and trends in the form of maps, globes, reports, and charts.
- Solve problems by looking at your data in a way that is quickly understood
- GIS give the accurate Data.
- Better Predictions and Analysis.

Disadvantages of GIS

- Excessive damage in case of internal fault.
- Long outage periods as repair of damaged part at site may be difficult.
- Expensive software.
- Integration with traditional map is difficult.

Remote Sensing

Remote Sensing

Introduction

- Gathering information about objects or phenomena from a distance without physically touching them.

- It's conducted without direct physical interaction with the target being observed.

- Remote sensing relies on detecting and measuring electromagnetic radiation which includes various wavelengths such as visible light, infrared and microwave.

- The process entails capturing and analyzing the radiation emitted or reflected by the target.
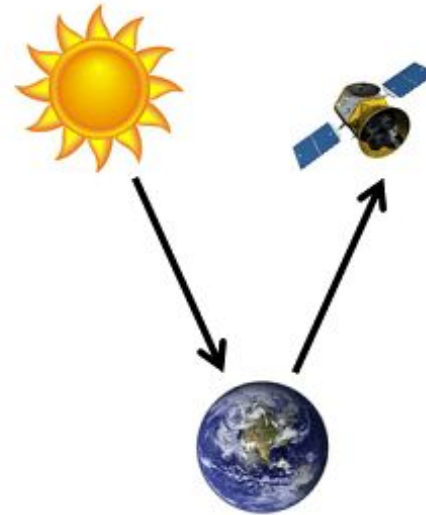
Types of Remote Sensing
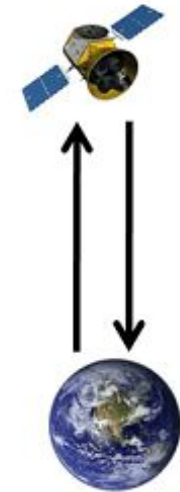
- **Passive Remote Sensing**

    - Relies on detecting natural emitted or reflected by the Earth's surface or atmosphere.

    - Examples include visible light, infrared and microwave sensors.

- **Active Remote Sensing**

    - Involves the emission of radiation by a sensor and subsequent measurement of the radiation that is reflected or scattered back from the target.

    - Common active remote sensing techniques include radar (Radio Detection and Ranging) and LiDAR (Light Detection and Ranging).

Passive remote sensor

Active remote sensor

Application of Remote Sensing

Environmental Monitoring

Natural Resource Management

Disaster Management

Urban Planning and Development

Climate Change Analysis

Challenges

- Data Quality and Interpretation

- Spatial and Temporal Resolutoin

- Atmospheric Interference

- Cost and Accessibility

- Data Integration and Fusion

Business Intelligence

Business Intelligence (BI) refers to the technologies, processes, and tools that organizations use to collect, integrate, analyze, and present business data. Business intelligence combines business analytics, data mining, data visualization, data tools and infrastructure, and best practices to help organizations make more data-driven decisions.Modern BI solutions prioritize flexible self-service analysis, governed data on trusted platforms, empowered business users, and speed to insight

How Business Intelligence Works

Businesses and organizations have questions and goals. To answer these questions and track performance against these goals, they gather the necessary data, analyze it, and determine which actions to take to reach their goals.

On the technical side, raw data is collected from business systems. Data is processed and then stored in data warehouses, the cloud, applications, and files. Once it's stored, users can access the data, starting the analysis process to answer business questions.

BI platforms also offer data visualization tools, which convert data into charts or graphs, as well as presenting to any key stakeholders or decision-makers. [1]
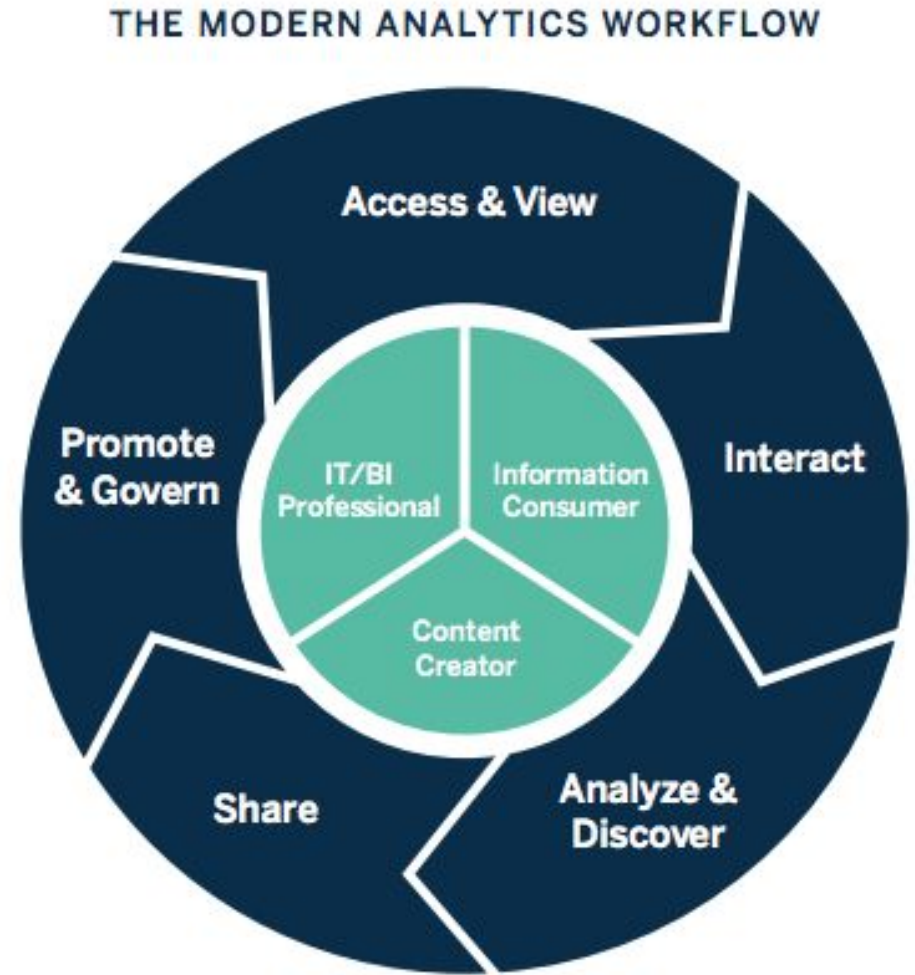
Significance Of Business Intelligence

❖ **Access to Real-Time Data**

A business intelligence solution provides access to real-time information that reduces the risk of potential errors while preparing critical data reports. Having access to real-time data enables you to monitor the company's health, detect and address operational inefficiencies, act on short-term market fluctuations and boost customer experiences.

❖ Provides Competitive Advantages

Business intelligence solutions allow you to understand what your competitors are up to, their strategies, approaches and more. It helps you improve your products and services while providing a seamless customer experience. Moreover, a company that closely monitors its internal processes and systems always stays ahead of the game.

❖ **Identify Market Trends**

Leverage external market data to detect sales trends and target regions that qualify for huge profit margins. Analyze customer data and market conditions to identify new markets. Some organizations leverage social media to gauge the market through user comments and feedback. Social media proves to be a valuable source for insights into customer preferences and pain points.

❖ **Increase Revenue**

Leverage Business intelligence tools to ask questions about why things happened through making comparisons across various dimensions. Identify sales weaknesses, get customer feedback, analyze competitors and improve operations with the help of BI to boost revenue.

❖ **Finance**

BI tools provide valuable insights into financial performance. It helps you track quarterly and annual budgets, identify potential issues before they occur and boost organizational health and financial stability. It tracks customer behaviors to prevent fraudulent activities and ensures regulatory compliance while addressing potential insider threats.

Disadvantages Of Business Intelligence

❖High initial costs

The purchase and overall setup of some of the best business intelligence software can initially seem like a major investment, however, its benefits are quickly realized. Data-driven decisions increase accuracy and reliability. That said, for smaller businesses, the upfront cost might appear daunting, but there are alternatives.

❖ **Data governance**

BI solutions produce vast amounts of data, which, if not managed well, can lead to serious security concerns. Lack of proper data governance can expose organizations to data breaches and other threats. For example, a SaaS company that sells CRM platforms having access to vast client data could, due to an oversight, inadvertently expose sales figures. A strong data governance framework would prevent such leaks and maintain client trust.

❖ **Human bias**

BI tools aim for objectivity, yet human biases can influence them, posing challenges for decision-reliant organizations. Each organization faces unique BI limitations due to varying datasets, organizational setups, and IT frameworks. Regular evaluations of BI tools can help pinpoint these constraints and formulate strategies to address them. [1]

Social Media Strategy

A social media strategy is a well-thought-out plan that indicates when, how, and what content to share on multiple socials of a brand. It helps you use resources efficiently and reach your target audience. Social media strategies are comprehensive plans outlining how businesses or individuals intend to use social media platforms to achieve specific goals.

f]Importance of Social media strategy

❖ **Social media marketing builds brand reputation and loyalty :**

Reputation is everything, especially in a challenging economic environment. According to The 2023 State of Social Media Report, building brand reputation and loyalty is a top priority for business leaders across industries, especially as they weather fluctuating market conditions.Social media allows brands to connect with their audience on a more personal level, creating authentic and lasting connections that can withstand both good times and bad.

❖ **Social media data informs stronger competitive positioning**

Getting an edge on the competition today can inform stronger business decisions tomorrow. However, if you're not using social media to keep tabs on what your competitors (and their customers) are prioritizing, you're missing out.Aggregate data on customer care interactions reveals strengths and weaknesses of competitor products or services. Content themes provide insights on the unique value props that competitors are highlighting, as well as opportunities to further differentiate your brand.

❖ Social media marketing supports better public relations outcomes

The 24-hour news cycle has done away with old methods of public relations. Today, it's not enough to simply pitch some journalists a press release. You need to establish a compelling brand narrative that proactively generates media interest, otherwise you'll get lost in the crowd. Social helps brands stand out by offering a variety of engaging ways to present a steady drumbeat of thought leadership and brand storytelling. The channel plays an increasingly large role in executive communication strategies, providing business leaders with new opportunities to share insights and showcase their expertise.

❖ **Social media marketing plays a critical role in crisis management**

Crises are no longer reserved for major brands. Social media opens businesses big and small up to a new level of scrutiny. Social media crises can unfold on various scales, whether it's an insensitive employee comment amplified by an outraged audience or a surge of customer complaints after a service slip-up. The most effective way to manage these risks is by having a social media crisis plan.

❖ **Social media marketing supports wow-worthy customer experiences**

More consumer-brand interactions are going digital, creating a massive opportunity for businesses looking to make an impression with their target audiences. One-on-one interactions now take place on a public stage, and their impacts are one-to-many. That's why it's so important for brands to create social media customer care strategies that support proactive and reactive community engagement. It's not enough to simply respond to service requests. To get the most out of social, you need to actively seek and join the conversations that move the needle for your brand, whether you're tagged or not . [2]

Advantages Of Social Media Strategy

- ❖ Cost-effective advertising.
- ❖ Building brand loyalty.
- ❖ Influencer partnerships.
- ❖ Audience insights and market research.
- ❖ Viral marketing opportunities.
- ❖ Enhanced customer targeting and segmentation.
- ❖ Access to user-generated .
- ❖ Important insights .

Disadvantages Of Social Media Strategy

❖ Time and resource intensive.

❖ Negative feedback and reputation management.

❖ Changes in platform algorithm.

❖ Information overload and limited attention span.

❖ Return on investment measurement.

❖ Privacy and data security concerns.

❖ Need to stay engaged and active. [3]

Future Scope Of Social Media Strategy

- ❖ **Understand your audience.** To capture the attention of potential clients, you must first understand who they are. Identify your target audience's demographics, interests, and online behaviors, to inform your social media strategy.
- ❖ **Use the right platforms.** Not all social media platforms are created equal. Identify the ones that your target audience frequents and focus your efforts there. This could be Facebook, LinkedIn, Instagram, or others.

- ❖ **Engage with your audience.** Social media is about building relationships. Respond promptly to comments and messages, share user-generated content, and be consistent in engaging your audience. This not only boosts your brand's visibility but also fosters trust.
- ❖ **Leverage social media ads.** Social media advertising is a cost-effective way to reach your target audience. Most platforms offer ad targeting based on user data, allowing you to reach potential clients with precision.
- ❖ **Share quality content.** Offering valuable, engaging content to your audience is critical. This can include blog posts, industry news, project highlights, or even customer testimonials. High-quality content can set you apart from your competitors. [4]