

Unit \Rightarrow 7

Recent Trends in

Technology

7.1 Concept of AI and Robotics

It is a branch of computer science that deals with designing and developing intelligent computer system similar to human intelligence having following characteristics:

- a) Understanding natural languages
- b) Reasoning and problem solving
- c) Parallel processing
- d) Self-learning

AI is generally associated with several computer science branches such as mathematics, psychology, biology, neuroscience, etc.

Uses and applications of artificial intelligence
The uses and applications of artificial intelligence are mentioned below:

- i) It is used in gaming industry.
- ii) Voice recognition
- iii) Pattern detection

- iv) Natural language processing
- v) Space exploration
- vi) Farming
- vii) Health sector
- viii) Cyber security
- ix) Education sector
- x) Banking sector

Components of artificial intelligence

The several components of artificial intelligence are mentioned below:

- i) Search and indexing
- ii) Logic generation
- iii) Learning from experience
- iv) Genetic programming
- v) Neural network
- vi) Common sense and reasoning
- vii) Expert system

i) **Search and indexing**: This intelligence is used to search solution of particular problem like possibilities of moves on chess playing game. Searching is very important and needs to be very fast and must search with accuracy.

ii) **Logic generation**: As the name suggest, AI is intelligence with creating logic in different problems. Logic in terms of predicate basis or whatever, this system creates logic for solving any kind of related problems as per the AI related system and software.

iii) Learning from experience: AI programming is built to learn from the experience like human being. Although learning are limited with comparison to the human beings and also depends on the programming language used.

iv) Genetic programming: AI programs are used to solve relationship between humans. As we see in genetically there is inheritance properties that can help the future prediction.

v) Neural network: Artificial intelligence technique that mimics the operation of the human brain that refers to nerves and neurons and comprises of densely interconnected computer processors working simultaneously that means parallel.

vi) Common sense and reasoning: The main goal of AI is to produce good reasoning power and produce logic. This reasoning power and logic made machines like human.

vii) Expert system: AI is an expert system that can recognize some type of figures, images or audio sounds. Pattern in any sense or any type which directly or indirectly presence in the system.

Robotics

Robotics is a branch of science and technology with automated machines that can mimic human behaviours and often perform task in similar fashion. It is an integrated field of technology which includes, mechanical engineering, electrical engineering and computer science. A robot is a reprogrammable, multifunctional, movable physical structure that consist of sensor system, mechanical motor, power supply and computer brain to control those elements. A robot may have following characteristics.

- Sensing (Light sensor, touch sensor, taste sensor, etc)
- Movement
- Energy (Able to power itself)
- Intelligence

7.9. Cloud computing

Cloud computing is the delivery of computing services such as storage, networking, software over the internet. It is ~~the~~ a kind of outsourcing of resources that offers faster innovation and flexibility.

It helps lowering the cost and increases the efficiency of business.

Types of cloud computing

- ① Public cloud: A public cloud uses an internet connection to access computing resources hosted on data centres managed by a third-party cloud service provider.

② Private cloud: It is used for organizations about sharing resources on a public cloud. It is implemented on servers owned and maintained by the organization and accessed over the internet or through a private internal network.

③ Hybrid cloud: A combination of several cloud environments is called hybrid cloud. It includes a combination of public cloud and private cloud. It allows for additional levels of flexibility.

Types of cloud services

① Infrastructure as a Service (IaaS): It contains the basic building blocks for cloud information technology. It provides access to networking features, computers' hardware and data storage space. It gives us the highest level of flexibility and management control over your IT resources.

② Platform as a Service (PaaS): It removes the need to manage underlying infrastructure and allows you to focus on the development and management of your applications. It is more powerful tool for resource procurement, capacity planning, software maintenance and more.

③ Software as a Service (SaaS): It provides the complete product that is run and managed by the service provider. In most cases, people referring to SaaS are referring to end-user application. We don't have to think about how the service is maintained or how the underlying infrastructure is managed. We only need to think about how you will use that particular software.

Advantages of Cloud Computing

The main advantages of cloud computing are listed below:

- a) Cost
- b) Speed
- c) Productivity
- d) Performance
- e) Reliability
- f) Security

Disadvantages of Cloud Computing

Some of the disadvantages of cloud computing are listed below:

- a) Downtime
- b) Limited control
- c) Security
- d) Technical issues
- e) Data breaches

7.3 Big Data

Big Data is a collection of huge volume of data which is growing exponentially with time such as social media, IoT devices, AI, mobile devices, networking files, etc. The big data are huge and complex data which needs specialized tools to process and extract. Several companies use big data to improve operations and provides better customer service.

Types of big data

a) Structured data : A data that can be stored accessed and processed in the fixed format is called structured data. They are easy to store, analyze and sort.

b) Semi-structured data : This data contains both form of data. In this sometimes data may be structured but the form of data may be unstructured and vice versa.

c) Unstructured data : A data with unknown form or mixed structure is called unstructured data. This possess multiple challenges to process to get the the actual value out of it. A heterogenous data source i.e. combination of text files, images, videos, etc. is an example of unstructured data.

Characteristics of big data

Some of the characteristics of big data are as follows:

a) Volume: The big volume of big data reflects the size of the data set, which is typically in exabytes (EB). Nowadays, many data-driven companies are working with petabytes (PB).

b) Variety: Big variety means that big diversity or big different types of data sources with different structures from which it arrived and the types of data available to everyone.

c) Velocity: It refers to the speed of generation of data. It deals with the speed at which data flows in from sources like business processes, application logs, networks and social media sites, sensors, other devices, etc.

d) Variability: It refers to the inconsistency which can be shown by the data at times. So that it needs powerful tools to be able to handle and manage the data efficiently and effectively.

Advantages of big data

The advantages of big data are listed below:

1. Better decision-making
2. Increased productivity
3. Reduce costs
4. Improved customer service

5. Fraud detection
6. Increased revenue
7. Increased agility
8. Greater innovation
9. Faster speed to market

Disadvantages of big data

The disadvantages of big data are mentioned below:

1. Need for talent
2. Need for cultural change
3. Cybersecurity risks
4. Rapid change
5. Hardware needs
6. Costs
7. Difficulty integrating legacy systems

7.4 Virtual Reality

VR is a modern technology in which users can get real life experience in a virtual world. It creates a 3D interactive environment where users can interact with simulated objects in that simulated environment.

There are three types of virtual reality. They are:

- i) Non-immersive virtual reality
- ii) Semi-immersive virtual reality
- iii) Fully immersive virtual reality

Advantages of virtual reality

Some advantages of virtual reality are mentioned below:

- i) Gaming and industry entertainment industry
- ii) Increased learning possibilities
- iii) More than real
- iv) Self-practice and simulation

Disadvantages of virtual reality

Some of the disadvantages of virtual reality are mentioned below:

- i) Very expensive
- ii) Isolated
- iii) Obsession
- iv) Unreal
- v) Risk for accident

7.5 Concept of e-com, e-med, e-gov and e-edu

E-commerce

E-commerce is a process of buying and selling products or services using internet.

Types of e-commerce

- i) B2C (Business to consumer)
- ii) B2B (Business to business)
- iii) C2B (Consumer to business)
- iv) C2C (consumer to consumer)

Advantages of e-commerce

The advantages of e-commerce are as follows:

- i) It makes shopping faster and reliable.
- ii) Shopping can be done 24x7.
- iii) Reduces operational costs.
- iv) No physical company set-up required.
- v) Provides better quality services.

Disadvantages of e-commerce

The disadvantages of e-commerce are as follows:

- i) Risk of fraud.
- ii) No guarantee of product quality.
- iii) Risk of mechanical failures.
- iv) Risk of hacking and data loss.

E-Governance

E-governance stands for electronic governance. It is the application of electronic devices to improve the interaction between government and citizens and to increase the administrative workflow within government operation. It also refers to smart governance that means simple, moral, accountable, responsive and transparent. Its main motto is "Putting people online not in line".

Types of e-governance

- i) G2G
- ii) G2C
- iii) G2B

Advantages of e-governance

Some of the advantages of e-governance are mentioned below:

- ① Corruption will be somehow minimized.
- ② Citizens can get direct access to governmental authorities.
- ③ Transparency in governmental activities.
- ④ Simplifying the government information to customers.
- ⑤ Increases public participation.

Disadvantages of e-governance

Some of the disadvantages of e-governance are mentioned below:

- ① Privacy risks.
- ② Security concerns.
- ③ Information transparency
- ④ Infrastructure including connectivity in rural areas
- ⑤ Capacity and awareness

E-Medicine

E-medicine refers to an approach that provides medical services whenever or wherever required using ICT. With the help of this approach, even small number of doctors can provide medical services to large number of people scattered in different locations.

Objectives of e-medicine

The objectives of e-medicine are mentioned below:

- ① To save the time wasted by doctors and patients while travelling.
- ② To provide cost effective medical service to the public.
- ③ To enhance peoples equality (unbiasness) in the availability of various medical services including general information.

Disadvantages of e-medicine

The disadvantages of e-medicine are as follows:

- ① Every citizens do not have internet access.
- ② Non-applicable in emergency cases.
- ③ Lack of trust issues.
- ④ Every citizens do not have technical knowledge.

E-Learning

E-learning is a platform that uses ICT to provide learning based environment which can be anytime, anywhere accessible. Some examples of e-learning platforms are unacademy, byjus, edx, ~~inf~~ internet, w3school, etc.

Advantages of e-learning

The advantages of e-learning are mentioned below:

- ① Effective at producing good outcomes.
- ② Everywhere learning (i.e. not limited by place or time)
- ③ Extends learning to more people.
- ④ Supports individual learning styles and needs.
- ⑤ Self paced.
- ⑥ Regularly updated content
- ⑦ Budget friendly

Disadvantages of e-learning

The disadvantages of e-learning are mentioned below:

- ① Difficult to update from rural areas.
- ② Compromised communication skills
- ③ Social isolation
- ④ Technical difficulties
- ⑤ Limited access to resources and support
- ⑥ Focuses more on theory

7.6 Concept of Mobile Computing

Mobile computing is a generic term describing one's ability to use technology while moving as opposed to portable computers. Also, it is a technical field that covers the design, development and evaluation of mobile applications using appropriate solutions that meet user requirements. It involves mobile communication, mobile hardware and mobile software.

Advantages of mobile computing

The advantages of mobile computing are given below:

- ① Portable
- ② Social interactivity
- ③ Quick service
- ④ Commonly used
- ⑤ Easy and quick enhancement

Disadvantages of mobile computing

The disadvantages of mobile computing are mentioned below:

- ① Insufficient bandwidth
- ② Security standards
- ③ Human health hazards

7.7. Concept of Internet of Things (IoT)

IoT consists of several computing devices that can be connected to internet. These devices may contain sensors that read data from external environment and process accordingly. The IoT devices are connected with cloud computing for faster and smoother access.

In general, any physical device that can be connected via internet is called IoT. For example, smart watch, CCTV camera, smart cities, smart cars, etc.

Advantages of IoT

The advantages of IoT are mentioned below:

- ① Easily and everywhere accessible.
- ② Multifunctionality
- ③ Enhances the living standard.
- ④ Time saving
- ⑤ Quick response

Disadvantages of IoT

The disadvantages of IoT are mentioned below:

- ① High risk of data robbery.
- ② Health hazards
- ③ Network / Technical issues
- ④ Difficulty in handling massive data.
- ⑤ More expensive
- ⑥ Regular maintenance

