UNIT-3

TOPIC 1: AI and its Applications

Artificial intelligence is the simulation of human intelligence processes by machines, especially computer systems. Specific applications of AI include expert systems, natural language processing, speech recognition and machine vision.

Applications of AI

Artificial Intelligence has various applications in today's society. It is becoming essential for today's time because it can solve complex problems with an efficient way in multiple industries, such as Healthcare, entertainment, finance, education, etc. AI is making our daily life more comfortable and fast.

Following are some sectors which have the application of Artificial Intelligence:

1. AI in Astronomy
   o Artificial Intelligence can be very useful to solve complex universe problems. AI technology can be helpful for understanding the universe such as how it works, origin, etc.

2. AI in Healthcare
- o In the last, five to ten years, AI becoming more advantageous for the healthcare industry and going to have a significant impact on this industry.
- o Healthcare Industries are applying AI to make a better and faster diagnosis than humans. AI can help doctors with diagnoses and can inform when patients are worsening so that medical help can reach to the patient before hospitalization.

3. AI in Gaming
- o AI can be used for gaming purpose. The AI machines can play strategic games like chess, where the machine needs to think of a large number of possible places.

4. AI in Finance
- o AI and finance industries are the best matches for each other. The finance industry is implementing automation, chatbot, adaptive intelligence, algorithm trading, and machine learning into financial processes.

5. AI in Data Security
- o The security of data is crucial for every company and cyber-attacks are growing very rapidly in the digital world. AI can be used to make your data more safe and secure. Some examples such as AEG bot, AI2 Platform,are used to determine software bug and cyber-attacks in a better way.

6. AI in Social Media
- o Social Media sites such as Facebook, Twitter, and Snapchat contain billions of user profiles, which need to be stored and managed in a very efficient way. AI can organize and manage massive amounts of data. AI can analyze lots of data to identify the latest trends, hashtag, and requirement of different users.

7. AI in Travel & Transport
- o AI is becoming highly demanding for travel industries. AI is capable of doing various travel related works such as from making travel arrangement to suggesting the hotels, flights, and best routes to the customers. Travel industries are using AI-powered chatbots which

can make human-like interaction with customers for better and fast response.

8. AI in Automotive Industry
   - o Some Automotive industries are using AI to provide virtual assistant to their user for better performance. Such as Tesla has introduced TeslaBot, an intelligent virtual assistant.
   - o Various Industries are currently working for developing self-driven cars which can make your journey more safe and secure.

9. AI in Robotics:
   - o Artificial Intelligence has a remarkable role in Robotics. Usually, general robots are programmed such that they can perform some repetitive task, but with the help of AI, we can create intelligent robots which can perform tasks with their own experiences without pre-programmed.
   - o Humanoid Robots are best examples for AI in robotics, recently the intelligent Humanoid robot named as Erica and Sophia has been developed which can talk and behave like humans.

10. AI in Entertainment
   - o We are currently using some AI based applications in our daily life with some entertainment services such as Netflix or Amazon. With the help of ML/AI algorithms, these services show the recommendations for programs or shows.

11. AI in Agriculture
   - o Agriculture is an area which requires various resources, labor, money, and time for best result. Now a day's agriculture is becoming digital, and AI is emerging in this field. Agriculture is applying AI as agriculture robotics, solid and crop monitoring, predictive analysis. AI in agriculture can be very helpful for farmers.

12. AI in E-commerce
   - o AI is providing a competitive edge to the e-commerce industry, and it is becoming more demanding in the e-commerce business. AI is helping shoppers to discover associated products with recommended size, color, or even brand.

13. AI in education:
   o AI can automate grading so that the tutor can have more time to teach. AI chatbot can communicate with students as a teaching assistant.
   o AI in the future can be work as a personal virtual tutor for students, which will be accessible easily at any time and any place.

Topic 2:ROBOTICS

Robotics is a branch of engineering that involves the conception, design, manufacture and operation of robots. The objective of the robotics field is to create intelligent machines that can assist humans in a variety of ways.

Robotics involve design, construction, and use of machines (robots) to perform tasks done traditionally by human beings.

Robots are widely used in such industries as automobile manufacture to perform simple repetitive tasks, and in industries where work must be performed in environments hazardous to humans.

Many aspects of robotics involve artificial intelligence; robots may be equipped with the equivalent of human senses such as vision, touch, and the ability to sense temperature.

In many situations robots can increase productivity, efficiency, quality and consistency of products:

- Unlike humans, robots don't get bored.
- Until they wear out, they can do the same thing again and again.
- They can be very accurate – to fractions of an inch (as is needed for example in manufacturing of microelectronics)

Topic 3: IOT AND ITS APPLICATIONS

What is IoT?

IoT is an umbrella term that refers to the billions of physical objects or "things" connected to the Internet, all collecting and exchanging data with other devices and systems over the Internet.

The Internet of Things (IoT) describes the network of physical objects— "things"—that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the internet.

IoT devices can range from small ordinary household cooking appliances to sophisticated industrial tools. Each IoT component has a Unique Identifier (UID) and they can also transmit data without the assistance of humans.

Applications of IoT

1. Wearables

Wearable technology is the hallmark of IoT applications and one of the earliest industries to deploy IoT. We have fit bits, heart rate monitors and smartwatches these days.

Guardian glucose monitoring device has been developed to help people with diabetes. It detects glucose levels in our body, uses a small electrode called the glucose sensor under the skin, and relates it to a radiofrequency monitoring device.

2. Smart Home Applications

With the use of Siri, Alexa, Google Home, and other household IoT-enabled applications, IoT has become one of the most important aspects of our daily routine.

3. Health care

Healthcare do real-time monitoring with the help of smart devices. It gathers and transfers health data such as blood pressure, blood sugar

levels, weight, oxygen, and ECG. The patient can contact the doctor by the smart mobile application in case of any emergency.

4. Smart Cities

A smart city is largely dependent of flow of information and actionable insights from the real-time city data. Here is where IoT technology can help with numerous city functions such as:

- Intelligent monitoring of traffic on the road to avoid roadblocks and easy commute.
- Scheduling of public transports can be improved with smart GPS.
- Sensors and RFIDs can help with better management of civic amenities like recycling centers and segregation of waste

5. Agriculture

The Internet of Things application has strong capabilities to improve and strengthen the current agriculture sector. Here are a few IoT use cases in agricultural processes:

- Agricultural Drones for imaging, mapping, and surveying the farms.
- IoT sensors can help farmers get accurate information on greenhouse conditions like temperature, humidity, lighting, etc.
- Just as in crop monitoring, these IoT sensors can also perform real-time cattle monitoring.

6. Industrial Automation

In industrial automation, IoT is used in the following areas:

- **Product flow monitoring**
- **Factory digitization**
- **Inventory management**
- **Safety and security**
- **Logistics and Supply Chain Optimization**
- **Quality control**
- **Packaging customization**

7. Smart Retail

With the help of smart gadgets and connected devices we are expecting safer and more efficient stores and supermarkets. They can gain an advantage in their business with:
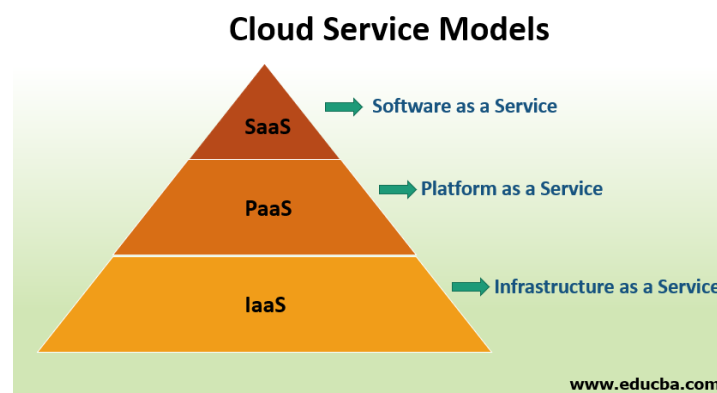
- Better supply-chain management with GPS sensors and RFID tags.
- Smart inventory management based on customer-buying behavior to avoid overstocking, stockouts, and shrinkage.
- Retailers can automate inventory visibility with IoT and also develop procurement planning.
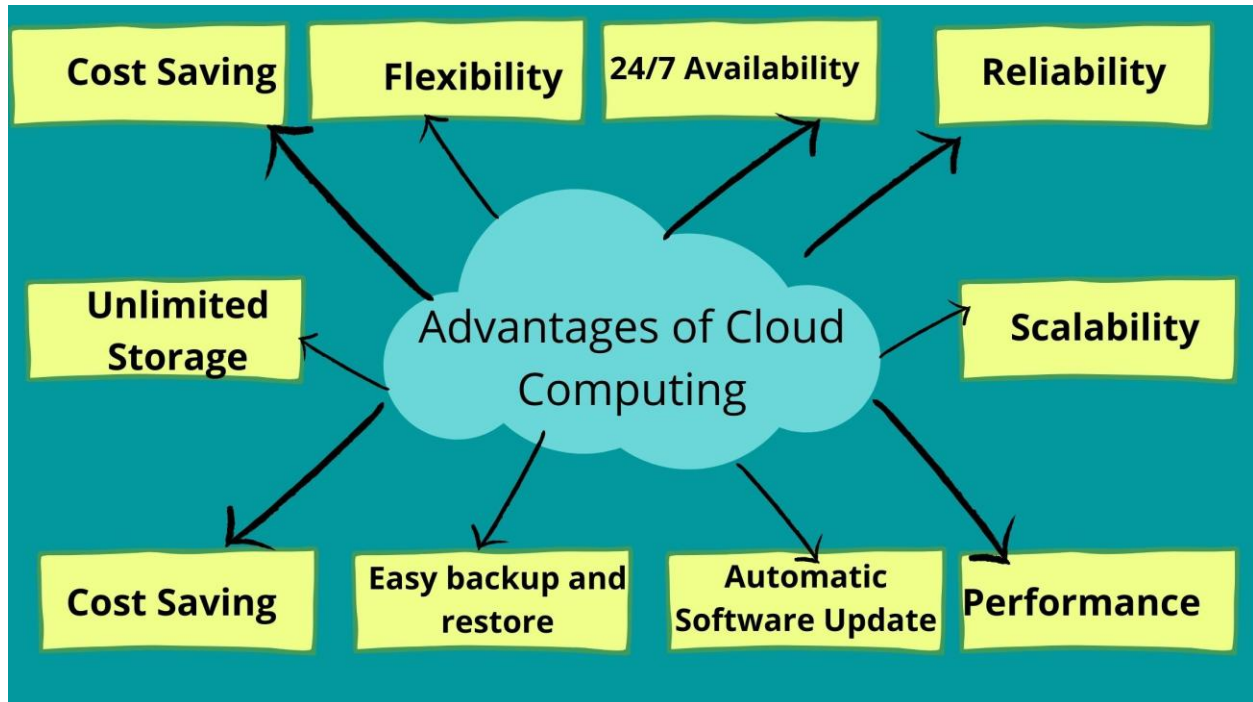- Automate and even personalize checkouts for customers.

8. Smart Farming

Farmers can minimize waste and increase productivity. The system allows the monitoring of fields with the help of sensors. Farmers can monitor the status of the area.

TOPIC 4: What is cloud computing and advantages?

Cloud computing is a term used to describe the delivery of on-demand computing resources—hardware, storage, databases, networking, and software—to businesses and individuals via a network (usually the internet). Cloud computing enables organizations to access and store information without managing their own physical devices or IT infrastructure.

Cloud Service Models

SaaS → Software as a Service
PaaS → Platform as a Service
IaaS → Infrastructure as a Service

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ADVANTAGES OF CLOUD COMPUTING

Advantages of Cloud Computing:

1. Cost Savings

Cost saving is one of the biggest Cloud Computing benefits. It helps you to save substantial capital cost as it does not need any physical hardware investments. Also, you do not need trained personnel to maintain the hardware. The buying and managing of equipment is done by the cloud service provider.

2.Scalability and flexibility

Cloud computing gives your business more flexibility. You can quickly scale resources and storage up to meet business demands without having to invest in physical infrastructure.

Companies don't need to pay for or build the infrastructure needed to support their highest load levels. Likewise, they can quickly scale down if resources aren't being used.

3.High Speed

Cloud computing allows you to deploy your service quickly in fewer clicks. This faster deployment allows you to get the resources required for your system within fewer minutes.

4. Back-up and restore data

Once the data is stored in a Cloud, it is easier to get the back-up and recovery of that, which is otherwise very time taking process on-premise.

5.Automatic Software Integration

In the cloud, software integration is something that occurs automatically. Therefore, you don't need to take additional efforts to customize and integrate your applications as per your preferences.

6. Reliability

Reliability is one of the biggest benefits of Cloud hosting. You can always get instantly updated about the changes.

7. Mobility

Employees who are working on the premises or at the remote locations can easily access all the could services. All they need is an Internet connectivity.

8.Unlimited storage capacity

The cloud offers almost limitless storage capacity. At any time you can quickly expand your storage capacity with very nominal monthly fees.

9.Collaboration

The cloud computing platform helps employees who are located in different geographies to collaborate in a highly convenient and secure manner.

10.Quick Deployment

Last but not least, cloud computing gives you the advantage of rapid deployment. So, when you decide to use the cloud, your entire system can be fully functional in very few minute

TOPIC 5:WHAT IS VIRTUAL REALITY?

Virtual Reality (VR) is a computer-generated environment with scenes and objects that appear to be real, making the user feel they are immersed in their surroundings. This environment is perceived through a device known as a Virtual Reality headset or helmet.

TOPIC 6:What is 3D printing?

3D printing, also known as additive manufacturing, is **a process in which a digital file is used to create a three-dimensional solid object**. In the 3D printing process, sequential layers of material are laid down by the '3D printer' until object creation is completed.
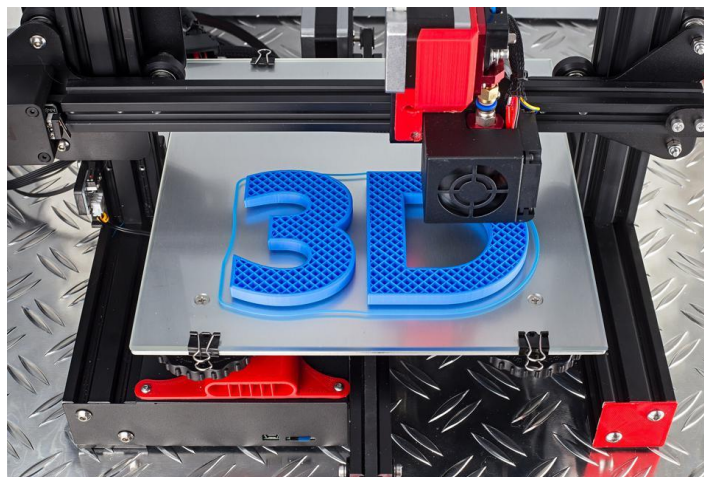
TOPIC7:Big Data

What is Big Data?

Big Data is a collection of data that is huge in volume, yet growing exponentially with time. It is a data with so large size and complexity that none of traditional data management tools can store it or process it efficiently. Big data is also a data but with huge size.

It primarily refers to data sets that are too large or complex to be dealt with by traditional data-processing application software.

Big data is often characterized by the three V's:

- the large volume of data
- the wide variety of data
- the velocity at which much of the data is generated, collected and processed.