Artificial Intelligence (AI) refers to the development and implementation of computer systems capable of performing tasks that typically require human intelligence. It involves the simulation of human intelligence in machines, enabling them to perceive, reason, learn, and make decisions.

AI can be classified into two types: narrow AI and general AI. Narrow AI, also known as weak AI, is designed to perform specific tasks or solve specific problems. General AI, also known as strong AI, refers to AI systems that possess the ability to understand, learn, and apply knowledge across various domains, similar to human intelligence.

Here are a few examples of AI applications:

1. Virtual Personal Assistants: Voice-activated assistants like Apple's Siri, Amazon's Alexa, and Google Assistant utilize natural language processing and machine learning techniques to understand and respond to user queries, perform tasks, and provide relevant information.
2. Recommendation Systems: Online platforms such as Netflix, Amazon, and Spotify use AI algorithms to analyze user preferences and behavior, generating personalized recommendations for movies, products, or music.
3. Image and Speech Recognition: AI is used in technologies like facial recognition systems, where algorithms can analyze and identify individuals in images or videos. Speech recognition systems, like those used in voice assistants or transcription services, convert spoken language into written text.
4. Autonomous Vehicles: AI plays a crucial role in the development of self-driving cars. These vehicles use sensors, machine learning, and computer vision techniques to perceive their surroundings, make decisions, and navigate safely without human intervention.
5. Fraud Detection: AI algorithms can analyze patterns and detect anomalies in large volumes of data, helping to identify fraudulent transactions or activities in areas like finance or cybersecurity.
6. Healthcare Applications: AI is utilized in medical imaging analysis, drug discovery, virtual nursing assistants, and personalized medicine, assisting in the diagnosis, treatment, and monitoring of various diseases.

Application 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:
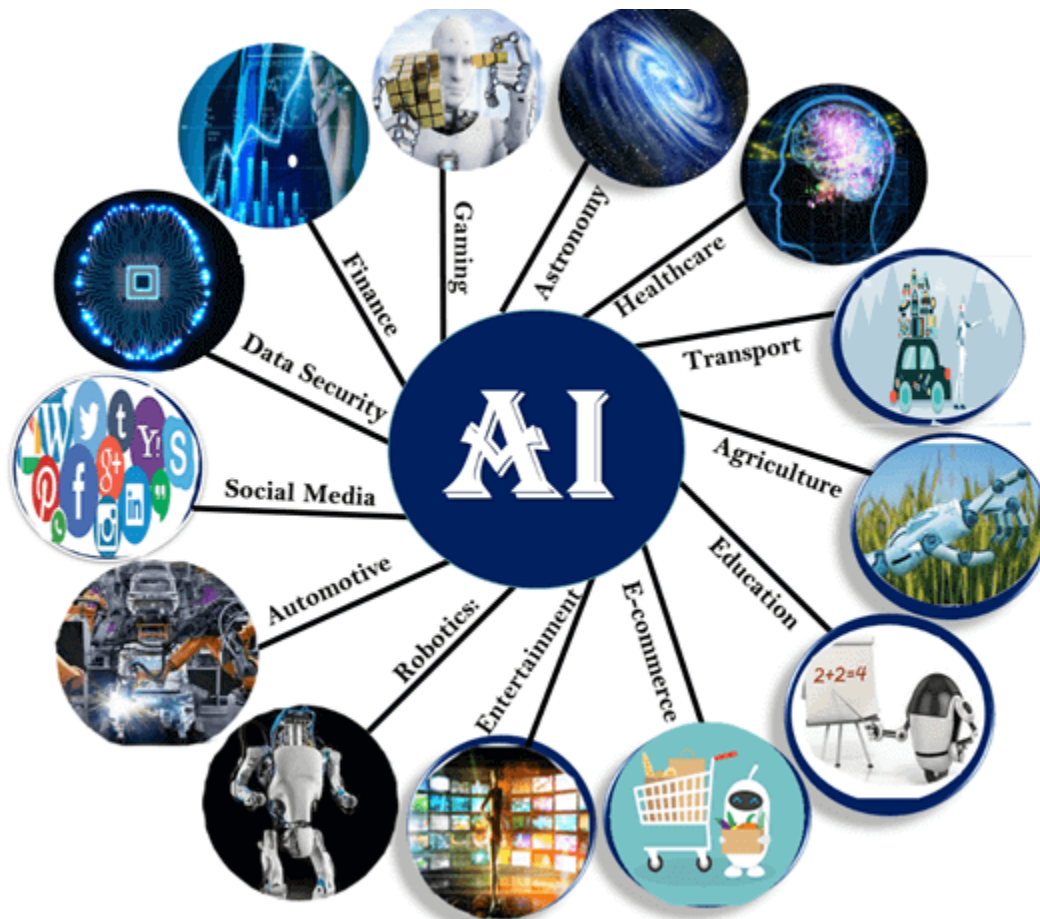
1. AI in Astronomy

- 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:

- 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.
- 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

- 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

- 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

- 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:

- AI can automate grading so that the tutor can have more time to teach. AI chatbot can communicate with students as a teaching assistant.
- 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.

Approaches to knowledge representation:

There are mainly four approaches to knowledge representation, which are given below:

1. Simple relational knowledge:

- o It is the simplest way of storing facts which uses the relational method, and each fact about a set of the object is set out systematically in columns.
- o This approach of knowledge representation is famous in database systems where the relationship between different entities is represented.
- o This approach has little opportunity for inference.

2. Inheritable knowledge:

- o In the inheritable knowledge approach, all data must be stored into a hierarchy of classes.
- o All classes should be arranged in a generalized form or a hierarchal manner.
- o In this approach, we apply inheritance property.
- o Elements inherit values from other members of a class.
- o This approach contains inheritable knowledge which shows a relation between instance and class, and it is called instance relation.
- o Every individual frame can represent the collection of attributes and its value.
- o In this approach, objects and values are represented in Boxed nodes.
- o We use Arrows which point from objects to their values.

3. Inferential knowledge:

- o Inferential knowledge approach represents knowledge in the form of formal logics.
- o This approach can be used to derive more facts.
- o It guaranteed correctness.
- o **Example:** Let's suppose there are two statements:
  1. Marcus is a man
  2. All   men   are   mortal
     Then   it   can   represent   as;

     man(Marcus)
     ∀x = man (x) ----------> mortal (x)s

4. Procedural knowledge:

- o Procedural knowledge approach uses small programs and codes which describes how to do specific things, and how to proceed.

- o In this approach, one important rule is used which is **If-Then rule**.

- o In this knowledge, we can use various coding languages such as **LISP language** and **Prolog language**.

- o We can easily represent heuristic or domain-specific knowledge using this approach.

- o But it is not necessary that we can represent all cases in this approach.

explain intelligent agents in AI?

Intelligent agents are a fundamental concept in the field of artificial intelligence (AI). An intelligent agent is an autonomous entity that perceives its environment, makes decisions or takes actions based on that perception, and seeks to achieve specific goals or objectives. These agents can operate in various domains and interact with the environment to accomplish tasks.

Here are the key components of an intelligent agent:

1. Perception: Intelligent agents have sensors or perception mechanisms to gather information about their environment. This information can be obtained through various means such as cameras, microphones, or other sensors that enable the agent to sense and perceive the relevant aspects of the environment.
2. Reasoning: Once an intelligent agent perceives its environment, it uses reasoning mechanisms to process the gathered information and make decisions. Reasoning can involve logical deduction, pattern recognition, statistical analysis, or other forms of inference to derive conclusions or generate actions.
3. Knowledge: Intelligent agents possess knowledge about the world or the specific domain in which they operate. This knowledge can be pre-programmed, acquired through learning processes, or obtained from interactions with the environment or other agents. The knowledge base provides the agent with the necessary information to understand and navigate its environment.
4. Decision-making: Based on the perceived information and reasoning, intelligent agents make decisions or select appropriate actions to achieve their goals. The decision-making process can be rule-based, where decisions are made based on predefined rules or logic. It can also involve machine learning techniques, where the agent learns from experience or training data to improve its decision-making abilities.
5. Action: Intelligent agents act upon the environment through effectors or actuators. These actuators allow agents to perform physical actions or communicate with other systems or agents to achieve their objectives. Actions can range from simple motor movements to complex interactions with the environment or other entities.
6. Learning and Adaptation: Intelligent agents can learn and adapt their behavior over time. They can acquire knowledge from experience, improve their decision-making capabilities, and update their internal models to better understand the environment. Learning

techniques such as reinforcement learning, supervised learning, or unsupervised learning enable agents to refine their behavior through feedback and interactions.

Differences between BFS and DFS

The following are the differences between the BFS and DFS:

	BFS	DFS
Full form	BFS stands for Breadth First Search.	DFS stands for Depth First Search.
Technique	It a vertex-based technique to find the shortest path in a graph.	It is an edge-based technique becau the edge are explored first from the node.
Definition	BFS is a traversal technique in which all the nodes of the same level are explored first, and then we move to the next level.	DFS is also a traversal technique i started from the root node and exp as possible until we reach the node adjacent nodes.
Data Structure	Queue data structure is used for the BFS traversal.	Stack data structure is used for the
Backtracking	BFS does not use the backtracking concept.	DFS uses backtracking to travers nodes.
Number of edges	BFS finds the shortest path having a minimum number of edges to traverse from the source to the destination vertex.	In DFS, a greater number of edg traverse from the source vertex to th
Optimality	BFS traversal is optimal for those vertices which are to be searched closer to the source vertex.	DFS traversal is optimal for thos solutions are away from the source
Speed	BFS is slower than DFS.	DFS is faster than BFS.
Suitability for decision tree	It is not suitable for the decision tree because it requires exploring all the neighboring nodes first.	It is suitable for the decision tree. Ba it explores all the paths. When the g its traversal.
Memory efficient	It is not memory efficient as it requires more memory than DFS.	It is memory efficient as it require BFS.

Types of search algorithms

Based on the search problems we can classify the search algorithms into uninformed (Blind search) search and informed search (Heuristic search) algorithms.