

Q. What is Artificial Intelligence?

Artificial Intelligence is the ability of a computer or machine to think, learn and make decisions in a way that is similar to humans.

Key characteristics of Artificial Intelligence.

A.I possesses several important characteristics that distinguish it from traditional computer systems.

1. Learnings.

AI systems learn from data and past experiences instead of relying only on fixed programming. The more data they receive, the better they become at performing tasks.

2. Reasoning.

4. Decision Making.

3. Problem Solving.

5. Perception.

6. Natural Language Processing (NLP).

7. Adaptability.

→ Scope of Artificial Intelligence.

AI is widely used in different sector.

Field	Applications.
Healthcare	Disease diagnosis, medical imaging.
Education	Smart learning systems.
Agriculture	crop monitoring.
Banking	Fraud detection.

Transportation	Self-driving Vehicles.
Manufacturing	Industrial Robots
E-Commerce	Product recommendation.
Cybersecurity	Threat detection
Smart Homes	Voice assistants.

→ History of Artificial Intelligence:-

Who was Alan Turing?

Alan Turing was a British mathematician, logician and Computer Scientist. He is widely regarded as the Father of Computer Science and one of the pioneers of A.I.

1950 - Alan Turing

Alan Turing proposed the famous Turing Test to determine whether a machine can exhibit intelligent behaviour similar to humans.

Turing Test

- A human interacts with both a machine and another human.
- If the evaluator cannot distinguish the machine from the human based on conversation, the machine is said to have passed the Turing Test.

The Turing Test (1950)

In 1950, Alan Turing published the research paper "Computing Machinery and Intelligence".

Can machines think?

To answer this question, he proposed the Turing Test, also known as the Imitation Game.

• How the Turing Test Works

- * A Human evaluator communicates with both a human and a machine through text.
- * The evaluator does not know which responses come from the human or the machine.
- * If the evaluator cannot reliably distinguish the machine from the human, the machine is said to have passed the Turing Test.

Importance: -

- Introduced the concept of machine intelligence.
- Inspired future AI research.
- Established a benchmark for intelligence behaviour.

2. Birth of Artificial Intelligence (1956)

In 1956, a group of researchers met at Dartmouth College in US for a Summer research workshop. The conference organized by John McCarthy who introduced the term. The researchers believed that machines could be developed perform tasks requiring human intelligence.

Major contributors

- John McCarthy
- Marvin Minsky
- Claude Shannon
- Allen Newell
- Herbert Simon

3. Early AI programs (1956-1970)

Researchers developed the first AI programs.

Important Developments:-

* General Problem Solver:-

Designed to solve a variety of logical problems using reasoning techniques.

Characteristics of Early AI.

- Rule-based systems
- Limited learning capability.
- Logical reasoning.
- Worked only in controlled environments.

4. Expert Systems (1970s-1980s)

AI Research shifted toward Expert Systems.

What is an Expert system?

An Expert System is a computer program that mimics the decision-making ability of a human expert in a specific domain.

- E.g:-
- Medical diagnosis
 - Financial decision-making
 - Fault detection in industries

popular Expert systems.

- MYCIN (medical diagnosis)
- DENDRAL (chemical)

5. AI Winter (late 1970s-1990s)

6. IBM Deep Blue Defeats Garry Kasparov (1997)

7. IBM Watson Wins Jeopardy! (2011)

9. AlphaGo Defeats Lee Sedol (2016)

10. Rise of Generative AI (2020 - Present)

11. ChatGPT (2022)

* In Nov. 2022, OpenAI launched ChatGPT, one of the most advanced conversational AI systems.

* ChatGPT is based on Large Language Models (LLMs) trained on vast amounts of text data.

Features:-

- Understands natural language.
- Answers questions.
- Generates essays.
- Writes computer programs.
- Translates languages.
- Assists in research and education.

Applications:-

- Education
- Customer support
- Health assistance
- Software development
- Content creation
- Business communication

Significance:-

ChatGPT made AI accessible to millions of users worldwide and demonstrated how Generative AI can assist people in everyday tasks.

→ Types of AI:-

1. Narrow AI (Weak AI):-

It is designed and trained to perform one specific task or limited sets of tasks. It is called narrow because its intelligence is limited to a particular application. Although, it may perform that task better than humans, it cannot think or reason like a human being.

Characteristics of Narrow AI:-

- Performs only a specific task.
- Cannot think like humans.
- Cannot transfer knowledge from one task to another.
- Learn within a limited domain.

- Fast, accurate and efficient for its designed purpose.

- Most AI applications today are Narrow AI.

E.g:- Google Maps, Siri (Apple), Amazon (Alexa), Google Assistant, Netflix, Spotify, ChatGPT, Email Spam-filter, Face Recognition.

⊛ Although ChatGPT performs many language-related tasks, it still considers Narrow AI bcz it specializes in language understanding and generation rather than processing general human intelligence.

Advantages of Narrow AI.

- High Accuracy.
- Fast performance.
- Reduce human effort.
- Works continuously.
- Automates repetitive tasks.

Limitations of Narrow AI.

- Cannot perform unrelated tasks.
- Lacks Common Sense.
- No self-awareness.
- Depends on training data.

2. General AI (Strong AI):-

It refers to a machine that can understand, learn, reason and perform any intellectual task that a human can perform. Any intellectual task. Unlike Narrow AI, General AI would not be limited to one specific task. It could apply knowledge from one area to another, solve unfamiliar problems, and adapt to new situations.

Characteristics of General AI:-

- Human-level intelligence.
- Applies knowledge across domains.
- Learns multiple tasks.
- Reasons logically.
- Understands context.
- Make independent decisions.

8. Super A.I (Artificial Super Intelligence):-

It is the hypothetical form of AI that would surpass human intelligence in every aspect, including creativity, reasoning, emotional understanding, scientific discovery and decision making.

Characteristics of Super AI:-

- Smarter than humans.
- Self learning and self-improving.
- Highly creative.
- Make better decisions than humans.
- Solve highly complex problems rapidly.
- May develop new knowledge independently.

Comparison of the three types of AI.

Feature	Narrow AI (Weak AI)	General AI (Strong AI)	Super AI (ASI)
Definition	Performs one specific task	Performs any intellectual task like a human	Surpasses human intelligence.
Intelligence level	Limited	Human level	Beyond human
Learning Ability.	learns with one domain	learns across many domains	Continuously self-improves.
Decision Making	Tasks-specific	Human-like	Superior to humans.
Self-awareness	No	Expected	Expected
Exists today?	Yes	No	No
E.g.	Siri, Alexa, Netflix; Spotify, chatGPT	None	None.