

Artificial intelligence

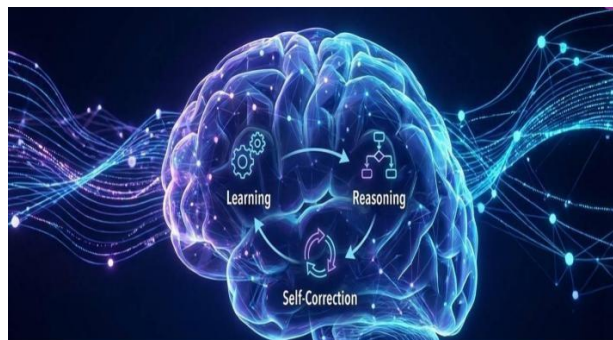
Definition of Artificial Intelligence. History of Artificial Intelligence. Artificial Intelligence Approaches. Artificial Intelligence Techniques

Definition of Artificial Intelligence:

Artificial intelligence (AI) is technology that enables computers and machines to simulate **human learning, understanding, problem solving, decision making, creativity and Independence.**



Artificial intelligence (AI) refers to the capability of computational systems to perform tasks typically associated with human intelligence, such as **learning, reasoning, problem-solving, perception, and decision-making.** It is a field of research in computer science that develops and studies methods and software that enable machines to perceive their environment and use learning and intelligence to take actions that maximize their chances of achieving defined goals. Such machines may be called AIs.



History of Artificial Intelligence: The Origins (1940s–1950s)

1. Alan Turing (1950): Published "Computing Machinery and Intelligence" proposing the question "Can machines think?".

2. The Birth of AI (1956)

Dartmouth Conference: The term "Artificial intelligence" was coined at a summer research project organized by John McCarthy, Marvin Minsky, Claude Shannon, and Nathan Rochester. This marked the formal beginning of AI as a field.

3. Early Optimism and Setbacks (1956–1970s)

Early successes in solving algebra problems and playing games (e.g., checkers) led to high expectations.

Limitations: By the 1970s, AI hit a wall due to limited computing power and lack of data. This period is often referred to as the first AI winter, characterized by reduced funding and interest.

4. Expert Systems (1980s)

AI revived with expert systems, like XCON at Digital Equipment Corporation. These rule-based systems modeled human decision-making in specific domains. However, they were brittle and difficult to scale, leading to another AI winter by the late 1980s.

5. Machine Learning and Data Revolution (1990s–2000s)

Focus shifted to machine learning.

It is a branch of artificial intelligence that allows a computer to learn from data and improve its performance automatically without direct programming.

6. Deep Learning and Modern AI (2010s–present)

It is an advanced type of machine learning that uses multi-layered neural networks and employs big data such as images, audio, and text.



7. Generative AI (2020s)

ChatGPT (2022) and similar models have brought AI into everyday use, capable of generating human-like text, images, code, and more.

Artificial Intelligent Approaches:

The term "AI approach" refers to the strategy used to build and design AI systems. The four main approaches to AI are:

- 1- **Human-thinking:** This approach focuses on building AI systems capable of thinking like humans (Alexa).
- 2- **Human-behaving:** This approach focuses on building AI systems that can behave like humans (Self-driving cars: AI systems that can control a vehicle and navigate roads, traffic, and obstacles in a human-like manner).
3. **Rational Thinking:** This approach focuses on building AI systems capable of logical reasoning and making decisions based on information and rules (For example, expert systems).

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4. Acting Rationally: This approach focuses on building AI systems capable of acting rationally. For example, AI for Games: AI systems that can play games like chess and make decisions based on the rules and objectives of the game.

Artificial Intelligence Techniques:

Artificial intelligence is an advanced science that seeks to enable machines to perform tasks that require intelligence comparable to that of humans. To achieve this, artificial intelligence relies on a set of techniques and methods that form the foundation of its work and various applications. In this lecture, we will discuss the most important techniques and methods upon which artificial intelligence relies.

First: (Machine Learning)

Machine learning is one of the fundamental methods of artificial intelligence, and it relies on training machines using large and diverse data. The goal of this training is to enable the machine to recognize patterns in the data and use them to make decisions or predict the future. This training is carried out through special algorithms that accurately analyze the data.

Second: Artificial Neural Networks

Neural networks are a technology inspired by the work of the human brain. This technology relies on building interconnected networks of simple processing units that work together to process data. These networks are trained to recognize complex patterns and connect them to make accurate decisions.

Third: Natural Language Processing

This technology relies on enabling computers to understand written or spoken human language. This technology is used to analyze texts, translate between languages, and understand questions or voice commands. This is done through algorithms that analyze meanings and extract appropriate context.

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Fourth: Computer Vision

Computer vision aims to enable computers to understand images and videos. This technology is used to analyze the content of images and extract information from them. Computer vision relies on algorithms that identify different components in an image, such as shapes, colors, and patterns.

Fifth: Intelligent Systems (Expert Systems)

Intelligent systems are among the oldest applications of artificial intelligence. These systems rely on rules and prior knowledge to solve problems and make decisions in specific fields. They are used in industries. Various methods to analyze data and make recommendations based on available knowledge.

Sixth: Intelligent Robotics

Intelligent robots are machines that rely on artificial intelligence technologies to perform tasks autonomously. These robots operate by analyzing their surrounding environment, making appropriate decisions, and adapting to changing circumstances.

Seventh: Deep Learning

Deep learning is a branch of machine learning that relies on multi-layer neural networks. Deep learning is used to analyze complex data such as images, text, and sounds, and is characterized by its high ability to accurately recognize patterns.

Eighth: Optimization Techniques

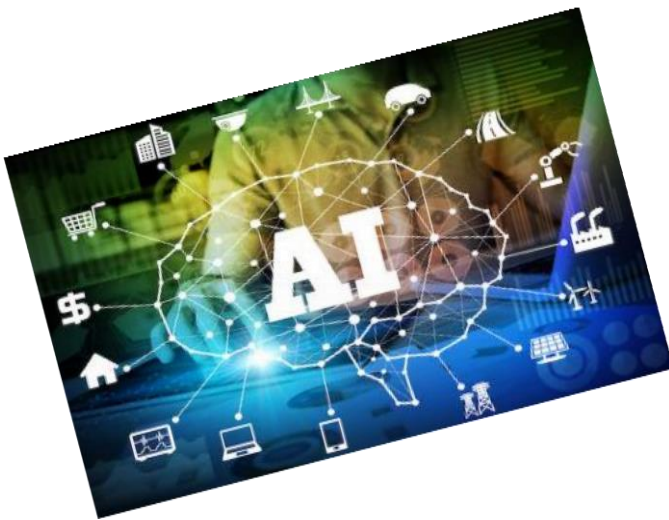
Algorithm optimization techniques are used to make intelligent systems more efficient and accurate. This is achieved by modifying the algorithms used to improve performance and reduce resulting errors.

Artificial Intelligence

- 1- Identifying the main characteristics of Artificial Intelligence and providing examples of them.
- 2- What are the benefits of Artificial Intelligence in various fields?
- 3- Identifying the challenges and ethical considerations of Artificial Intelligence.

Key Characteristics of AI:

The attributes of AI can be described as its abilities. These characteristics enable AI to be much more than just a computer and permit AI to learn, comprehend, and adapt to its surroundings.



1. Learning Capability: One of the main characteristics of AI is its capacity to be able to draw lessons from the data. The more information AI gets exposed to, the better it gets at what it does.

Example of Learning in AI Applications: Use virtual assistants such as Siri and Alexa.