

Today



Hi, friend! What can I do to help you today?

Hello! I am working on a project and want to learn more about AI in STEM. Could you provide some basic information?



Yesterday



Certainly! I would love to help you get started on your project. Let me generate a popup with some information about artificial intelligence.

What is AI?

Principles and Mechanics

Artificial intelligence is a form of technology that is able to do tasks that would usually involve human intelligence, including activities such as reasoning, learning, and perceiving.

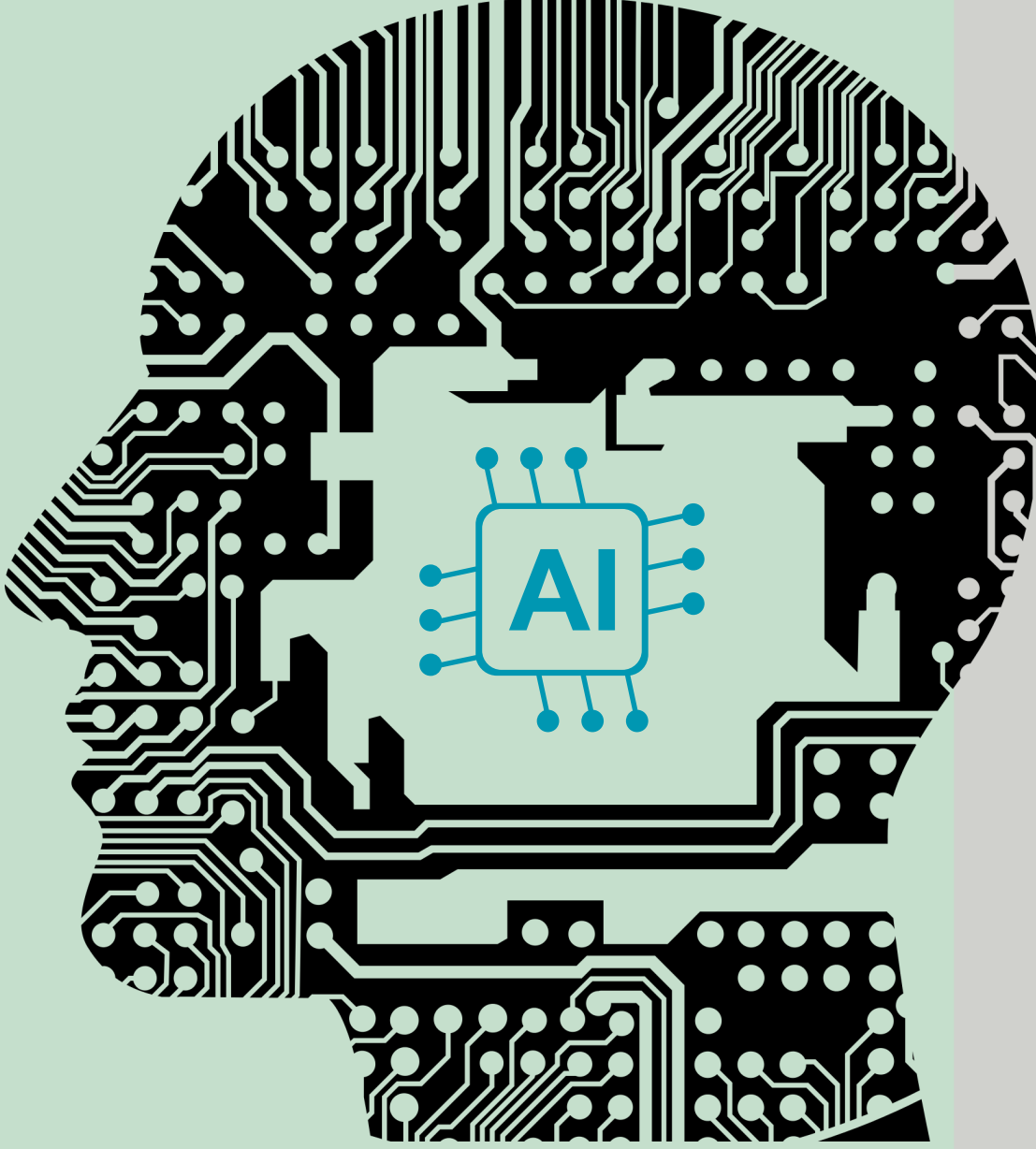
Its functionalities are applicable to a multitude of tasks due to its ability to minimize human error, expedite the research and development process, and automate repetitive tasks [4].

4 Stages of AI Development

- Reactive machines:** Limited AI that responds to various stimuli according to already pre-established rules. [4]
- Limited memory:** The majority of contemporary AI is categorized as having limited memory and utilizes this memory to enhance its performance through training with new data over time [4].
- Self aware (Also does not yet exist):** a theoretical machine that not only possesses self-awareness but also intellectual and emotional capacities comparable to those of a human being [4].
- Theory of mind (Yet to exist):** AI capable of replicating the human mind and exhibiting decision-making capabilities on par with those of a human being [4].

EXAMPLES

- Natural Language Processing
- Computer Vision



Artificial intelligence training models

- Supervised (input-output) learning** connects a specific input to an output by utilizing labeled / structured training data [3].
- Unsupervised (extracting patterns from data) learning** recognizes patterns from unlabeled / unstructured data. Compared to supervised learning, the final outcome is not predetermined [3].
- Reinforcement (interaction) learning** executes a specified task through trial and error in a feedback loop until its performance falls within an accepted range [3].

What makes a machine intelligent?

The **Turing test**, also known as the 'imitation game,' by Alan Turing in 1950 assesses a machine's capability to demonstrate intelligent behavior on par with or indistinguishable from that of a human being. [6]. Debates have arisen regarding its stringency [2], leading to various theories and considerable ambiguity.

STEM Applications

Artificial intelligence, with its diverse applications and capabilities, holds profound implications across a multitude of fields in STEM (Science, Technology, Engineering, and Mathematics). As AI continues to evolve, its application in STEM fields holds the promise of pushing the boundaries of knowledge and innovation.

Anomaly Detection

AI seeks to identify unfamiliar objects that are different from what the AI model is accustomed to. It can analyze extensive datasets and recognize patterns, correlations, and trends that may elude the human eye [1]. This is extremely useful in fields like genomics and climate sciences [1].

STEM Education

AI technology is deployed to meet instructional and educational needs, spanning disciplines like medical, programming, and mathematical education [7]. These tools, including personalized learning and adaptive assessments [7], can help students learn faster and obtain a more comprehensive understanding of the material.

Simulations/Modeling

AI techniques have the capability to construct intricate models and simulations. These models assist researchers in investigating phenomena across various domains such as physics, economics, and the social sciences [1] by accelerating research and development.

Supervised Learning

A type of AI training process in which a model is trained on a labeled dataset. Once trained, the AI can subsequently apply the learned patterns to make predictions about new data [3]. This is especially useful for labelling datasets where the correct answers are not pre-established.

Ethical Considerations

Inclusive Growth, Sustainable Development, and Well-Being

Trustworthy AI should "contribute to overall growth and prosperity for all – individuals, society, and planet – and advance global development objectives" [5].

Human-centered Values and Fairness

AI systems should "respect the rule of law, human rights, democratic values and diversity" [5]. In other words, AI should be developed to reduce bias, promote fairness, and be socially just.

Transparency and Explainability

AI systems should have "responsible disclosure" to ensure that people understand and challenge them when necessary [5].

Robustness, Security, and Safety

AI systems must function in a "robust, secure and safe way throughout their lifetimes" by assessing and managing risks [5].

Accountability

Organizations and individuals "developing, deploying or operating" AI systems should be held accountable for their "proper functioning" [5]. This includes respecting the four other principles above.

Sources

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