Introduction to Artificial Intelligence (AI)

Definition and Meaning

- **Artificial Intelligence (AI)** refers to the **design of intelligent behavior in machines** or artificial systems.
- The term **"Artificial Intelligence"** was coined by **John McCarthy in 1956** during the **Dartmouth Conference**.
- AI attempts to **simulate human intelligence**—the capacity to acquire, understand, and apply knowledge to achieve goals.

Core Objectives of AI

- Develop systems capable of **thinking, learning, and problem-solving** like humans.
- Model **mental/intellectual processes** using **computational methods**.
- Build **autonomous systems** that can **learn from data** and **make decisions independently**.

Characteristics of AI Systems

- **Cognitive modeling:** Study of human mind functions via computational approaches.
- **Knowledge representation and reasoning:** Using logic and data to simulate thought.
- **Machine learning:** Allowing systems to improve with experience.
- **Adaptability:** Ability to adjust behavior based on new data.

Interdisciplinary Nature of AI

AI lies at the intersection of several fields:

- **Mathematics**
- **Computer Science**
- **Philosophy**
- **Psychology**
- **Biology**
- **Cognitive Science**

Why AI is Important

- AI is transforming various sectors including **education, healthcare, transportation, and governance**.
- It enables **automation, predictive analysis, personalization**, and intelligent decision-making.

Historical Milestones in Artificial Intelligence

Year	Event / Contribution	Contributor(s)	Significance
1931	Foundation of Theoretical Computer Science	Kurt Gödel	Introduced formal language and incompleteness theorems
1936	Turing Machine concept	Alan Turing	Laid foundation for modern computing

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1956	Term "Artificial Intelligence" coined	John McCarthy	Dartmouth Conference—formal birth of AI as a field
1957	General Problem Solver (GPS)	Newell, Shaw, Simon	First AI program aimed at solving general problems
1958	Lisp programming language	John McCarthy (MIT)	Became the dominant language for AI research
1959	Game-playing Checkers Program	Arthur Samuel (IBM)	First AI to challenge human champions
1963	Sketchpad (interactive graphics)	Ivan Sutherland	Introduced concepts of GUI and CAD systems
1966	Semantic networks	Ross Quillian	Early model for knowledge representation
1967	Dendral program	Feigenbaum, Lederberg et al.	First expert system for chemical analysis
1967	Computer Mouse invented	Doug Engelbart	Enhanced human-computer interaction
1968	Book "Perceptrons" published	Marvin Minsky & Seymour Papert	Examined limitations of early neural networks
1972	Prolog programming language	Alain Colmerauer	Key language for symbolic AI and logic programming
Mid-1980s	Rise of neural networks using backpropagation	Paul Werbos (concept in 1974)	Revived interest in connectionist models
1990s	AI expands into multiple domains	Various contributors	Growth in ML, NLP, data mining, planning, etc.
1997	Deep Blue defeats Kasparov	IBM	First AI system to beat a reigning world chess champion
2002	Roomba robot introduced	iRobot (MIT researchers)	Brought AI into commercial home appliances
2006	2 million Roombas sold	—	Marked AI's widespread commercial adoption

Important AI Tools

AI Tool / Platform	Year of Invention	Function & UGC NET Relevance (with Company Highlighted)
ChatGPT	2018	Conversational AI; used in research, tutoring, and writing assistance. Developed by **OpenAI**.
DALL·E	2021	Text-to-image generation; creative AI applications. Developed by **OpenAI**.
Bard AI	2022	Conversational AI integrated with web search. Developed by **Google** (using PaLM model).

AI Tool / Platform	Year of Invention	Function & UGC NET Relevance (with Company Highlighted)
Copilot	2019	AI coding assistant for developers and students. Developed by **GitHub** in partnership with **OpenAI**.
TensorFlow	2016	Open-source ML library for building AI models. Developed by **Google Brain**.
Keras	2015	High-level deep learning API; widely used in education. Developed by **François Chollet** at **Google**.
GPT-2	2018	Text-generation model; foundational for future GPTs. Developed by **OpenAI**.
GPT-3	2020	Large language model; enables advanced NLP. Developed by **OpenAI**.
GPT-4	2023	Multimodal AI model (text + image). Developed by **OpenAI**.
IBM Watson	2015	Question-answering and analytics AI. Developed by **IBM**.
Amazon Alexa	2014	Voice assistant using NLP and ML. Developed by **Amazon**.
Siri	2011	Voice-based AI assistant. Developed by **Apple Inc.**
Google Assistant	2016	Smart assistant using contextual AI. Developed by **Google**.
Hugging Face Transformers	2020	Open-source NLP library supporting BERT, GPT, etc. Developed by **Hugging Face**.
OpenCV (AI-enhanced)	2019	Vision-based AI for image and video. Maintained by **Open Source Computer Vision Library** community.
Replika	2017	Emotional intelligence chatbot. Developed by **Luka Inc.**
Notion AI	2020	Writing and note-generation tool. Developed by **Notion Labs Inc.**
Jasper AI	2022	Content creation and copywriting automation. Developed by **Jasper.ai**.
Synthesia	2019	AI-generated videos with avatars. Developed by **Synthesia.io** (UK-based startup).
Runway ML	2021	AI video and image editing for creators. Developed by **Runway**.

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