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AI: Shaping the present and Redefining the future

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Introduction

Intelligence can be defined as an individual's ability to think, learn and act accordingly. Individuals acquire it gradually in their growing years while observing the events, patterns, environment and behaviour of the people around them. When a machine/computer or a program does the same; think and learn from the information supplied to it and create new content intelligently. The computer or machine is said to have or possess some intelligence which can be termed as machine intelligence or Artificial Intelligence. Computers have the ability to reason and solve problems in a similar way to humans using AI in a much faster and efficient way. AI applications are integrated into daily life. The major concern in this regard is to develop a collaboration between AI and humans to enable them to work together and enhance each other's capabilities rather than depend on one system. AI will redefine all the fields where implemented from education to health sector, business and finance sector to employment, cyber sector to law field and everyday life of individuals. AI will act as a co-worker rather than a replacement, augmenting human abilities rather than eliminating jobs entirely. AI is becoming a bigger part of daily life, with generative AI tools already helping people write, code and learn, and AI systems being used to analyze data and assist in research in almost every industry. In the future, AI could also further assist with human care, household tasks and workplace safety, boosting productivity and efficiency across different prospects.

The journey of AI can be categorised or have been through different stages named as reactive machines, limited memory machines, theory of mind and self-awareness machines. Reactive AI machines start with specializing in just one field of work that requires no memory or data like a chess game. And grow to limited memory machines that have minimal memory to collect previous data and continue adding it further to make proper decisions like google maps, chatbots, siri, alexa and Generative AI tools. Theory of mind AI machines would understand thoughts, emotions, belief and intention of human beings to interact socially in a more natural and empathetic way and Final aim is to have self-aware AI machines that would be intelligent, alive, aware and conscious termed as Artificial general Intelligence (AGI). Currently, only the first two types have been developed and implemented in real-world applications. The latter two are still conceptual and research and philosophical debate are ongoing. Therefore, broadly AI can be classified into two types mentioned in table 1 below.

Table 1: Types of AI

WEAK AI	STRONG AI
Narrow AI	General AI (AGI)
Perform specific tasks	capable of understanding, reasoning, learning, and applying knowledge to solve complex problems
Lack general intelligence	human-level intelligence even surpass in some tasks
Operates within predefined boundaries	Performs in many areas and tasks
Example: siri, alexa, Google Maps, Generative AI	Yet to be developed

Key components of AI

The key components of AI are learning, reasoning and decision making, problem solving, perception and language processing.

Learning

Learning is the process by which AI systems improve their performance by analyzing data, identifying patterns, and making decisions based on past experiences. Key types of learning include supervised, unsupervised, reinforcement, semi-supervised, self-supervised, and deep learning.

Reasoning and Decision Making

Reasoning allows AI to analyze information, draw conclusions, and make informed decisions using logic, algorithms, and predictive analytics. This process enables AI systems to solve novel problems and adapt to new situations.

Problem Solving

Problem solving refers to AI's ability to break down complex tasks into manageable steps and develop solutions. This often involves algorithms that allow the system to evaluate different strategies for achieving specific goals.

Perception

Perception in AI involves processing sensory data such as images, audio, and environmental signals. Main areas include computer vision and speech recognition, allowing AI to understand and interact with the surrounding world.

Language Processing

Language processing, mostly known as natural language processing (NLP), equips AI to read, interpret, and generate human language. It involves syntax analysis, semantic understanding, and dialogue management to facilitate interaction with people.

Data

High-quality data is essential for AI systems to learn, make accurate predictions, and avoid bias. Both structured and unstructured data types are important for various applications.

Table 2: AI abilities on the basis of the key components described

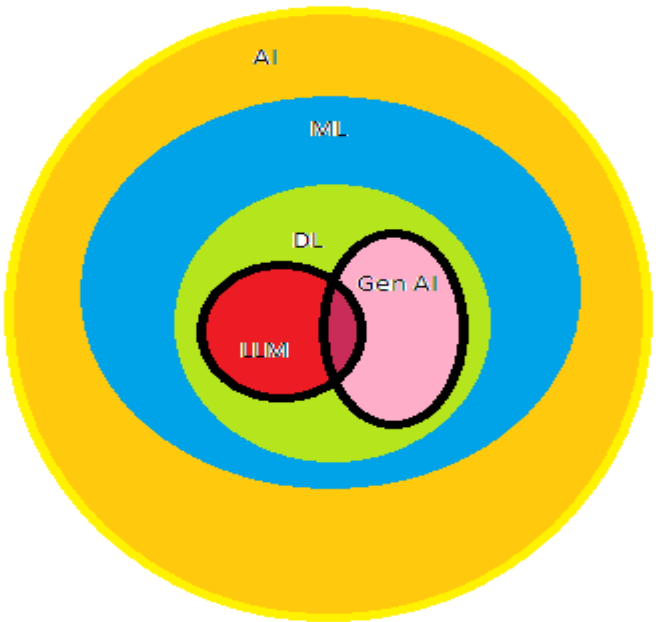
Human Ability	AI Equivalent Example
Think / Reason	Solving problems, making decisions (e.g., chess AI)
Learn from experience	Machine Learning (e.g., recommending YouTube videos)
See and recognize objects	Computer Vision (e.g., facial recognition)
Understand & generate speech	Natural Language Processing (e.g., Siri, ChatGPT)
Move or interact physically	Robotics (e.g., self-driving cars, warehouse robots)

AI learns from a lot of data, spots patterns and improves over time much like a child or student. AI systems accept data input in the form of speech, text, image, etc. The system then processes data by applying various rules and algorithms, interpreting, predicting, and acting on the input data. Upon processing, the system provides an outcome, i.e., success or failure, on data input. The result is then assessed through analysis, discovery, and feedback. Lastly, the system uses its assessments to adjust input data, rules and algorithms, and target outcomes. This loop continues until the desired result is achieved. This is termed as machine learning that further enhances towards deep learning named the implementation techniques of AI differentiated as below in table 3.

Table 3: Comparison of ML & DL

MACHINE LEARNING	DEEP LEARNING
Subset of Artificial Intelligence	Subset of Machine Learning
Use structured and labelled data (weights)	Use artificial neural network Can take unstructured data as input
Statistical algorithm to learn from patterns	Layered structure having one input layer , one output layer and more than one hidden layers
Supervised, Unsupervised and Reinforcement learning are three types of ML	ANN, CNN and RNN are three types of neural networks used in deep learning
Train and Learn from data to recognise existing patterns and perform decision making	Train to recognise complex patterns from variety of data and Unlock hidden patterns for more accurate decision making
Spam filters in emails, recommendations on social medias OTTs	Face recognition, self driving cars, google translate

Figure 1: Key Technologies of AI



AI Applications

AI has stepped out of the realm of science fiction and is practically present everywhere and being used by everyone on every day basis. AI has vast applications from individual to business, healthcare to agriculture, entertainment to transportation, education to human resource management.

Through voice assistants like Siri and Alexa : Virtual assistants such as Siri, Alexa, and Google Assistant understand and respond to spoken commands, providing information, reminders, and controlling other devices.

Smart home devices : AI powers smart home devices, automating tasks like adjusting thermostats or lighting for energy efficiency and convenience, and enhancing security with smart cameras.

Personalized recommendations : from platforms like Netflix and Spotify : AI algorithms analyze user behavior to recommend movies on Netflix or products on Amazon, with the engine driving significant revenue for these platforms. AI curates personalized feeds and content for users on social media platforms, enhancing user engagement.

Search engines use AI to understand queries and deliver relevant results, improving the search experience.

AI-powered customer service via chatbots **:** Many companies use AI-powered chatbots to provide instant customer support, answer questions, and assist with transactions.

Self-driving cars : AI is crucial for the development of self-driving cars, enabling them to perceive their surroundings and navigate complex environments.

Improved transportation and traffic management: AI helps optimize traffic flow and improve overall transportation efficiency.

Fraud detection in banking : Banks use AI to monitor financial transactions in real-time, identifying and flagging suspicious activities to prevent fraud.

Manage Investment and Trading : AI algorithms analyze vast amounts of market data to make **Real-time trading decisions and manage investments :** AI-driven platforms offer personalized investment advice and help individuals manage their finances.

Education: AI has also played a significant role in democratizing access to education, especially for those in remote or underprivileged areas. In classrooms and training centers, AI-powered adaptive learning tailors educational content to each student's needs, while plagiarism detection ensures academic integrity. Teachers and trainers can even leverage data analytics to predict student performance so they can intervene early if they spot problems.

Healthcare diagnosis and treatment : AI aids in clinical diagnosis, drug discovery, and the development of treatment plans, improving patient outcomes.

Enhanced agriculture : AI optimizes crop yields by analyzing soil conditions, predicting weather patterns, and automating tasks, contributing to sustainable farming practices.

Natural Disaster Prediction : AI is used in climate modeling and forecasting to predict natural disasters, allowing for proactive mitigation.

Gaming : AI creates dynamic and engaging experiences by tailoring games to individual player tastes.

Video Analysis : AI can analyze videos to provide real-time narration, identify objects, and extract specific information, enhancing accessibility and content creation.

HR management : AI tools can help organizations automate many time-consuming HR tasks like resume screening and workforce planning. HR professionals can also use AI to streamline recruitment processes and monitor employee performance.

Generative AI is the creative force of AI which learns from data and uses that knowledge to create new content like text, images, audio and even videos. The commonly used tools of GenAI are mentioned below and still many more are on the way. Table 4 summarizes them.

1.	Chatbots (Multimodal)	ChatGPT Gemini DeepSeek Perplexity Grok
2.	Image generation	DALL-E MidJourney
3.	Summarize book/documents	Google NoteLLM LeapAhead
4.	Writing emails	Flowrite
5.	Create presentations	Gaama Canva Plus AI
6.	Caption writing tool	Copy.ai
7.	Video generation	runway, Veo 3 , Captions
8.	Code writing	GitHub, GitHub Copilot
9.	Creating websites	Build AI

Gen AI Chatbots These are advanced generative AI chatbots that use LLM and NLP to generate human-like conversational responses across a wide range of topics and contexts.

ChatGPT : Generative PreTrained transformer based on transformer neural network architecture. It is pre-trained on massive text corpora to learn grammar, facts, context and then fine tuned on specific datasets for improved task alignment.

Gemini : is Google's most advanced and capable multimodal AI model family, developed by Google DeepMind.

DeepSeek : chinese company advanced gen ai chatbot wit MoE (mixture of experts) layers. Compete with gpt 4 with open source and low cost

Perplexity : is an AI powered answer engine that provides accurate, trusted and real time answer to any question with references. It is a next generation AI search.

Grok : XAI (Twitter) grok 3 and 4 are elon musk ai tool used as a search tool rather than free flowing conversational assistant Real Time intelligence , Direct integration with live data , used for trending topics & market updates (Regular, Fun mode)

Copilot : AI powered companion from Microsoft that helps the user to think, create, and get things done faster and smarter in both personal and professional tasks and chat naturally. It answers questions, creates content, boosts productivity, automates tasks in Word, Excel, and PowerPoint, using GitHub Copilot to help debug, write code. It is platform compatible and used with windows & mac, ios and android, web browsers and whatsapp and telegram.

Table 4: Features of Gen AI Chatbots

Company/ Brand	**AI Tool**	**Launched in year**	**Key features/ Strengths**	**Free Version**
OpenAI	ChatGPT 3.5, GPT-4, GPT-5, DALL- E (Image generation) Sora (Video Version)	Nov 2022 2023 2025	Text, multimedia, code generation, personal talk	partial
Google DeepMind	Gemini (Bard), Gemini Live, Workspace, NotebookLM	Dec 2023	Text, images, audio, video, code,platform integration with youtube, Maps,Gmail and workspace, voice enabled chats (Truly multimodal)	yes
XAI (Twitter)	Grok 3 Grok 4	Nov 2023	Real Time intelligence , Direct integration with live data , used for trending topics & market updates (Regular, Fun mode)	Partial via grok.free

Perplexity	Perplexity	Aug 2022	Not an LLM itself but uses GPT, claude etc. Deliver concise, referenced, up-to-date answers, ideal for research purpose	Partial
DeepSeek	DeepSeek V3	Jan 2025	Coder assistant, complex mathematical calculations, performs multilingual tasks, creative writing, text generation	Yes open source
Microsoft	GitHub, Copilot 365, Azure AI Studio	June 2021	Web Based Platform for collaborative software development (Version control), office automation, Productivity enterprise Apps	Partial
Meta Facebook Inc.	Meta AI driven tools, Llama	2021-2025	Social media communication (Fb, Insta, whatsapp), Metaverse (Immersive meaningful virtual experiences with VR , AR, XR)	yes
Mid Journey	Mid Journey	2021	Image generation tool	Paid
Anthropic	Claude 3.5	2021	Helpful, harmless, honest	partial

AI hallucination : are instances where AI systems generate outputs that are inaccurate, false, or nonsensical despite appearing plausible. A responsible AI user evaluates and confirms the AI output before using it actually.

The cost of using Gen AI tools : is very high as it includes a lot of server space and computing power to bifurcate and understand user's queries and consumes large amounts of electricity requires lot of water for cooling the server, so be Kind towards the environment and use AI carefully only for mandatory tasks or chats.

AI ethical concerns

Artificial Intelligence also has ethical concerns and certain limitations that need to be considered. But with a positive and learning attitude synergy with AI technologies and humans surely can be achieved.

- Privacy Concerns
  - Lot of private data floating on internet
  - Online theft and Data breaches
- Possibilities of unemployment
  - Reduce the need of Manpower
  - Create new job opportunities
- Conquering the world
  - Machines and robots may take over the world
  - Human and Machine War Like in movies
- Require Knowledge and effort
  - Demands fair amount of knowledge and expertise : Organizations are adopting AI and budgeting for certified professionals in the field, thus creating a growing demand for trained and certified professionals. With AI certification job seekers may scale up their career and increase their earning potential.

Therefore, the essential need is that authorities should devise ethical AI practices, ensuring fairness, transparency & accountability in AI deployment.

Conclusion

AI is a tool. It can be good or bad depending on how it's used because it does not have emotions and consciousness, it just processes the patterns that exist in data. So, efforts and research are proceeding towards making AI conscious to maintain synergy with humans. However, when used responsibly, AI may improve lives and solve big problems. This is not the time to choose out of AI and humans but to build a world where both coexist together by complementing one another. Governments & businesses must work together to implement policies that balance technological progress with societal well-being.

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