Artificial Intelligence (AI)

Artificial Intelligence (AI) is the ability of a computer or robot to perform tasks commonly associated with humans, such as the ability to reason, discover meaning, generalize, or learn from past experience. Computers can be programmed to carry out very complex tasks, for example, discovering proofs for mathematical theorems or playing chess, with great proficiency. Some computer programs have attained the performance levels of human experts and professionals in performing certain specific tasks, for example, AI can be found in applications like medical diagnosis, computer search engines, voice recognition and handwriting recognition. The technology behind AI is based on the aim to reproduce the “neural network” that exists in the human brain, which is simply billions of electric nodes which communicate with each other using electric pulses. Siri and Alexa are examples of everyday AI in our homes. AI's applications now extend to various fields such as healthcare, finance, and transportation.

How does AI “learn”?

The simplest way to learn is by trial and error. For example, a computer program for chess might try all possible moves until the best one is found. The program can then store the choice, with the position, so that the next time the computer encounters the same position it would “remember” the solution. This type of “memorizing” is relatively easy to implement on a computer. More challenging however, is the problem of “generalization”. This involves applying past experience to similar new situations. For example, a program that learns the past tense of regular English verbs will not know the past tense of “jump” unless it previously had been presented with the word “jumped”, whereas a program that can generalize can learn the “add -ed” rule and so form the past tense of “jump” based on experience with similar verbs.

Reasoning

To reason is to “draw inferences appropriate to the situation”. Inferences are classified as either “deductive” or “inductive”.

<u>An example of “deduction”:</u>

“Fred is in either the museum or the café. He is not in the café, therefore he is in the museum.”

<u>An example of “induction”:</u>

“Previous accidents like this were caused by instrument failure; therefore this accident was caused by instrument failure.”

Inductive reasoning is common in science, where data are collected and models are developed to describe and predict future behaviour. Deductive reasoning is common in mathematics, where elaborate structures of theorems are built from a small set of basic rules. There has been considerable success in programming computers to draw inferences, especially deductive inferences. However, true reasoning involves more than just making inferences; it involves making inferences which are relevant to a particular situation. This is one of the hardest problems for AI.

Problem solving

This may be characterized as a systematic search through a range of possible actions in order to reach some predefined goal. Problem-solving methods can be divided into “special purpose” and “general purpose”. A “special-purpose” method is made for a particular problem and often exploits very specific features of the situation. In contrast, a “general-purpose” method is applicable to a wide variety of problems. One general-purpose technique used in AI is a “means-end analysis”. This is a step-by-step reduction of the difference between the current state and the final goal. The program selects actions from a list of possibilities (in the case of a simple robot this might be: PICK-UP, PUT-DOWN, MOVE-FORWARD, MOVE-BACK, MOVE-LEFT, and MOVE-RIGHT, etc.) until the goal is reached. Many diverse problems have been solved by artificial intelligence programs. Some examples are finding the winning move (or sequence of moves) in a board game, devising mathematical proofs, and manipulating “virtual objects” in a computer-generated world.

Perception

This refers to the environment which is scanned and the scene is decomposed into separate objects in various spatial relationships. Analysis is complicated by the fact that an object may appear different depending on the angle from which it is viewed, the direction and intensity of illumination in the scene, and how much the object contrasts with the surrounding objects. Artificial perception is now well advanced to enable optical sensors to identify individuals, autonomous vehicles to drive at moderate speeds on the open road, and robots to roam through buildings identifying objects and people.

Language

A productive language can formulate an unlimited variety of sentences. Today, it is easy to write computer programs that can respond fluently in a human language to questions and statements. Although none of these programs actually understands language, they may, in principle, reach the point where their command of a language is indistinguishable from that of a normal human. What, then, is involved in genuine “understanding”? There is no universal answer to this question. If a computer responds well to a question, does it really “understand”?

Summary

The advance of AI today is incredibly fast and is already impacting on many of our lives, directly and indirectly. There are many ethical implications of AI, such as privacy concerns and potential biases. AI is now part of our lives and will continue to be so, the only question is – to what extent?

Questions and Discussions

Q1. AI has been implemented in industries like healthcare, finance, and transportation. What are the advantages and disadvantages of AI in each of these areas?
Q2. Do you think AI will take away our jobs eventually?

Jobs possibly threatened by AI

1. Administrative & Clerical Jobs:
   - Data entry clerks
   - Receptionists (AI chatbots and voice assistants)
   - Payroll and HR assistants
   - Bookkeeping and accounting clerks

2. Customer Service & Call Center Jobs:
Voice recognition tools are now widespread.
   - Call center agents
   - Technical support reps
   - Travel agents (automated booking systems)

3. Financial and Legal Assistants:
AI tools can review contracts, assess risk, and perform financial analysis quickly.
   - Paralegals and legal assistants
   - Basic financial analysts
   - Tax preparers

4. Manufacturing & Warehousing:
Robotic automation and AI-powered logistics are replacing manual labor.
   - Assembly line workers
   - Forklift operators and pickers
   - Quality control inspectors

5. Media & Content Production
Generative AI is now capable of producing articles, summaries, images, videos and programs.
   - Journalists
   - Programmers
   - Copywriters

Translators (AI can handle basic translations, though quality varies)

6. Transportation:
Autonomous vehicle technology is developing rapidly.
   - Truck drivers
   - Taxi and delivery drivers

7. Education:
AI can do standardized teaching.
   - Test prep tutors
   - Grading assistants
   - Online course facilitators

Jobs at Less Risk

AI currently has limitations in empathy, judgment, physical dexterity, and creativity in unstructured environments.

- Skilled trades (electricians, plumbers)
- Mental health professionals
- Creative directors and artists
- Teachers (especially early and special education)
- Complex medical professionals (surgeons, diagnosticians)