8 Introduction to Artificial Intelligence

Since the invention of computers or machines, their capability to perform various tasks went on growing exponentially. The question 'Can a machine think and behave like humans do?' led to the thought of Artificial Intelligence. The development of AI started with the intention of creating similar intelligence in machines that we find high in humans.

ARTIFICIAL INTELLIGENCE
The Future of Everything

Artificial Intelligence is composed of two words Artificial and Intelligence, where artificial defines 'man-made', and intelligence defines 'thinking power'. Hence AI means 'A man-made thinking power'.

A branch of computer science named artificial intelligence pursues developing the computer or machines as intelligent as human beings.
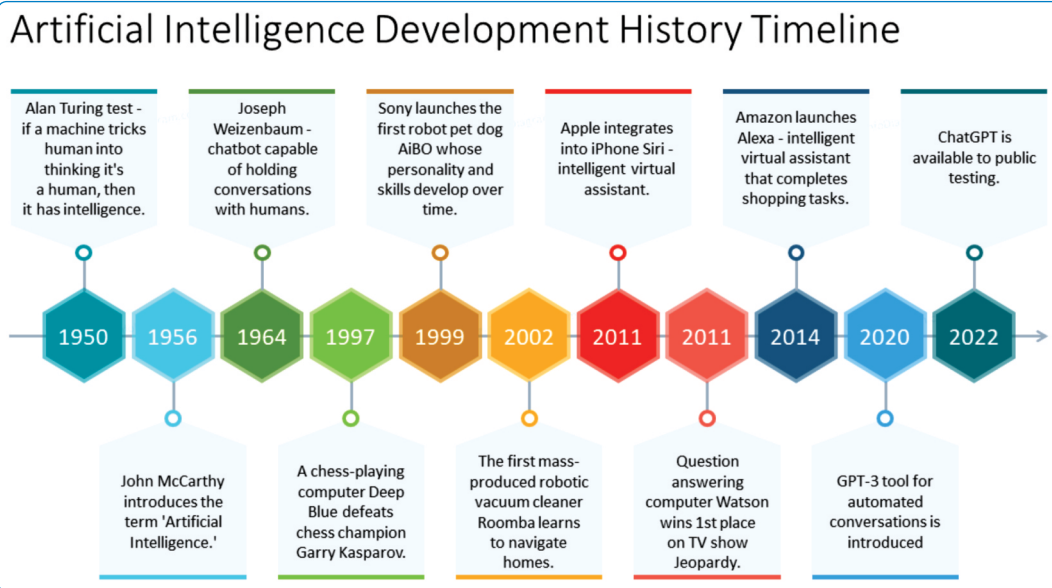
CONCEPT OF INTELLIGENCE

Intelligence has been defined in many ways: the capacity for logic, understanding, self-awareness, learning, emotional knowledge, reasoning, planning, creativity, critical thinking, and problem solving.

Perception — Intelligence — Problem Solving

Reasoning   Learning   Linguistic Intelligence
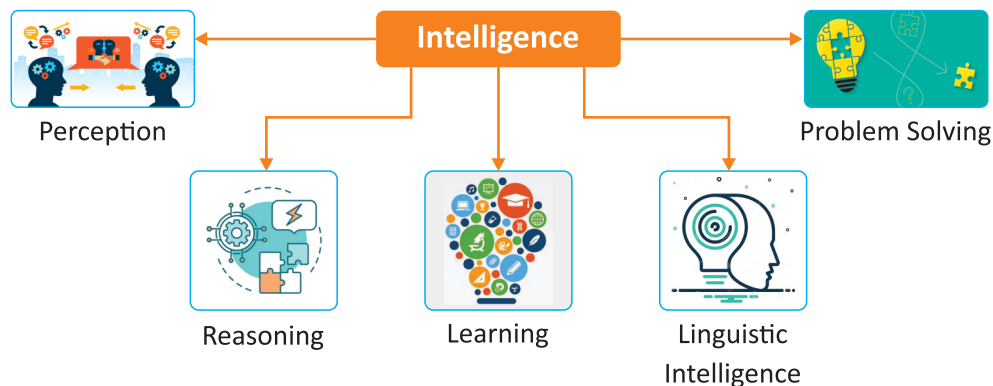
Intelligence is intangible. It is composed of the following:

○ **Reasoning:** It is the set of processes that enables us to provide basis for judgement, making decisions and prediction.

○ **Learning:** It is the activity of gaining knowledge or skill by studying, practicing or experiencing something.

Artificial Intelligence Development History Timeline

Timeline (top entries):
- **1950** — Alan Turing test - if a machine tricks human into thinking it's a human, then it has intelligence.
- **1964** — Joseph Weizenbaum - chatbot capable of holding conversations with humans.
- **1999** — Sony launches the first robot pet dog AiBO whose personality and skills develop over time.
- **2011** — Apple integrates into iPhone Siri - intelligent virtual assistant.
- **2014** — Amazon launches Alexa - intelligent virtual assistant that completes shopping tasks.
- **2022** — ChatGPT is available to public testing.

Timeline (bottom entries):
- **1956** — John McCarthy introduces the term 'Artificial Intelligence.'
- **1997** — A chess-playing computer Deep Blue defeats chess champion Garry Kasparov.
- **2002** — The first mass-produced robotic vacuum cleaner Roomba learns to navigate homes.
- **2011** — Question answering computer Watson wins 1st place on TV show Jeopardy.
- **2020** — GPT-3 tool for automated conversations is introduced

History of Artificial Intelligence

1950: **Alan Turing** introduced **Turing Test** for evaluation of intelligence and published Computing Machinery and Intelligence.

1952: **Arthur Samuel**, a computer scientist, developed a checkers playing computer program – the first to learn independently how to play a game.

1956: AI research started with a conference at Dartmouth College, which was attended by many scholars with a common interest in AI. In the conference they wrote complex programs for problems such as beating someone at a game of checkers or solving word problems.

1958: **John McCarthy** developed **LISP** (LIST processing), the most popular and still the favoured programming language for Artificial Intelligence research.

1959: **Samuel** coined the term '**Machine Learning**' when speaking about programming a computer to play a game of chess better than the human who wrote its program.

1986: **Mercedes-Benz** built and released a driver less van equipped with cameras and sensors. It was able to drive up to 55 mph on a road with no other obstacles nor human drivers.

1997: **Deep Blue**, a chess playing computer developed by **IBM** became the first computer to win a chess game and match against the chess world champion Garry Kasparov.

2000: Professor **Cynthia Breazeal** developed **Kismet**, a robot that could recognize and simulate emotions with its face. It was structured like a human face with eyes, lips, eyelids and eyebrows.

2011: **Watson**, a Natural Language question answering computer was created by **IBM**.

2014: **Microsoft** release **Cortana**, their version of a virtual assistant similar to Siri on IOS.

Examples: In weather forecasting using AI they have reduced the majority of human error.

TAKE RISKS INSTEAD OF HUMANS

This is one of the biggest advantages of Artificial Intelligence. We can overcome many risks limitations of humans by developing an **AI Robot** which in turn can do the risky things for us. Let it be going to mars, defuse a bomb, explore the deepest part of oceans, mining of coal and oil, it can be used effectively in any kind of natural or man-made disasters.

HELPING IN REPETITIVE JOBS

In our day-to-day work, we will be performing many repetitive works like sending a thanking mail, verifying certain documents for errors and many more things. Using Artificial Intelligence we can productively automate these repetitive tasks and even remove boring tasks for humans and free them for other creativity.

DIGITAL ASSISTANCE

Some of the highly advanced organizations use digital assistants to interact with users which saves the need for human resources. The digital assistants also used in many websites provide things that users want. We can chat with them about what we are looking for. Some chatbots are designed in such a way that it becomes hard to determine that we're chatting with a chatbot or a human being.

Example: we all know that organizations have a customer support team that needs to clarify the doubts and queries of the customers. Using AI the organization can set up a voice bot or chatbot which can help customers to clear their doubts.

FASTER DECISIONS

Using AI alongside other technologies we can make machines take decisions faster than a human and carry out actions quicker. While taking a decision human will analyze many factors both emotionally and practically but AI-powered machine works on what it is programmed and delivers the result in a faster way.

Example: we all have played Chess game in Windows. It is nearly impossible to beat computer because of the AI behind the game. It will take the best possible step in a very short time according to the algorithms used behind it.

DAILY APPLICATIONS

Daily applications such as Apple's **Siri**, Window's **Cortana,** Google's **OK Google** are frequently used in our daily routine whether it is for searching a location, taking a selfie, making a phone call, replying to a mail and many more.

BRANCHES OF ARTIFICIAL INTELLIGENCE ■

Artificial Intelligence is used to solve real-world problems by using some processes or techniques. These processes or techniques are known as the branches of AI. They are given as follows:
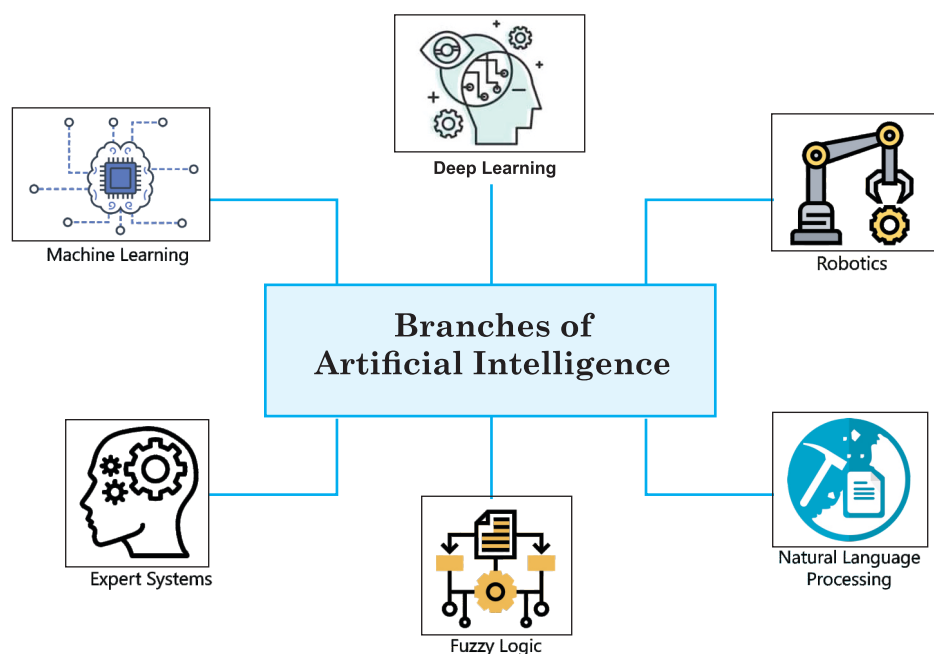
MACHINE LEARNING

Machine Learning is defined as a technology that is used to train machines to perform various actions such as predictions, recommendations, estimations, etc., based on historical data or past experience. It refers to the study of computer systems that learn and adapt automatically from experience, without being explicitly programmed.

Netflix and **Amazon** use similar machine learning algorithms to offer personalized recommendations.

DEEP LEARNING

Deep Learning is an advanced field of machine learning that can be used to solve more advanced problems. Deep learning is the logic behind the face verification algorithms on Facebook, self-driving cars, virtual assistance like Siri, Alexa, and so on.

NATURAL LANGUAGE PROCESSING

Natural Language Processing (NLP) refers to the branch of artificial intelligence, concerned with enabling computers to understand text and spoken words in much the same way human beings can.

For example, social media platforms such as Twitter, Facebook, and Amazon use NLP to filter information to hide unnecessary or unwanted options.

HEALTHCARE

AI has significant use in healthcare. Artificial Intelligence efficiently make diagnosis and also operates on patients without human supervision. Such technological surgeries are already taking place. Personal healthcare assistants can remind you to take medicines, exercise, eat healthier, etc. An example of excellent healthcare technology is **IBM Watson**.

BANKING AND FINANCE

In the financial industry, AI programs can identify potential customers, to recognize fraud and even to forecast changes in stock trends. A lot of banks have already adopted AI based system to provide customer support.

EDUCATION

AI can certainly make education more efficient. AI technology can discover the need of students. Then it can adapt according to their needs. AI tutor can provide study help to students.

TRAVEL

For hotels and other businesses in the tourism industry, one of the most exciting uses of AI is adding customers online. AI can respond to questions and provide valuable information to customers.

ONLINE SHOPPING

Most online shopping websites such as Amazon and Flipkart use AI to recommend products to a user based on his interest and previous purchases. Machine learning prevents financial frauds involving credit cards and other online payment options.

SOCIAL NETWORKING

Companies use AI technology to profile their prospective customers. By analyzing their behavior on social media and digital platforms, Artificial Intelligence can determine what their habits are, and what motivates them to spend money. These types of analysis are essential in personalized campaigns.

PRACTICE TIME

A. Tick ☑ the correct answer

1. AI is the science and engineering of making .... machines.

   a. Artificial ☐   b. Intelligent ☐   c. Super ☐

2. .... coined the term Artificial Intelligence.

   a. James Gosling ☐   b. Tim Berners Lee ☐   c. John McCarthy ☐

3. .... is the virtual assistant on IOS.

   a. Siri ☐   b. Alexa ☐   c. Cortana ☐

4. .... language cannot be used in AI application development.

   a. LISP ☐   b. Visual Basic ☐   c. Prolog ☐

5. Deep Blue, the IBM chess program is a .... Artificial Intelligence.

   a. Limited Memory ☐   b. Reactive ☐   c. Self-Awareness ☐

B. State 'T' for True and 'F' for False

1. Humans are more intelligent than machines. ☐

2. Watson became the first computer program to beat a chess world champion. ☐

3. Microsoft's Cortana is a smart assistant that can interact with a user using speech recognition. ☐

4. Self-driving car is an example of Limited Memory Artificial Intelligence. ☐

6. Differentiate between Reactive Artificial Intelligence and Theory of Mind Artificial Intelligence.

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ACTIVITY

A Give five examples of Artificial Intelligence that you may have seen around you at home or at other places.

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B Prepare a PowerPoint presentation on different applications of Artificial Intelligence.

FOR TEACHERS

A Encourage students to read and explore about AI online and in school library.

B Organize a group discussion on how AI is going to influence our lives in future?