PIET SANSKRITI SENIOR SECONDARY SCHOOL

NFL Township PANIPAT

GRADE - IX

Unit 1   **Artificial Intelligence**

Unit 1.1: Excite

Introduction to Artificial Intelligence

1. Father of Artificial Intelligence

John McCarthy is the father of Artificial Intelligence.

2. Artificial Intelligence

Artificial Intelligence is a way of making a computer, a computer-controlled robot, or a software think intelligently, in the similar manner the intelligent humans think.

AI is accomplished by studying how human brain thinks, and how humans learn, decide, and work while trying to solve a problem, and then using the outcomes of this study as a basis of developing intelligent software and systems.

3. Goals of AI are :

- **To Create Expert Systems** − The systems which exhibit intelligent behaviour, learn, demonstrate, explain, and advice its users.
- **To Implement Human Intelligence in Machines** − Creating systems that understand, think, learn, and behave like humans.

4. What Contributes to AI ?

Artificial intelligence is a science and technology based on disciplines such as Computer Science, Biology, Psychology,

Linguistics, Mathematics, and Engineering. A major thrust of AI is in the development of computer functions associated with human intelligence, such as reasoning, learning, and problem solving.

Out of the following areas, one or multiple areas can contribute to build an intelligent system.
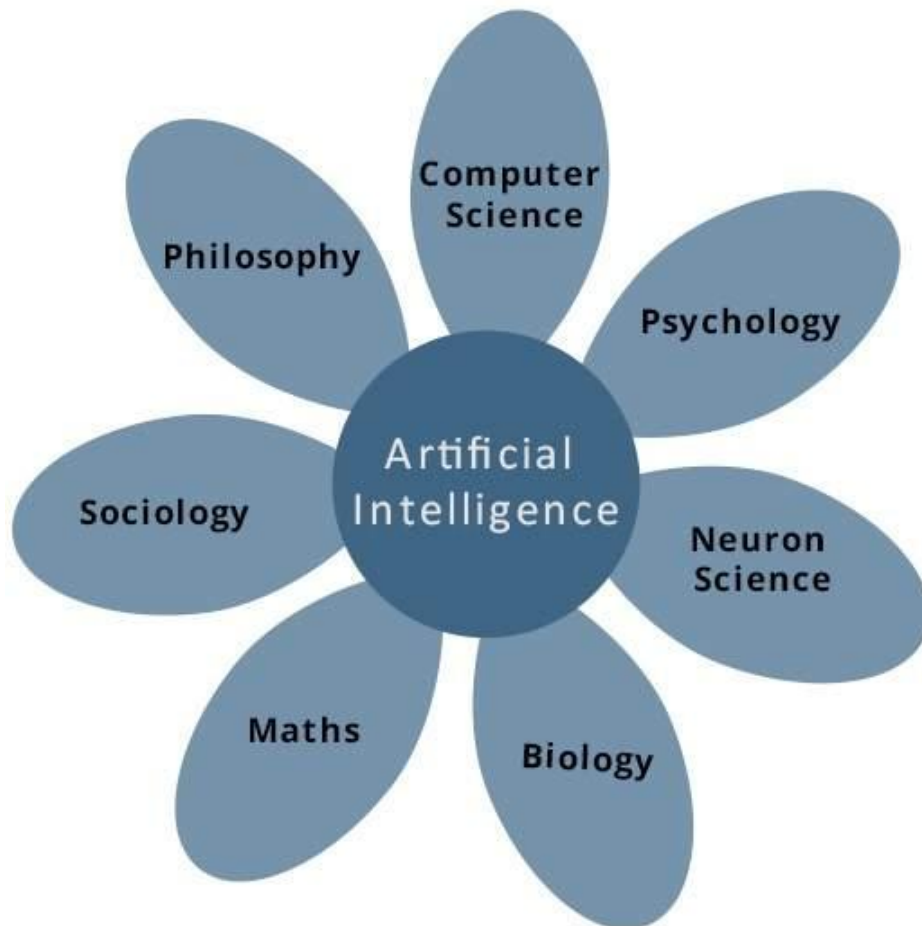
5. **Why AI is needed ?**

Programming Without and With AI

The programming without and with AI is different in following ways —

Programming Without AI	Programming With AI
A computer program without AI can answer the **specific** questions it is	A computer program with AI can answer the **generic** questions it is meant to solve.

meant to solve.	
Modification in the program leads to change in its structure.	AI programs can absorb new modifications by putting highly independent pieces of information together. Hence you can modify even a minute piece of information of program without affecting its structure.
Modification is not quick and easy. It may lead to affecting the program adversely.	Quick and Easy program modification

6. Write down the Applications of AI.

AI has been dominant in various fields such as −

- **Gaming** − AI plays crucial role in strategic games such as chess, poker, tic-tac-toe, etc., where machine can think of large number of possible positions based on heuristic knowledge.

- **Natural Language Processing** − It is possible to interact with the computer that understands natural language spoken by humans.

- **Expert Systems** − There are some applications which integrate machine, software, and special information to impart reasoning and advising. They provide explanation and advice to the users.

- **Vision Systems** − These systems understand, interpret, and comprehend visual input on the computer. For example,

- A spying aeroplane takes photographs, which are used to figure out spatial information or map of the areas.
- Doctors use clinical expert system to diagnose the patient.
- Police use computer software that can recognize the face of criminal with the stored portrait made by forensic artist.

- **Speech Recognition** – Some intelligent systems are capable of hearing and comprehending the language in terms of sentences and their meanings while a human talks to it. It can handle different accents, slang words, noise in the background, change in human's noise due to cold, etc.

- **Handwriting Recognition** – The handwriting recognition software reads the text written on paper by a pen or on screen by a stylus. It can recognize the shapes of the letters and convert it into editable text.

- **Intelligent Robots** – Robots are able to perform the tasks given by a human. They have sensors to detect physical data from the real world such as light, heat, temperature, movement, sound, bump, and pressure. They have efficient processors, multiple sensors and huge memory, to exhibit intelligence. In addition, they are capable of learning from their mistakes and they can adapt to the new environment.

7. **Three Domains of AI**

- **Natural Language Processing (NLP)**
- **Computer Vision**
- **Data**

1. Natural Language Processing

NLP includes machines or robots to understand and process language that human speaks.

Natural Language Processing (NLP) refers to AI method of communicating with an intelligent system using a natural language such as English.

Processing of Natural Language is required when you want an intelligent system like robot to perform as per your instructions, when you want to hear decision from a dialogue based clinical expert system, etc.

The field of NLP involves making computers to perform useful tasks with the natural languages humans use. The input and output of an NLP system can be −

- Speech
- Written Text

Components of NLP
There are two components of NLP as given −

Natural Language Understanding (NLU)
Understanding involves the following tasks −

- Mapping the given input in natural language into useful representations.
- Analysing different aspects of the language.

Natural Language Generation (NLG)
It is the process of producing meaningful phrases and sentences in the form of natural language from some internal representation.

It involves −

- **Text planning** − It includes retrieving the relevant content from knowledge base.

- **Sentence planning** − It includes choosing required words, forming meaningful phrases, setting tone of the sentence.
- **Text Realization** − It is mapping sentence plan into sentence structure.

The NLU is harder than NLG.

Difficulties in NLU

NL has an extremely rich form and structure.

It is very ambiguous. There can be different levels of ambiguity −

- **Lexical ambiguity** − It is at very primitive level such as word-level.
- For example, treating the word "board" as noun or verb?
- **Syntax Level ambiguity** − A sentence can be parsed in different ways.
- For example, "He lifted the beetle with red cap." − Did he use cap to lift the beetle or he lifted a beetle that had red cap?
- **Referential ambiguity** − Referring to something using pronouns. For example, Rima went to Gauri. She said, "I am tired." − Exactly who is tired?
- One input can mean different meanings.
- Many inputs can mean the same thing.

  Play the game **Mystery Animal** to understand the concept of NLP.

  https://mysteryanimal.withgoogle.com/

2. **Computer Vision**

   Computer vision is a field of computer science that works on enabling computers to see, identify and process images in the same way that human vision does, and then provide appropriate output. It is like imparting human intelligence and instincts to a

computer. In reality though, it is a difficult task to enable computers to recognize images of different objects.

Computer vision is closely linked with artificial intelligence, as the computer must interpret what it sees, and then perform appropriate analysis or act accordingly.

Play the game **Emoji Scavenger hunt** to understand the concept of Computer Vision.

https://emojiscavengerhunt.withgoogle.com/

3. Data

"Data is the lifeblood of AI. An AI system needs to learn from data in order to be able to fulfil its function.

- **How AI is used on a website/store**
  AI collects data from multiple sources and build a store of knowledge that will ultimately enable accurate predictions about you as a consumer that are based not just on what you buy, but on how much time you spend in a particular part of a site or store, what you look at while you're there, what you do buy compared with what you don't and when you again visit that site, it shows products according to your previous search.

- **How AI is used in gaming**
  Artificial Intelligence video games are largely used to determine the behaviour of non-player character (NPCs) in games. (A non-player character (NPC) is a video game character that is controlled by the game's artificial intelligence (AI) rather than by a gamer.) Based on the behaviour of NPCs , system predicts NPCs' next move and then act accordingly..

  Artificial intelligence has long been used to simulate human players in board games. Computer chess players are the best-known example. Modern chess programs are

able to easily beat the best human players. IBM's <u>Deep Blue</u> computer famously beat Garry Kasparov in 1997.

Play the game **Rock, paper and scissors** to understand the concept of DATA.

Link - bit.ly/iai4yrps