Introduction of Artificial Intelligence

Objective: In this content we will learn the following:

- Basic of artificial Intelligence.
- Definition with its problem domains.
- Reason of Learning AI
- Goals of AI
- Turing test
- Knowledge Characteristics
- Application of AI

Artificial Intelligence: In which we try to explain why Artificial intelligence to be subject most worthy of study , & in which we try to decide what exactly it is, this being a good thing to decide before embarking.

Intelligence: It contains the following attributes to exhibits the Intelligent Behavior:

- **Knowledge**

- **Searching**

- **Inference**

- **Abstraction**

Definition of AI:

- ◉ **We call a program for a computer artificially intelligent if it does something which, when done by a human being, will be thought to require human intelligence.”**

- ◉ **“Artificial intelligence is the study of computations that make it possible to perceive, reason, and act.”**

Three Essential Components of AI Systems

- **Should be able to handle knowledge that is both general and domain specific, implicit and explicit, and at different levels of abstraction.**

- **Involves having suitable control mechanisms to constrain the search through the knowledge base, and a means of arriving at conclusions from premises and available evidence.**

- **This should be designed such that it modifies the existing internal representational structure to incorporate the new information, with minimal disturbance to existing information.**

Reasons for studying A.I

- **To learn more about ourselves.**

- **(Unlike philosophy & psychology,) to build intelligent entities as well as understand them.**

- **These constructed intelligent entities are interesting & useful in their own right.**

Possible Goals of AI:

First Goal: Systems that think like humans.

- **Definition1 : "the exciting new effort to make computers think…machine with minds, in the full & literal sense(Haugeland,1985)".**

- **Definition2 : " [the automation of] activities that we associate with human thinking, activities such as decision making, problem solving, learning …"(Bellman,1978).**

Second Goal: Systems that think act humans.

- **Definition1 : " the art of creating machines that perform functions that require intelligence when performed by people"(kurzweil, 1990).**

- **Definition2 : " the study of how to make computers do things at which, at the moment, people are better" (Rich & knight,1991).**

Third Goal: Systems that think rationally.

- **Defition1 : "the study of mental faculties through the use of computational models"(charniak & McDermott ,1985).**

- **Defition2 : " the study of the computations that make it possible to perceive,, reason, &act" (winston , 1992).**

Fourth Goal: Systems that act rationally.

- **Definition1 : "a field of study that seeks to explain & emulate intelligent behavior in terms of computational processes" (schalkoff ,1990).**

- **Definition2 : the branch of computer science that is concerned with the automation of intelligent behavior" (Luger & stubblefield,1993).**

Turing Test:

- **Proposed by Alan Turing (1950).**

- **Ability to achieve human-level performance in all cognitive tasks, sufficient to fool an interrogator.**

- **Roughly , the computer should be interrogated by a human via a teletype, & passes the test if the interrogator cannot tell if there is a computer or a human at the other end.**

- **The computer would need to possess the following capabilities :**

- **Natural language processing.**

The following are required in Turing Test:

- **Knowledge representation.**

- **Automated reasoning**

- **Machine learning.**

- **Computer vision,**

- **Robotics.**

Characteristics of Knowledge : AI technique is a method that exploits knowledge

The knowledge should have following Characteristics:

- The knowledge captures generalization.

- It can be understood by people who must provide it.

- It can easily be modified to correct and to reflect changes in the world and in our world view.

- It can be used in a great many situations even if it is not totally accurate or complete.

- It can be used to help overcome its own sheer bulk by helping to narrow the range of possibilities that must usually be considered.

AI Problem Domain: There are three Problem domains of AI:

- Formal Task
  - Game Playing
    - Chess
    - Checkers
    - Go
    - Tic-Tac-Tao
  - Theorem Proving of Mathematics
    - Geometry
    - Logic

- Mundane Task
  - Commonsense Reasoning
  - Perception
    - Vision
    - Speech
  - Natural Language Processing
    - Understanding
    - Generation
    - Translation
  - Robotics

- Expert Task
  - Engineering
  - Design
  - Fault finding
  - Manufacturing Planning
  - Scientific Analysis
  - Medical diagnosis
  - Financial Analysis

Application of AI

- **Pattern Recognition**

  - **Fraud Detection and Prevention**

  - **Face Recognition**

  - **Handwriting Recognition**

- **Bio-informatics**

  - **Data Mining**

  - **Bio-Medical Informatics**

- **Expert Systems**

  - **Diagnosis and troubleshooting**

  - **Decision Making**

  - **Design and Manufacturing**

  - **Process Monitoring and control**

  - **EIA(Environmental Impact Assessment)**

- **Computer Vision**