**Artificial Intelligence | An Introduction**

Before leading to the meaning of artificial intelligence let understand what is the meaning of Intelligence-

Intelligence: The ability to learn and solve problems. This definition is taken from webster’s Dictionary.

The most common answer that one expects is **“to make computers intelligent so that they can act intelligently!”**, but the question is how much intelligent? How can one judge intelligence?

…as intelligent as humans. If the computers can, somehow, solve real-world problems, by improving on their own from past experiences, they would be called “intelligent”.   
Thus, the AI systems are more generic(rather than specific), can “think” and are more flexible.

Intelligence, as we know, is the ability to acquire and apply knowledge. Knowledge is the information acquired through experience. Experience is the knowledge gained through exposure(training). Summing the terms up, we get **artificial intelligence** as the “copy of something natural(i.e., human beings) ‘WHO’ is capable of acquiring and applying the information it has gained through exposure.”

**Intelligence is composed of:**

* Reasoning
* Learning
* Problem Solving
* Perception
* Linguistic Intelligence

Many tools are used in AI, including versions of search and mathematical optimization, logic, and methods based on probability and economics. The AI field draws upon computer science, mathematics, psychology, linguistics, philosophy, neuroscience, artificial psychology, and many others.

**Need for Artificial Intelligence**

1. To create expert systems that exhibit intelligent behavior with the capability to learn, demonstrate, explain, and advise its users.
2. Helping machines find solutions to complex problems like humans do and applying them as algorithms in a computer-friendly manner.

**Approaches of AI**

There are a total of four approaches of AI and that are as follows:

* **Acting humanly (The Turing Test approach):**This approach was designed by Alan Turing. The ideology behind this approach is that a computer passes the test if a human interrogator, after asking some written questions, cannot identify whether the written responses come from a human or from a computer.
* **Thinking humanly (The cognitive modeling approach):**The idea behind this approach is to determine whether the computer thinks like a human.
* **Thinking rationally (The “laws of thought” approach):** The idea behind this approach is to determine whether the computer thinks rationally i.e. with logical reasoning.
* **Acting rationally (The rational agent approach):**The idea behind this approach is to determine whether the computer acts rationally i.e. with logical reasoning.

**Applications of AI** include **Natural Language Processing, Gaming, Speech Recognition, Vision Systems, Healthcare, Automotive**, etc.

An AI system is composed of an agent and its environment. An agent(e.g., human or robot) is anything that can perceive its environment through sensors and acts upon that environment through effectors. Intelligent agents must be able to set goals and achieve them. In classical planning problems, the agent can assume that it is the only system acting in the world, allowing the agent to be certain of the consequences of its actions. However, if the agent is not the only actor, then it requires that the agent can reason under uncertainty. This calls for an agent that cannot only assess its environment and make predictions but also evaluate its predictions and adapt based on its assessment. Natural language processing gives machines the ability to read and understand human language. Some straightforward applications of natural language processing include information retrieval, text mining, question answering, and machine translation. Machine perception is the ability to use input from sensors (such as cameras, microphones, sensors, etc.) to deduce aspects of the world. e.g., Computer Vision. Concepts such as game theory, and decision theory, necessitate that an agent can detect and model human emotions.

Many times, students get confused between Machine Learning and Artificial Intelligence, but Machine learning, a fundamental concept of AI research since the field’s inception, is the study of computer algorithms that improve automatically through experience. The mathematical analysis of machine learning algorithms and their performance is a branch of theoretical computer science known as a computational learning theory.

Stuart Shapiro divides AI research into three approaches, which he calls computational psychology, computational philosophy, and computer science. Computational psychology is used to make computer programs that mimic human behavior. Computational philosophy is used to develop an adaptive, free-flowing computer mind. Implementing computer science serves the goal of creating computers that can perform tasks that only people could previously accomplish.