
1- Review of AI

What is Artificial Intelligence (AI) ?

- Artificial Intelligence (AI) is a branch of Science which deals with helping machines finding Solutions to complex problems in a more human-like fashion.
- This generally involves borrowing characteristics from human intelligence, and applying them as algorithms in a computer friendly way.
- AI is generally associated with Computer Science, but it has many important links with other fields such as Maths, Psychology, Cognition, Biology and Philosophy, among many others.
- AI currently encompasses a huge variety of subfields, from general-purpose areas such as perception and logical reasoning, to specific tasks such as playing chess, proving mathematical theorems, writing poetry, and diagnosing diseases.

HISTORY OF AI

- The origin of artificial intelligence lies in the earliest days of machine computations. During the 1940s and 1950s,
- AI begins to grow with the emergence of the modern computer.
- Among the first researchers t attempt to build intelligent programs were Newell and Simon.
- Their first well known program, logic theorist, was a program that proved statements using the accepted rules of logic and a problem solving program of their own design.
- By the late fifties, programs existed that could do a passable job of translating technical documents and it was seen as only a matter of extra databases and more computing power to apply the techniques to less formal, more ambiguous texts.
- Most problem solving work revolved around the work of Newell, Shaw and Simon, on the general problem solver (GPS).
- Unfortunately the GPS did not fulfill its promise and did not because of some simple lack of computing capacity.
- In the1970's the most important concept of AI was developed known as Expert System which exhibits as set rules the knowledge of an expert. The application area of expert system is very large. The 1980's saw the development of neural networks as a method learning examples.
- Prof. Peter Jackson (University of Edinburgh) classified the history of AI into three periods as:
 1. Classical
 2. Romantic
 3. Modern

1. Classical Period:

- It was started from 1950. In 1956, the concept of Artificial Intelligence came into existence. During this period, the main research work carried out includes game plying, theorem proving and concept of state space approach for solving a problem.

2. Romantic Period:

- It was started from the mid 1960 and continues until the mid 1970. During this period people were interested in making machine understand, that is usually mean the understanding of natural language. During this period the knowledge representation technique “semantic net” was developed.

3. Modern Period:

- It was started from 1970 and continues to the present day. This period was developed to solve more complex problems. This period includes the research on both theories and practical aspects of Artificial Intelligence. This period includes the birth of concepts like Expert system, Artificial Neurons, Pattern Recognition etc. The research of the various advanced concepts of Pattern Recognition and Neural Network are still going on.

COMPONENTS OF AI

There are three types of components in AI

1) Hardware Components of AI

- a. Pattern Matching
- b. Logic Representation
- c. Symbolic Processing
- d. Numeric Processing
- e. Problem Solving
- f. Heuristic Search
- g. Natural Language processing
- h. Knowledge Representation
- i. Expert System
- j. Neural Network
- k. Learning
- l. Planning
- m. Semantic Network

2) Software Components

- a. Machine Language
- b. Assembly language
- c. High level Language
- d. LISP Language
- e. Fourth generation Language
- f. Object Oriented Language
- g. Distributed Language
- h. Natural Language
- i. Particular Problem Solving Language

3) Architectural Components

- a. Uniprocessor
- b. Multiprocessor

- c. Special Purpose Processor
- d. Array Processor
- e. Vector Processor
- f. Parallel Processor
- g. Distributed Processor

Note(Some More Points About AI)

- AI is about generating representations and procedures that automatically or autonomously solve problems heretofore solved by humans.
- AI is the part of computer science concerned with designing intelligent computer systems, that is, computer systems that exhibit the characteristics we associate with intelligence in human behaviour such as understanding language, learning, reasoning and solving problems.
- AI is the study of mental faculties through the use of computational models.
- AI is the study of the computations that make it possible to perceive, reason, and act.
- AI is the exciting new effort to make computers think machines with minds, in the full and literal sense.

WEAK AND STRONG AI

- There are two conceptual thoughts about AI namely the Weak AI and Strong AI. The strong AI is very much promising about the fact that the machine is almost capable of solve a complex problem like an intelligent man. They claim that a computer is much more efficient to solve the problems than some of the human experts. According to strong AI, the computer is not merely a tool in the study of mind, rather the appropriately programmed computer is really a mind. Strong AI is the supposition that some forms of artificial intelligence can truly reason and solve problems. The term strong AI was originally coined by John Searle.
- In contrast, the weak AI is not so enthusiastic about the outcomes of AI and it simply says that some thinking like features can be added to computers to make them more useful tools. It says that computers to make them more useful tools. It says that computers cannot be made intelligent equal to human being, unless constructed significantly differently. They claim that computers may be similar to human experts but not equal in any cases. Generally weak AI refers to the use of software to study or accomplish specific problem solving that do not encompass the full range of human cognitive abilities. An example of weak AI would be a chess program. Weak AI programs cannot be called “intelligent” because they cannot really think.

Areas of Artificial Intelligence

- **Machine Vision:** It is easy to interface a TV camera to a computer and get an image into memory; the problem is understanding what the image represents.
- **Speech Understanding:** Speech understanding is available now. Some systems must be trained for the individual user and require pauses between words. Understanding continuous speech with a larger vocabulary is harder.
- **Touch(tactile or haptic) Sensation:** Important for robot assembly tasks.

Robotics

- Although industrial robots have been expensive, robot hardware can be cheap. The limiting factor in application of robotics is not the cost of the robot hardware itself. What is needed is perception and intelligence to tell the robot what to do; "blind" robots are limited to very well-structured tasks.

Planning

- Planning attempts to order actions to achieve goals. Planning applications include logistics, manufacturing scheduling, planning manufacturing steps to construct a desired product.

Expert Systems

- Expert Systems attempt to capture the knowledge of a human expert and make it available through a computer program.

Theorem Proving

Proving mathematical theorems might seem to be mainly of academic interest. However, many practical problems can be cast in terms of theorems.

Symbolic Mathematics

- Symbolic mathematics refers to manipulation of formulas, rather than arithmetic on numeric values.
 - Algebra
 - Differential and Integral Calculus

- Game Playing

- Games are good vehicles for research because they are well formalized, small, and
- self-contained. They are therefore easily programmed. Games can be good models of competitive situations, so principles discovered in game-playing programs may be applicable to practical problems.