1. What is Artificial intelligence AI ?

Definition 1:- Artificial Intelligence is the study of man-made computational devices and systems which can be made to act in a manner which we would be inclined to call intelligent.

The birth of the field can be traced back to the early 1950s. Arguably, the first significant event in the history of AI was the publication of a paper entitled "Computing Machinery and Intelligence" by the British Mathematician *Alan Turing*.

In this paper, Turing argued that if a machine could past a *certain test* (which has become known as the ***'Turing test'***) *then we would have grounds to say that the computer was intelligent*. Turing also considered a number of arguments for, and objections to, the idea that computers could exhibit intelligence.

Definition 2:- AI is the study of how to make computers do things which at the moment people do better. This is ephemeral as it refers to the current state of computer science and it excludes a major area ; problems that cannot be solved well either by computers or by people at the moment.

Definition 3:- AI is a field of study that encompasses computational techniques for performing tasks that apparently require intelligence when performed by humans.

Definition 4:- AI is the field of study that seeks to explain and emulate intelligent behavior in terms of computational processes.

Definition 5:-AI is about generating representations and procedures that automatically or autonomously solve problems theretofore solved by humans.

Definition 6:-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 behavior understanding language, learning, reasoning and solving problems.

To build a programs that can perform intelligent tasks we need :

1. Search methods.
2. Knowledge representation schemes (how to represent knowledge inside the machine computer).
3. How to reach conclusions for the represented knowledge (inference).

Over View of AI Application Areas:

Two most, fundamental concerns of AI researches are *knowledge representation and search*, the first of these addresses the problem of capturing in a formal language.

Search is a problem solving techniques that systematically explores a space states might include the different board configuration in a game or intermediate steps in a reasoning process. This space of alternative solutions is then searched to find a final answer.

Most Applications to search in a space state are:-

1- Game Playing :

Much of early research in state space search was done using common board game such as chess and the 8-puzzle. Most games are played using a well-defined set of rules; this makes it easy to generate the search space and frees the researcher from many of ambiguities and complexities.

2- Automated Reasoning and Theorem Proving:

Automatic theorem proving is the oldest branch of artificial intelligence. Theorem proving research was responsible for much of the early work in formalizing search algorithms and developing formal representation languages such as predicate calculus and logic programming (PROLOG).

3- Expert Systems :

In artificial intelligence, an expert system is a computer system that emulates the decision-making ability of a human expert. Expert systems are designed to solve complex problems by reasoning about knowledge, represented primarily as if–then rules rather than through conventional procedural code. The first expert systems were created in the 1970s and then proliferated in the 1980s.[3]Expert systems were among the first truly successful forms of AI software.

An expert system is divided into two sub-systems: the inference engine and the knowledge base. The knowledge base represents facts and rules. The inference engine applies the rules to the known facts to deduce new facts. Inference engines can also include explanation and debugging capabilities.
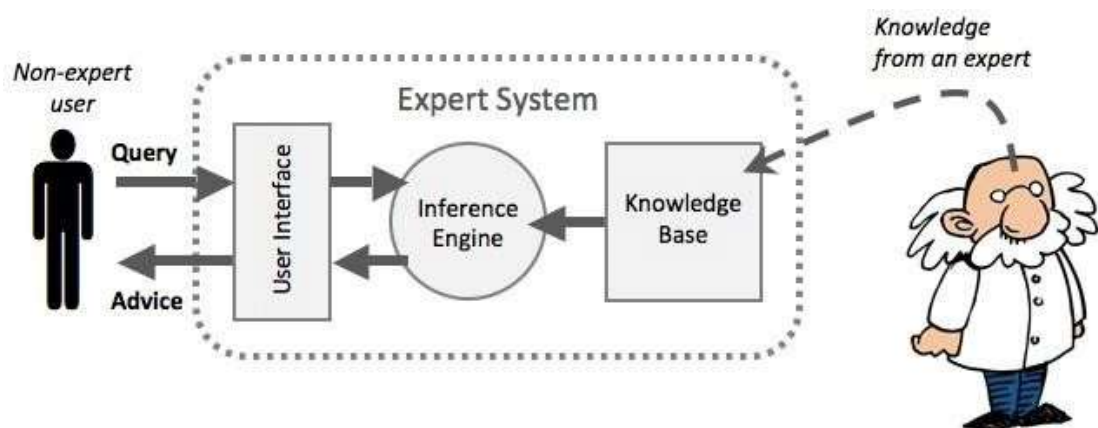
In spite of the promise of expert systems it would be a mistake to overestimate the ability of this technology, current deficiencies include:

1- Difficulty in capturing "deep" knowledge of the problem domain.
2- Lack of robustness and flexibility.
3- Inability to provide deep explanations.
4- Difficulties in verification.

5- Little learning from experience.

4- Natural Language Understanding and Semantic Modeling:

One of the long-standing goals of artificial intelligence is the creations of programs that are capable of understanding human language. Understanding natural language involves much more than parsing sentences into their individual parts of speech and looking those words up in a dictionary. Real understanding depends on extensive background knowledge about the domain of discourse and the idioms used in that domain.

5- Parallel Distributed Processing (PDP) :

Most of the techniques presented in this text use explicitly represented knowledge and carefully designed search algorithms to implement intelligence. Avery different approach seeks to build intelligent programs using models that parallel the structure of neurons in the human brain.

Neural architectures also provide a natural model for parallelism, because each neuron is an independent unit.