



# Artificial Intelligence: Its Applications and Various Issues

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**Abstract** - Since the last few years there has been a large amount of research into Artificial Intelligence (AI). Artificial intelligence is exhibited by the artificial entity; a system is generally assumed to be a computer. AI systems are now generally used in economics, medicine, engineering and the military, as well as being built into many common home computer software applications, traditional strategy games like computer chess, card games and other video games. AI is also used in typical problems such as Pattern recognition, Natural language processing and more, with this we can learn something about how to make machines solve problems by observing other people or just by observing our own methods. This system is working throughout the world as an artificial brain. This paper gives an overview of artificial intelligence design & implementation details, and the application areas of this technology. And also, we have explained the brief ideas of AI and it includes various advanced systems such as Neural Network, Fuzzy Systems, and Evolutionary computation.

**Keywords** -Artificial Intelligence, Pattern Recognition, Neural Network, Fuzzy Systems, Natural Language Processing.

## I. INTRODUCTION

We may find it hard to imagine life without the power of computers. Indeed, all expanses of our livelihood are affected and have benefited from technological development and an increasingly powerful computerized environment. In the future, intelligent machines will replace or enhance human capabilities in many areas. Past few years have witnessed an ever-increasing dependency on big data and big analytics and investment in the development of 'SELF-LEARNING' machines by observing the working environments. These complex machines are set to assist in decision making, predicted to further enhance our immediate living environment - the way we commute and communicate. It is claimed that artificial intelligence is playing an increasing role in the research [1] of management science and operational research areas. AI is intelligence exhibited by machines. It is the study and developments of intelligent machines and software that can reason, learn, communicate, manipulate and perceive the objects. [4] In 1956, John McCarthy devised this term as a branch of computer science concerned with making computers to behave like humans. Before it has been termed as Artificial Intelligence several terms were proposed for it such as:

- Complex Information Processing
- Heuristic programming
- Machine Intelligence
- Computational Rationally

In Computer Science, the field of AI research defines itself as the study of "Intellectual Representatives", any device that perceives its environment and takes actions that maximize its chance of success at some goal. Intelligence is commonly considered as the ability to collect knowledge and reason about knowledge to solve complex problems. It's emphasis on the computation that makes machines smarter and more useful.

## II. AREAS OF ARTIFICIAL INTELLIGENCE

There are no such areas of AI when it comes to what the AI system does. This is because many of the systems do many different things. For example, a robot may include areas of Natural Language Processing, Pattern Recognition and Machine Learning that helps it to do its job. Although some major areas of interest are:

- **Knowledge Illustration and Enunciation**- Displaying information in an expressive and efficient form.
- **Learning and Adaptation** - Analyzing data to determine general trends, facts, and techniques from instruction, experience, and collected data.

- **Discussion, Planning, and Interim** - Ways to make decisions, strategies or achieve definite goals, as well as analyzing the performance of the plans and designs.
- **Speech and Language Processing** - Interacting and translating between natural written and spoken languages.
- **Image Understanding and Synthesis** - analyzing photographs, diagrams, and videos.
- **Manipulation and Movement** - Copying and improving the abilities of hands, arms, feet, and bodies.
- **Autonomous Agents and Robots** – The creation of robots, capable of interacting with the situation and making decisions self-sufficiently.
- **Multi-agent Systems** - Enabling any AI systems to interact and work together.
- **Cognitive Modelling** - Techniques and the replication of the way people think and impress knowledge.
- **Mathematical Fundamentals** - Mathematically analyzing the previously stated areas.

### III. RESEARCH AREAS OF ARTIFICIAL INTELLIGENCE

The domain of artificial intelligence is huge in breadth and width. While proceeding, fig. 1 shows the broadly common and prospering research areas in the domain of AI.

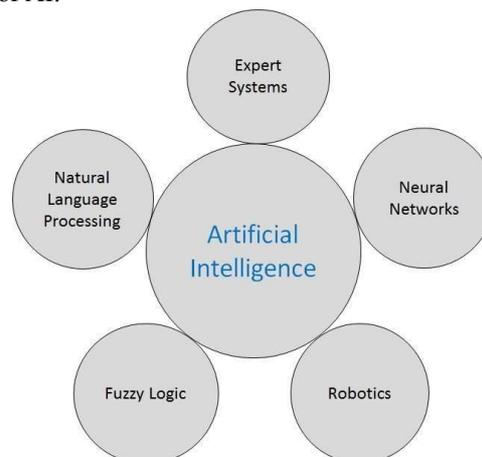


Fig 1. Research areas of AI

#### A) Expert Systems:

Expert systems (ES) are one of the prominent research domains of AI.[4] The expert systems are the computer applications developed to solve complex problems in a particular domain, at the level of extraordinary human intelligence and expertise. It was introduced by the researchers at Stanford University, Computer Science Department. The expert systems are capable of –

- *Instructing*
- *Training and supporting human in decision making*
- *Representing*
- *Arising a solution*
- *Analyzing*
- *Enlightening*
- *Inferring input*
- *Expecting results*
- *Justifying the conclusion*
- *Suggesting alternate options to a problem*

#### B) Neural Networks: -

Another research area in AI, Artificial neural networks (i.e.,) is inspired from the natural neural network of the human nervous system.[4] A computing system is made up of a number of simple, highly interconnected processing elements, which manage the information by their lively state reply to external inputs.

THERE ARE TWO TYPES OF ARTIFICIAL NEURAL NETWORK (ANN) TOPOLOGIES:

1. FEEDFORWARD ANN.
2. FEEDBACK ANN.

#### 1) Feedforward ANNs:

A feedforward neural network is an artificial neural network in which networks between the units do not form a cycle as in fig.2. As such, it is different from feedback neural networks. The feedforward neural network was the first and simplest type of artificial neural network developed.

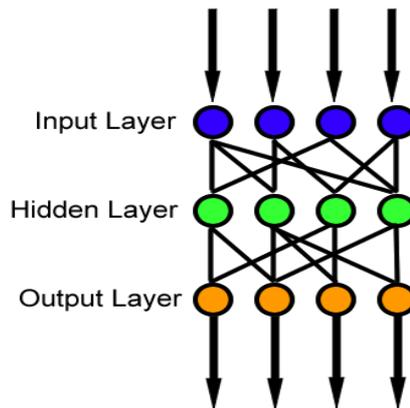


Fig 2: - Feedforward ANNs

## 2) Feedback ANNs:

It is also called as Recurrent Neural Network (RNN) where connections between the units form a directed cycle as in fig. 3. This creates an internal state of the network which allows it to exhibit dynamic time-based behavior. RNNs can use their internal memory to process illogical sequences of inputs. This makes them applicable to tasks such as unsegmented connected.

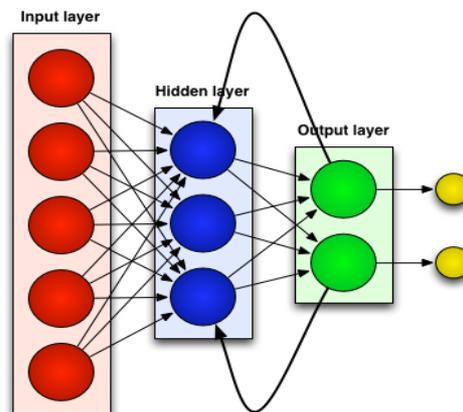


Fig 3: Feedback ANNs

## C) Natural Language Processing:

It is a field of artificial intelligence, and reckoning semantics concerned with the interface between computers and human verbal communication and, in particular, concerned with programming computers to successfully process large natural language quantities.[4] Processing of Natural Language is required when you want an intelligent system to perform as per your instructions. There are two components of NLP:

### 1) Natural Language Understanding (NLU):

Understanding NLU involves the following task:

- Mapping the given input (in natural language) into useful representations.
- Analyzing different aspects of the language.

### 2) Natural Language Generation (NLG):

It is the process of producing meaningful phrases and sentences in the form of natural language from some internal illustration. It involves:

- *Text planning* –It includes repossessing the relevant content from knowledge base.
- *Sentence planning* – It includes choosing required words, forming meaningful phrases, background tone of the sentence.
- *Text Realization* – It is mapping sentence plan into sentence structure.

## D) Fuzzy logic:

In 1965, Lotfi A. Zadeh developed fuzzy logic to address inaccuracy and uncertainty which usually exists in engineering problems. [2] Fuzzy logic is a form of many-valued logic in which the truth values of variables may be any real number between 0 and 1. It is a sort of computer logic that is different from Boolean logic. It is different in the way that it allows values to be more precise than on or off. Whereas Boolean logic only allows true or false, fuzzy logic allows all things in between. For example, take a reference of a computer game: the player is standing in a doorway while a thing explodes. Now the Boolean logic would be that if the player is hit or not hit, but the doorway protects him from the explosion.

Therefore, he might only be hit 20%, and takes less damage; this is the fuzzy logic. James Bezdek editor in chief of the IEEE transactions on fuzzy systems, defined fuzzy logic to be one part of 'computational intelligence', altogether with such research areas as neural networks, evolutionary computation, and genetic algorithms. However, the term 'Computational Intelligence' it is not undisputed, since it had already been widely used to mean artificial intelligence before it was redefined by Bezdek. In cases, artificial intelligence as well as fuzzy logic, one tries in some sense to imitate life in its problem-solving capability. The ways how to achieve this goal are different in many respects, but there are also many common points where the two fields overlap.

Areas where fuzzy logic and artificial intelligence meet in current research include:

- *Fuzzy expert systems*- e.g., for medical diagnosis or intelligent tutoring systems.
- *Theoretical investigations*-e.g., combinations of fuzzy logic with modal logics and other forms of defeasible reasoning, i.e., based on questionable knowledge; this also includes investigations into fuzzy logic programming languages such as fuzzy extensions of PROLOG.
- *Machine learning*- e.g., combinations of fuzzy logic with neural networks, genetic algorithms, associative memories, symbolic learning methods such as case based reasoning.
- *Robotics*- involving motion control and planning capabilities, e.g. when flying a fully automated helicopter or driving a car on a freeway.
- *Pattern matching*- e.g., face recognition.
- *Fuzzy deductive databases*- e.g., to ease data retrieval in geographic information systems.
- *Constraint satisfaction problem solving methods*- applied for example in manufacturing process scheduling, or in bridge design.

#### **E) Robotics: -**

Robotics is a branch of Artificial intelligence, [4] which consists of Electrical Engineering, Mechanical Engineering, and Computer Science for designing, construction, and the application of robots. The term robotics was introduced by writer *Isaac Asimov*. [3] Robots are now used in factories to perform high-precision jobs such as riveting and welding. They are also used in special situations that are dangerous for humans - for example, in getting rid of toxic wastes or defusing extremely complex bombs. Although great advances have been made in the field of robotics during last decade, robots are still not very useful in day-to-day life, as they are too inept to perform ordinary household chores.

### **IV. ISSUES REGARDING ADVANCES IN ARTIFICIAL INTELLIGENCE**

Artificial Intelligence is being developed with such an incredible speed that sometimes it seems magical. There is an opinion among some developers and researchers that AI could grow so immensely powerful that it would be very difficult for humans to control them. Humans advanced AI systems by introducing into them every possible intellect they could, for which the humankind itself now seem threatened. There are various issues or areas of threats that AI has [4]:

- *Threat to Human Privacy*: - An Artificial Intelligence program that recognizes human speech and understands the natural language is theoretically capable of understanding each and every conversation on e-mails and telephones which compromises our privacy.
- *Threat to Human Dignity*: - AI systems have already started replacing the humankind in few industries. It should not replace people in those sectors where they hold valuable positions which are pertaining to ethics such as nursing, surgeon, judge, police officer, etc.
- *Threat to Human Safety*: - The self-improving AI systems might become so powerful than humans that could be very difficult to stop from achieving their goals, which may lead to unwanted consequences.

### **V. CONCLUSION**

Artificial Intelligence and its technology always interests and surprises us with the new ideas, topics, innovations, products etc. Although AI is still not implemented in real life as shown in the films (i.e.; extremely intelligent robots resulting in a threat to the humankind), there have been many efforts to reach that level. However, rather than replacing humans, it is both AI and the humans that's likely to bring the greatest change to the world. If human values are carefully articulated and embedded into AI systems, then socially unacceptable outcomes might be prevented. AI will proceed to change the world of work, and the workers will need to engage in lifelong learning, developing their skills and changing jobs more often than they did in the past. In future, if the humans continue to work together with AI, the challenge will be to ensure that we anticipate any negative health and safety consequences, evaluate the risks, and share this important knowledge to benefit the future working world.

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