



A Survey on Artificial Intelligence and its Applications

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ABSTRACT: Artificial Intelligence (AI) is an emerging technology in today's world. Now and then most of the things in the world may use AI. The ability of making a machine to make decisions on its own is termed as AI. This paper presents a brief survey on AI and its various emerging applications along with real time examples. A generic analysis on AI is presented in this paper. Intelligence is the way of thinking and acting upon the environment. This might depends on the Intelligent Quotient (IQ) of a person. AI can also be used to make predictions in future. All the intelligence can be done through programming. Learning is one of the part of AI which makes a machine to learn and then act upon real time situations by using past experience. Typically AI is broad filed in computer science which is mostly used for automation purposes in order to reduce man power. AI helps people to make their tasks easily and efficiently. There is huge difference on Natural Intelligence (NI), Machine Intelligence (MI) and AI. There is wide range of applications for AI that ranges from computer vision to expert systems.

KEYWORDS: AI, IQ, ML, Learning, Automation.

I. INTRODUCTION

Artificial Intelligence is a combination of computer science, physiology, and philosophy. AI is a broad topic, consisting of different fields, from machine vision to expert systems. The element that the fields of AI have in common is the creation of machines that can "think". There are various definitions given by different authors who belong to AI field. Some of the definitions are:

1. The area of computer science focusing on creating machines that can engage in human behaviors of intelligence is called "Artificial Intelligence" [1].
2. Artificial intelligence is study of mental faculties (powers) through use of computational models (Charniak and McDermott, 1985) [1].
3. ``The study of the computations that make it possible to perceive, reason, and act" (Winston, 1992) [1].
4. Artificial Intelligence (AI) is study of intelligent agents that act on environment [1].
5. The ability of a computer to think itself is called Artificial Intelligence.

II. HISTORY OF AI

In [2] Dartmouth Conference, John MC Carthy is regarded as the father of Artificial Intelligence in 1956. The evidence of AI can be traced back to ancient Egypt, but with the development of the electronic computer in 1941, the technology finally became available to create machine intelligence like human intelligence. AI is the biological motivation of human brain. The cognitive thinking and natural language made AI to grow faster. From the birth of AI, 4 decades ago, there has been a wide variety of AI programs, and they have impacted other technological advancements. The first AI program called "**The Logic Theorist**" was written by Allen Newell, J.C. Shaw and Herbert Simon in 1956 [2]. The following diagram illustrates about the complete history of AI.

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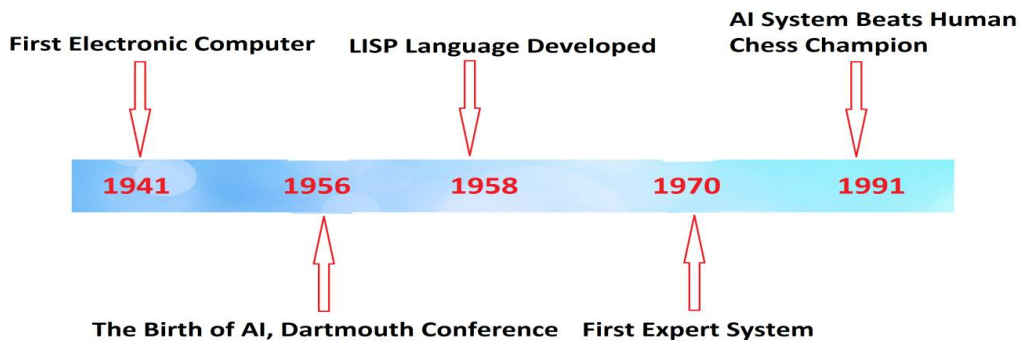


Figure 1 History of AI

III. VARIOUS DISCIPLINES IN AI

AI is an area in computer science [1], whereas again AI contains many sub disciplines or branches which deal in specific about the subject. These disciplines are ranges from machine vision to expert systems. They are:

- A) Natural Language Processing (NLP)
- B) Knowledge Representation and Reasoning (KRR)
- C) Pattern Recognition (PR)
- D) Machine Learning (ML)
- E) Artificial Neural Networks (ANN)

A. Natural Language Processing (NLP):

NLP is the process of understanding human language and converting to machine understandable form. For example, Speech Recognition in smart phones can understand human language and process the information as per our requirement [3] [4] [5].

B. Knowledge Representation and Reasoning (KRR):

KRR is used for representing information in computer understandable form in order to complete a specified task. Intelligence means knowledge that is acquired and stored in a knowledge base that is used for making decisions on its own [6] [7].

C. Pattern Recognition (PR):

PR is the phenomenon of classifying particular data into different classes based on their specific attributes. For example, there are two different classes A and B. Assume a new data point X, and now it has to be classified whether it belongs to class A or class B that is based on attributes of data point X. The following diagram illustrates about pattern recognition [7].

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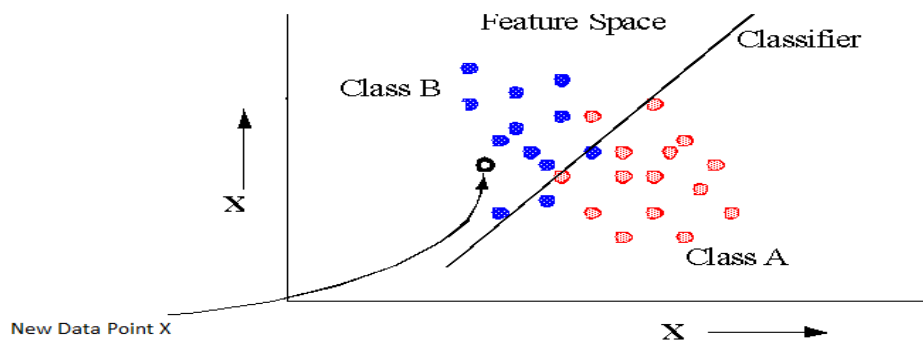


Figure 2 Representation of Pattern Classification

D. Machine Learning (ML):

ML deals with study, analysis and construction of algorithms to make a machine to learn for making decisions on its own. ML algorithms use input as past data i.e., specifically called as training data [8]. For example, making an autonomous car that can take directions on its own using past data.

E. Artificial Neural Networks (ANN):

ANN is developed with the inspiration of biological neuron that is how a human brain works. It mainly contains Input layer, Hidden layer and output layer. Whereas all these layers helps in thinking process. Input layer takes training data, then ANN is trained with it and now prediction can be done from the built model. The following diagram represents ANN [9] [10].

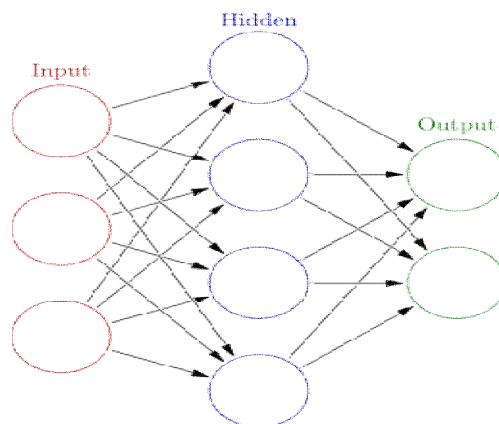


Figure 3 Artificial Neural Networks

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IV. APPLICATIONS OF ARTIFICIAL INTELLIGENCE

There is wide range of applications [8] where AI is used in today's world. AI can be used in various fields. They are

1. Military Applications
2. Medicinal Applications
3. Space Applications
4. Industrial Applications
5. Telecommunication Applications

1. Military Applications:

Some robots work autonomously or remote-controlled which are specifically designed for military applications. Such intelligent systems are currently being researched by a number of militaries related members. Already remarkable success has been achieved with unmanned aerial vehicles (UAV) like the predator, which are capable of doing Surveillance photographs, and even accurately launching pilotless missiles at ground targets. A subclass of these is unmanned aerial combat vehicles, which are designed to carry out strike missions in combat. The military forces of the future will use multi-agent robotic workforces for reconnaissance and surveillance, logistics and support, communications infrastructure, forward-deployed offensive operations, and as tactical decoys to conceal manoeuvre by manned assets [13].



Figure 4 Artificial Soldier

2. Medicinal Applications:

The technologies used in today's state-of-the-art medical robotics. We provide our expertise to healthcare organizations, medical practitioners, small companies, and educational institutions.

3. Space Applications:

In recent years, our exploration of the Solar System has involved more orbiters and rovers than human astronauts. This trend should continue in the future and this is why we need more 'intelligent' or autonomous robots. But of course, these robots will be controlled by advanced on-board software. Planetary aerobots could transform the way we explore

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those planets and moons which support an atmosphere. Traditional orbiters offer a 'bird's eye view' of the planet, covering vast swathes of land, with limited resolution. On the other hand, rovers or Landers provide a highly detailed characterization of their local surroundings. Bridging this gap, the planetary aerobot can travel large distances whilst at an altitude which allows for the acquisition of extremely high resolution images. The following is the image of rovers and Exomars that are using AI:



Figure 5 Space Rovers and Exomars

4. Industrial Applications:

Robots are used in a wide range of industrial applications. The earliest applications were in materials handling, spot welding, and spray painting. Robots were initially developed for performing specific tasks that are too hot, heavy, and hazardous like die casting, forging, spot welding and so on. Perhaps the most popular applications of robots are in industrial welding [14].

The two basic types of welding are spot welding and arc welding, although laser welding is done. Some environmental requirements should be considered for a successful operation. Another popular and efficient use for robots is in the field of spray painting [15].

5. Telecommunication Applications:

In telecommunication field, AI can be used for automation purposes wherever needed. For example, tweaking of some parameters at enodeB can be done with neural networks using deep learning.

V. ADVANTAGES OF AI

The advantages are more - robots can perform tasks that, we humans just don't want to do or cannot be able to do. Robots can do things that are more precise work than humans and can be used in medical sciences and other useful works.

VI. FUTURE OF AI

The population of robots will grow rapidly in future. Robots will continue to be used in tasks were danger, repetition, cost, and precision prevents humans from performing. In future, if the robotics will be used in constructive way than in destructive way then it needs very peaceful to mankind.

VII. CONCLUSION

AI will be used anywhere in the future wherever humans are required. With this cost will be decreased. Particularly in industries currently robots are used for performing certain tasks. Robotics is an engineering field, which uses AI



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techniques to build intelligent robots for the purpose of efficiency. The research of Robotics and AI would lead to a manufacturing of Robots that will be used in every industry.

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