Applications of Artificial Intelligence & Associated Technologies

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Abstract— This paper focuses on the meaning of artificial intelligence and its various advantages and disadvantages including its applications. It also tracks the current status of this technology in the real-world application and discusses the applications of AI in the fields of heavy industries, gaming, aviation, weather forecasting, expert systems with the focus being on expert systems. The paper concludes by predicting the future potential of Artificial Intelligence.

Keywords: Turing Test, Gaming Industry, Weather Predictions

I. INTRODUCTION

Artificial intelligence (AI) is defined as intelligence displayed by an artificial being to solve multifaceted problems and such a system is generally assumed to be a computer or machine. Artificial Intelligence is an unification of computer science and physiology Intelligence in simple language is the computational part of the ability to achieve goals in the world. Intelligence is being able to think to imagine creating learning and understanding, recognizing patterns, making choices adapting to change and learn from experience. Artificial intelligence focuses on making computers behave like humans more human like fashion and being faster than humans. Hence it is called as Artificial Intelligence. Artificial intelligence can be divided into parts according to philosophy of AI. a) Strong AI b) Weak AI

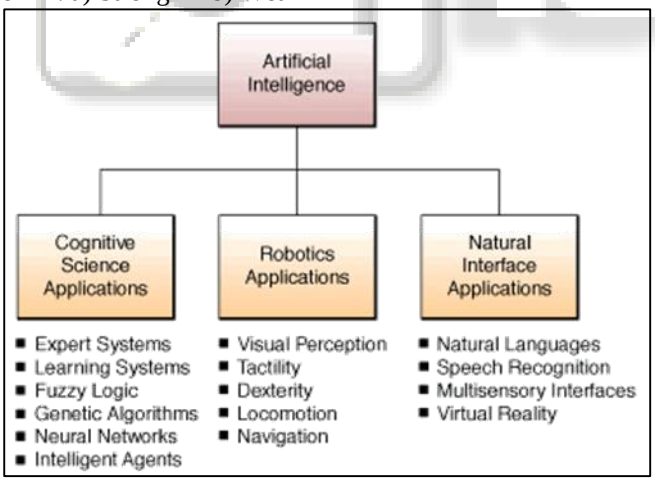

Fig. 1: Overview of Artificial Intelligence

A. Strong AI

The belief behind Strong AI is that the machines could be made to think or in other words represent human minds in the future. Thus, Strong AI claims that in near future we will be surrounded by kinds of machine that completely works and behaves like human beings and machines can be able to achieve have human level intelligence. If that is the case, these machines will have the ability to reason, think and do all functions that a human can possibly do. Current research is nowhere near creating strong AI, and a lively debate is ongoing as to whether this is even possible.

B. Weak AI

The principle behind Weak AI is simply the fact that machines are made to act as if they are intelligent. Weak AI states that thinking like features can be added to computers to make them more useful tools and this has already begun. For example, when a real player plays carrom against a computer, the real player may feel as if the computer is actually making pretty good moves. But the carrom application is not thinking and planning at all. All the moves it makes are formerly provided to the computer by a human and that is how it is guaranteed that the software will make the right moves at the right times. More examples of Weak AI are witness expert systems, drive by wires cars and speech recognition systems Artificial Intelligence is the capacity of an artificial being to execute tasks, which would otherwise only be expected of the human brain. These tasks include the capacity for knowledge and the capability to acquire it. It also comprises of the capability to judge, understand relationships and produce original thoughts.

Intelligence = perceive + Analyse + React

Also, there is a huge different between short term memory and RAM. Short-term memory holds pointers to the long-term memory where all the information is actually stored while RAM stores data that is isomorphic to data being held on a hard disk. The RAM is also limited to memory capacity while there seems to be no capacity limit when it comes to short-term memory.

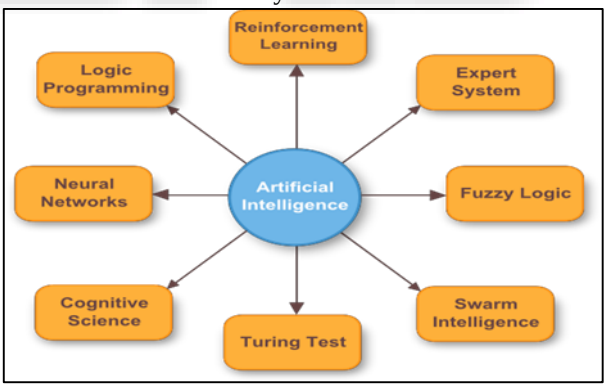

Fig. 2: Areas of Artificial Intelligence

1) Turing Test:

The Turing test is a test of a device's capability to demonstrate intellectual performance. The test was introduced by Alan Turing in his 1950 paper Computing Machinery and Intelligence. The original question behind this test was "Can machines think? ". The test progresses as follows a human judge encounters in a natural language conversation with one human and one machine, each of which seems to appear as a human. All participants are placed in insulated locations. If the judge unfailingly tells the machine from the human, the machine has passed the test. In order to test the machine's intelligence rather than its ability to solidify words into audio, the conversation is limited to a text-only network such as a

computer keyboard and screen." Satisfactorily many interrogators were unable to distinguish the computer from the human being then it is to be concluded that the computer thinks.

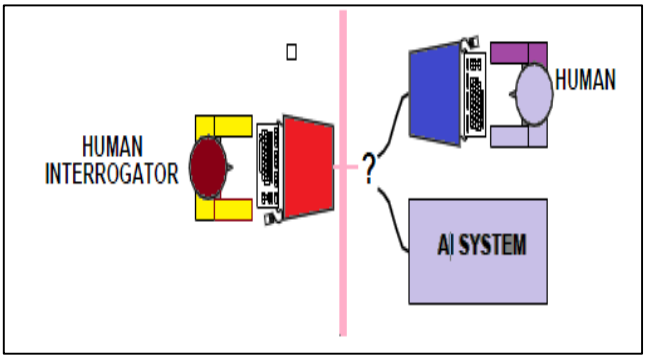

Fig. 3: Turing test for checking machine intelligence

C. *Roots of AI*

Artificial Intelligence has distinguishable roots in a number of older disciplines, particularly

- Philosophy
- Logic/Mathematics
- Computation
- Psychology/Cognitive Science
- Biology/Neuroscience

There is predictably much overlap Example, between philosophy and logic, or between mathematics and computation. By focusing at each of these in turn, we can get a better understanding of their role in AI, and how these important regulations are developed to play that role.

II. Advantages and Disadvantages

- Major advantage of artificial intelligence is that its decisions are centred on facts ignoring the emotions. Even if we put our extreme efforts, it is pretty much known that decisions made by humans are mostly touched in an unconstructive way by our emotions.
- Machines with artificial intelligence don't require any sleep, thus overpowering the inborn disadvantage of tiredness in humans
- Widespread of knowledge. Once an artificial mind is taught anything, it becomes very easy to teach the others reducing the time wasted in otherwise passing on knowledge to other humans through training.
- AI mostly has been infamous for lagging in giving creative responses.
- AI has been unable to provide with a logical reasoning behind their answers,
- Currently AI is at a stage where it cannot be decided whether it is a solution to a particular problem or not.
- If there occurs any malfunction in the AI then it can provides wrong solutions which stops us from having blind belief in AI.
- Since it is a machine it lacks common sense which cause major problems.
- Putting AI in the right hands is a boon but if it falls in wrong hands then it can cause mass destruction.

Considering all the above points, one of the most concerning problem with the development of AI is that it will soon start substituting humans in every field thus causing an increase in the rate of unemployment, which can cause depression, crime, riots. There are various fields in which the human touch is essential and there is an increasing sense of belief that machines will never be able to replace humans. The caring behaviour of nurses in hospitals is one example of a job that humans feel machines will never be able to do justice to.

III. Current Progress

Artificial Intelligence was created with one aim of imitating or even overcoming human minds. So, it is very important we doubt the fact whether it doing its work or not.

It cannot be ignored that the fact of AI is implemented all around us specifically in the fields of medicine, etc. It is being used in houses and big enterprises. Such as military bases and the NASA space station. NASA has sent out AI powered robots to planets so as to learn more about their habitat and atmosphere, with the intention of investigating if there is a possibility of humans living on these planets.

A very famous automobile brand Mercedes Benz have used expert systems to design components of their vehicles, even the subway systems in Washington, D.C implements these systems causing the subway trains to stop within 3 inches of the right spot on the platform. These trains have motormen predominantly to reassure passengers. AI has been categorized into various applications in these fields and has become too common to be referred to as Artificial Intelligence anymore. There are some blind supporters of AI who still refer to the chess game which was played by an AI powered machine with Kasparov a professional chess player. In this game the machine defeated Kasparov as the operators reprogrammed the machine after every round based on the moves Kasparov played. So it was never a fair fight as the machine was loaded with pattern of Kasparov games as they analysed his previous games.

New technologies like the XBOX 360's Kinect and apple's Siri are an example of AI but we all are aware with the fact that these technologies are way behind from being perfect. Since, there has not been much of a development for AI in past few decades, it has not reached at a level where it can be confidently stated that AI can completely replace the human mind. All this being said, research on a large-scale id being carried out regarding the human brain. There are two main project which are trying to stimulate human brain, the Cortex which is carried out by Artificial Intelligence Inc and Swiss' government IBM sponsored Blue Brain.

IV. Applications

Artificial Intelligence has application in almost all human activities if it is used in the form of neural network and expert systems. What makes Artificial Intelligence a cutting-edge technology is a combination of high precision and low computation time. The humans are being side-lined superiorly by Robot ESS which is already being used in workshop level jobs in large industries. AI is even being implemented in stock brokerage firms to analyse data, to buy or sell stocks without interference of humans.

A. Gaming Industry

AI is mostly being used in the gaming industry by chess. These machines may not be as intelligent as humans but they use brute force to make their moves they check 100's of position before they make each move. As mentioned above Microsoft XBOX 360's Kinect uses it for body motion. But all of this is still at their initial stage and require a lot more attention to used daily.

B. Heavy Industries

There are various job which have proved to be dangerous for humans so heavy industries makes use of AI. These machines can carry out intense working as they do not need break, thus overpowering the inborn advantage of tiredness in humans.

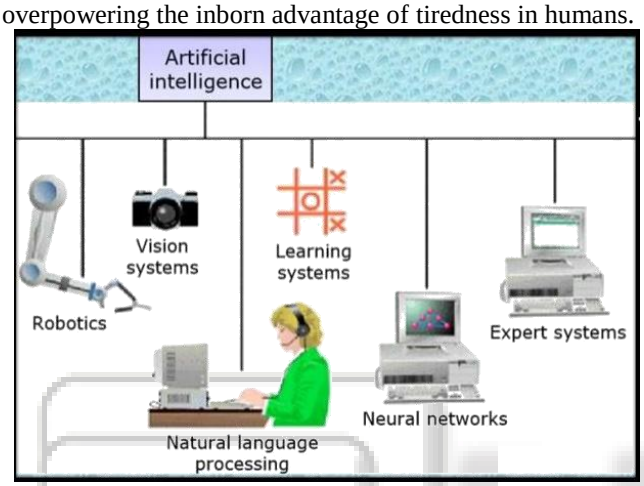

Fig. 4: AI Applications

C. Weather Forecasting

Weather conditions can be predicted using the neural networks nowadays. The past data is supplied to the neural networks which then analyses the data and successfully predicts the future weather conditions.

D. Expert Systems

The systems which can achieve total expertise in particular fields are termed as Expert Systems. These systems are developed to work in niches areas. Expert systems mainly use analysis to solve these problems by filtering the solutions to yes-no questions. An expert system is made up of 3 parts-

- Base of knowledge- It is a base of knowledge, rules and relationships of all kinds of data.
- Interpretation engine- It interprets with knowledge from knowledge base and runs the analysis and provides the instruction human brain would produce.
- Rule- It links the given solution to the final answer and it is a conditional statement.

E. Data Mining or Knowledge Extraction

Data mining is growing very fast. It comes under a process called KDD which includes databases of knowledge. This process performs operations on data like data cleaning, pre-processing data. It deals with the algorithms to detect patterns hidden and relationships which are unsuspected between large data set elements. AI is a much broader area than machine learning. AI deals with knowledge representation. Knowledge representation, knowledge acquisition, and inference including search and control, are three fundamental techniques in AI

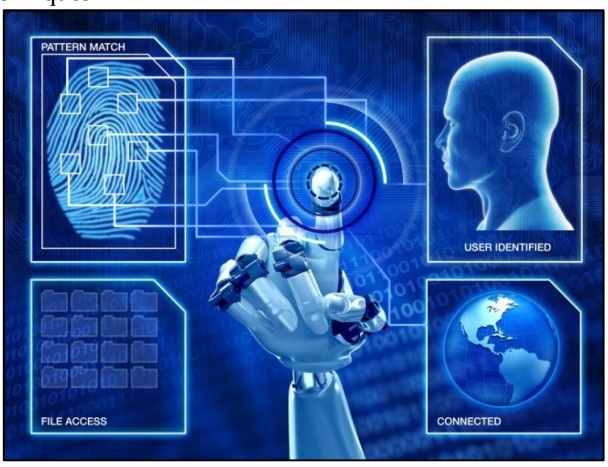

Fig. 5: Pattern Matching AI Applications

F. Knowledge Representation

Large volume of data is used by data mining to discover interesting patterns. Patterns like this opt to take vivid forms, such as association rules, classification rules, and decision trees, and therefore, knowledge representation becomes an issue of interest in data mining.

V. FUTURE ASPECTS

Using artificial intelligence will help in the production of machines and computers, which will become much more advanced than what we have today. Systems for speech recognition will progress and achieve a new level of success and will be able to communicate with humans, using text messages and voice, in formless English. There will be a great future some day for expert system applications in all aspects of health care, in both clinical and administrative areas, in improving patient care and allocating financial, social, and other resources. When it comes to the question of Artificial Intelligence creating machines, which are more intelligent than human beings, no one seems to have the answer. Also, even if it is possible, the amount of time it will take cannot be predicted. It is also expected to have human brain features like learning from experience, cognition and perception. Whether human consciousness will be incorporated in these machines is still not known. Robots in the future will be able to do everybody's work and will be faster and more efficient as compared to human beings in doing it. If one is ill, they can hire a robot nurse that will provide them with medicines at proper intervals. Thus, it can be safely said that Artificial Intelligence is still in its embryonic stage and its future depends only and only upon the scientists solving the mystery of the human brain. Till that is done, no one can make a conclusion of whether our future will be affected positively or negatively by Artificial Intelligence.

VI. CONCLUSION

The computing world has a lot to gain or benefits from various AI approaches. Their ability to learn by example makes them very flexible and powerful. Furthermore, there is no need to devise an algorithm in order to perform a specific task i.e. there is no need to understand the internal

mechanisms of that task. They are also very well suited for real time systems because of their fast response and computational times which are due to their parallel architecture. The goal of artificial intelligence is to create computers whose intelligence equals or surpasses humans. Achieving this goal is the famous "AI problem from last decade researchers are trying to close the gap between human intelligence and artificial intelligence.

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