

A Review Paper on Artificial Intelligence and Machine Learning

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Abstract: Long time ago, all kind of work was done only by the humans. There were no such machines and technologies like today. At that time, science was not developed and technologies were not invented. So the working was totally dependent on the people and humans. New superiorly advanced technologies are not less than blessing of god. Adaptive inventions for reducing the human work and bright future were invented which is simply called as Artificial Intelligence and Machine learning. Even though there were many false assumptions at the early beginning, but it is a new era of errorless technology and superior science. One of the directions of development of artificial intelligence systems was machine learning; giving the computer the ability to self-improvement in the process of performing a certain function. This review paper involves the general concepts of artificial intelligence and machine learning. Many new scientific articles in the field of artificial intelligence and expert systems have been published.

Keywords: AI, Digitalization, humanoids, supervised learning, unsupervised learning.

INTRODUCTION

Artificial intelligence (AI)[1] and machine learning (ML)[2] are transforming multiple sectors of the economy and impacting several aspects of our daily lives. Workplaces such as finance, healthcare, retail, education, and technology are leveraging AI to automate tasks, reduce costs, and make data driven decisions. In our homes, AI is powering television and movie recommendations, personal digital assistants, security cameras and home automation. As AI continues to permeate our world, it is becoming more and more critical to validate that these types of systems are functional, safe, secure, available and resilient. In other words, AI needs testing. Industries everywhere are being disrupted by the application of AI and ML and the testing industry is no exception. Testing involves evaluating a product by learning from it through experimentation, which includes studying, questioning and modeling. However, the current state of the art in automated testing still requires manual effort. Researchers and practitioners are recognizing the potential for AI and ML to bridge

the gap between human-present and machine-driven testing capabilities. As a result, several companies are attempting to develop AI-powered automated testing tools and these tools are generating what some consider being a much needed industry buzz in testing innovation. Hence, it seems that just like AI needs testing, testing needs AI. Artificial Intelligence for Software Testing (AIST) is an emerging field aimed at developing AI tools to test software, devising methods to test AI systems and designing software that is capable of self-testing or self-healing.

ARTIFICIAL INTELLIGENCE

Artificial intelligence is an intellect that is much smarter than the best human brain in practically every field, including computer science and linguistic logic. It is a modern method of machines which will do muscle work and illustrate complex questions in an “intellectual” manner. It is concerned with the basic and most important aspects in our life i.e. philosophy, computer science, mathematics, linguistics, biology, neuron science, sociology etc. AI plays a very

important role to exhibit intelligent behavior, to learn, demonstrate and give advice to the user. Fig.1 shows the various sectors in AI.

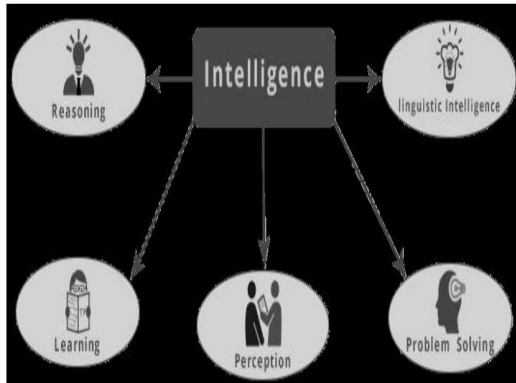


Fig.1: Sectors in AI

Artificial intelligence has 2 types:

1. Weak AI
2. Strong AI[3]

Weak AI:

The principle of Weak AI is that the machines behave as if they are intelligent. Weak AI proves that virtual abilities like thinking, talking, moving can be done by machine if they are programmed in that manner. For example, in the chess game, the computer can play and move players automatically. The computer does not have thinking ability but in actual it is programmed so that the computer always takes right step.

Strong AI:

The principle of Strong AI is that the machines will do calculations and think it and will predict the answer in future. E.g. the artificial intellectual supercomputer WATSON invented by IBM. Thus in future, there will be definitely such machines or may be humanoids which will do own work and think more powerful than human beings.

MACHINE LEARNING

Machine learning is a current application of AI which promotes the reality just to be able to give machines the access to data for more ease in human work and just to learn them for themselves. Learning is a key hallmark of artificial intelligence. It is an ability of the machines to take real time data and feedback to improve performance over a time. Machine learning[4] is type of artificial intelligence which has ability to learn and takes the data to get good output. Both the terms, artificial intelligence and machine learning combined together very frequently when the concepts like big data, data science and analysis comes in mind. Machine learning is very efficient solution to handle such a big data in multinational industries. They actually work like a super-computer. These machines are generally known as “Humanoids”[5] are very perfect at their work. These robots or machines can talk, answer complex questions and perform multiple jobs at a time. Fig.2 shows the machine learning mechanism

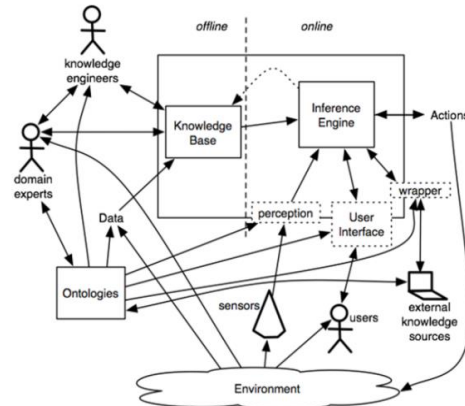


Fig.2: Diagram Representing Machine Learning Mechanism

The diagram explains that machine learning does not only depend on how the knowledge engineer performs on training bases but also how he works for new experiments. Machine learning is one of the most important technical approaches to AI and the basis of many recent advances and commercial applications of AI. Modern machine learning is a statistical process that helps to define the output and future use of data. There are following types of learning:

1. Supervised learning[6]
2. Unsupervised/predictive learning[7]
3. Reinforcement learning[8]

Supervised learning:

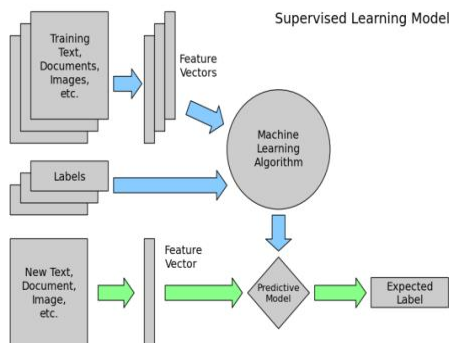


Fig. 3: Supervised learning model

In this process, the researchers tell the machine what the correct answer is for a particular input. It is most common technique for training neural networks and other machine learning architectures. It involves learning a mapping from a set of inputs to a target variable. The target is discrete and real value. It is solved by decision trees, naive Bayes, boosting and multi-layer neural networks. Fig.3 shows the supervised learning model.

Unsupervised/predictive learning: Fig.4 shows the unsupervised learning model.

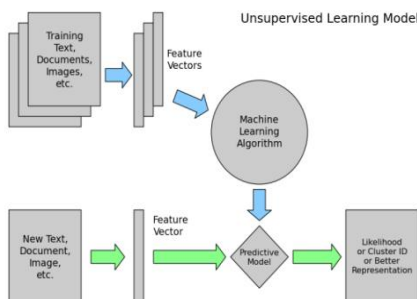


Fig.4: Unsupervised Learning Model

Reinforcement learning:

In this algorithm, the AI decides how to behave in order to get most of the work done. A computer program interacts with dynamic environment in which it must perform a certain task to win against opponent. The program gives feedback in terms of punishment or reward. The machine itself selects actions to be performed for better output.

APPLICATIONS OF AI AND MACHINE LEARNING

AI is most useful topic in human life. There are many day-to-day examples of AI. There is Siri by Apple, Watson by IBM[9] and Cortana by Windows Mobile for various operating systems which are intelligent digital personal assistants which have speech and gesture recognition systems which help the user to find and sort out all the needed things without any physical appearance. Many future and current researches are going on by scientists on humanoids i.e. robotics along with human behavior and feelings. There are also high performance cars along with automatic drivers' assists, missiles with radar, satellites and navigation systems. Google self-driving car is described in Figure 5.



Fig. 5: Google Self-Driving Car

The self-driving car called Waymo which is a Google initiative drives on the road without a driver. Again NASA and Google are together for the first ever humanoid astronaut which is an absolute example of artificial intelligence.

CONCLUSION

The entire world is on the way of digitalization and for that purpose the artificial intelligence and

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machine learning concepts plays an important role. The research paper is totally based upon, how the intelligence and new machine technologies get invented in our day to day life. Today's machines are ready to give the knowledge based education and are responsible for improving the intelligence. In future, we cannot think and imagine about the progress of world without Artificial Intelligence[10] and Innovative Machines. We can't imagine about what happening in surrounding and in all over world because of scientists and engineers. Scientist developed the Robots who are working like a Human Being and also the research is going on to create the best world in future. Young generation support is one of the most important parameter to develop the new technologies. Combination of Science and Engineering and the quality machine learning will surely take the world at its highest fit.

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