How will Artificial Intelligence change the world?

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Abstract—
In this paper I will give an in-depth analysis of A.I (Artificial Intelligence). I will go in to detail the many ways that this new, emerging technology can have serious repercussions on our world as we know it today, but also the ways that it can have a very positive affect on our world in the future. A.I is quickly becoming one of the most talked about and popular technology out there with many big tech companies investing heavily in it as they see a future where A.I will be hugely involved. We live in a world where A.I is surrounding us even in places where we aren't even aware.

Keywords— **Machine Learning, Neural Network, Robotics**

I. INTRODUCTION

A.I is the study and creation of machines that would require human intelligence in order to be operational. The main aim of A.I is to produce machines that are capable of making decisions that a human is also capable of. These machines should be able to solve problems, make decisions, hold the same intelligence as a human and learn on its own in initiative. [6]

Even though A.I has been around for centuries and has been seen in mythological discoveries it has only become popular in the last decade due to increased research and development. Everyones interpretation of A.I is that of a Terminator like robot that will one day become smarter than humans and will be able to control the world and humans could seize to exist. Although this "could" be a possible outcome it most likely would never happen.

[7]A.I is a very broad area of computer science which is commonly broken into 3 main types: Machine Learning, Neural Networks and Deep Learning. A.I uses algorithms in order to process an operation, an algorithm is a set of unambiguous instructions that a computer is able to execute or to perform an operation.

II. HISTORY OF A.I

The idea of A.I hasn't just been a new technology thought about in the last few years or decades, this has been an idea that has been around for centuries dating all the way back to the ancient Greeks where there has been prove that they had myths about robots, also Chinese and Egyptian engineers developed automatons. The field of A.I itself wasn't initially founded until 1956 at a conference in Dartmouth College in New Hampshire where the term 'Artificial Intelligence was first mentioned. Many scientists who attended the conference were optimistic about the future of A.I including MIT cognitive scientist Marvin Minsky who is quoted to have said [1]Within a generation the problem of creating Artificial Intelligence will substantially be solved, from the book AI: The Tumultuous Search for Artificial Intelligence (Basic Books, 1994). Moving forward from this foundation of 1956, achieving artificial intelligence was not as easy as first thought. After many reports of poor progress in development in A.I, all government funding and any popular interest in the field was dropped from 1974-1980, also known as the A.I winter. Later on in the 1980s the field was refunded by the British government in order to compete with the Japanese efforts to research A.I. Once again a second A.I winter occurred from 1987 to 1993. This fall occurred as a reduced amount of government funding and also coinciding with collapse of the early general-purpose computers. It wasnt until 1997 when research picked up again when IBMs Deep Blue became the first computer to win a game of chess by beating chess champion Russian grandmaster Garry Kasparov. In the 1950s a computer scientist and Mathematician by the name of Alan Turing developed a competition to assess whether a machine is intelligent enough as a human. In 2018 the talking computer chatbot was able to trick judges into believing that it was a real skin-and-blood human during this Turing test. However this achievement has been dismissed by many A.I experts as they believe that only a third of the judges were fooled by the chatbot and always claiming that it also was able to dodge many questions that a human would not be able to. In 2011, on an exhibition game of jeopardy, a quiz show, IBMs question answering system, Watson, managed to defeat the two greatest Jeopardy champions, Brad Rutler and Ken Jennings, by a huge margin. Adding to this, in 2016, AlphaGo won four out of five games of Go, [2]an abstract strategy board game with the aim to surround more territory than your opponent. AlphaGo managed to beat Go champion Lee Sedol becoming the first computer to play the game to beat a professional Go player. In 2017, world number one Go player for two years running Ke Jie lost a three-game match against AlphaGo. These winnings saw the completion of a significant milestone in A.I development as Go is a very complex game, much more complex than chess.

III. TYPES OF A.I

A.I is a very broad concept to deal with it so it can be divided up into different types in order to gain a better understanding of the area of A.I. [3]Although there are various types of A.I to discuss I have decided to talk about the three most important types, Machine Learning, Neural Networks and Deep Learning. Other types of A.I would

include Weak AI, Strong AI and Artificial Super-intelligence which simply categorize the different strength levels of A.I used, the more power required for the operation would be decided by choosing one of these types.

A. Machine Learning

Machine Learning can be described in the same way as A.I but the main difference between the two is that A.I is the broad science of copying human abilities, whereas machine learning is a subset of A.I that is able to teach a machine to be able to learn. [4] Machine learning is born from the theory that machines could learn without having to be manually programmed to perform a task and a pattern recognition system. In recent years machine learning has moved on to making a computer learn from data it can identify and when being exposed to this new data being able to adapt to it independently. A few examples of the huge developments in machine learning would the self-driving Google car, online pop-up recommendations for apps or stores and being able to see what is being said online about a certain topic or about a certain store you are looking at. The biggest change in making machine learning become so popular in recent times is the availability of affordable data storage to process the more powerful computers required to process the data. These improvements have made it so much easier to produce large scale models at a much faster, accurate and making complex data much simpler to deal with than the past. In order to create a good machine learning model you must have a proper algorithm written, make it scalable and it needs an automation process. Machine learning is becoming vastly used across all industries, some examples include:

- Financial Services - Here a bank would use machine learning in order to process the large chunk of data they would be dealing with on a daily basis and also be able to keep track of any fraudulent activity as a security platform.
- Government - Countries would use this technology in order to identify ways in which they would be able save money and also it would be an efficient way to analyze all the data spread out between all the areas of the state.
- Transportation - This area would use machine learning in order to track patterns such as when is transport most popular during the day and when is it not so they know where they can save money by not having as much transport on the road at certain times during the day.
- Health care - New devices are being made readily available that have the capability to track a persons heart rate, track steps and sleeping trends. Even these small devices are being used at a bigger scale in our hospitals making work easier on doctors and also improving our own health care system.

B. Neural Network

This is the area of machine learning intended to replicate the way the human brain learns. The network is designed to have both an input and an output layer, it also has a hidden layer where units can transform input layers into something the output layer is able to understand. These layers are best used for sorting and finding patterns that are too complicated for a programmer to teach to a machine. [5] These networks have been around since the 1940s but have only become widely used in the last few decades. To simplify how neural networks work we can use the example of a factory production line where you begin with your raw materials (Input layer), it is then sent down the line to the hidden layer where it is developed and analysed. It will then be pushed on to another hidden layer where more testing will take place in order to identify the next parts of the data (E.G, if an image was used here the second hidden layer would be able to test that the image would have an edges or shapes). The process will continue like this for a few more layers until all components of an image for example are recognised by the system and then it is passed out to the output layer for used by humans. Inside neural networks there are also some different types:

1) Feedforward neural network This is the most basic type of neural networks where the information can only travel in which direction from the input layer to the output layer.
2) Recurrent neural network This is the most commonly used type of neural network where the data can travel in multiple directions unlike the feedforward method. This type has greater capabilities of learning on its own and is most commonly used for the more complex jobs for example language recognition or identifying handwriting.

These are only two examples of a variety of methods. Some other would include Convolutional neural networks, Boltzmann machine networks, Hopfield networks are just to name a few. Choosing which type of network to use is dependent on the type of task you are working on and the volume of data being used. Sometimes it can be a good idea to use more than just one network to complete a task. Neural networks are capable of being used in a wide variety of tasks from autonomous cars to detecting fraud and being used in most CGI platforms to being used on automated household devices such as lights and sprinklers for example. The neural network learns from the data it receives so the more data being given to the network the more accurate and precise it will be. The data when being tested is used split into 3 categories, an initial training stage, the next stage involves fine-tuning the data in the proper order of use and finally the main test of seeing does the input layer interact with the output layer. Although neural networks seems to be a great method used in A.I it also has its problems. The biggest problem is that it is a black box which means the data has to be spoon fed to the networks in order to get an answer. It also can be a very slow method and can use up a lot of computer power to run the more complexity of the task. These issues are currently being worked on by developers and researches and new ways of improving these problems should be in place sometime soon.

C. Deep Learning

Deep Learning is essentially a higher class of Neural Networks with a deeper meaning of learning to it. It is another method of A.I in which it requires a computer to learn on its own instinct but to a higher regard. It is the main method used in using voice recognition or control used in most phone or tablet devices today or even in driver-less cars when speaking to a sat-nav or even when it comes to recognising a sign on the road or where other vehicles and pedestrians are along the road. On some occasions this method has proven to show signs of intelligence much stronger than humans. Similarly, like neural networks it uses big data sets in order to teach a computer to learn and uses the layers method that we saw in Neural networks (Input/output). Deep learning was first talked about during the 1980s but has recently but brought into practice because it needs large amounts or labelled data for big projects. It also needs a highly powered computer to perform tasks, this is needed to reduce the time required to train a machine and makes the outcomes more efficient. Deep learning is being used in a variety of products and industries, a few examples include:

- Automated driving: Deep learning is being used here to detect objects while driving such as signs, lights, pedestrians.
- Medical research: Like where machine learning is used in health-care systems around the world, deep learning has been introduced to medical research to try and detect any disease or sickness systems in people automatically without requiring numerous tests.
- Electronics: For example, the use of amazon echo in homes that can respond to the users voice when asked a certain question
- Industrial automation: In industries nowadays, robotics is being implemented constantly. It also improves the health and safety of operators and employees as these robotic machines can detect when an object or person is nearby and is able to stop a procedure automatically if it senses danger.

As stated earlier deep learning is a more sophisticated type of neural networks, the deep part meaning it goes into more depth than neural networks as in neural networking there are usually only two to three hidden layers whereas in deep learning there can be over one hundred hidden layers between input and output. The biggest issue with deep learning is the vast amount of data it requires to complete a task. This is mainly down to the fact of how accurate and precise deep learning is when it comes to training a machine to learn. Also, if there isnt enough data readily available the processing speed will be severely slow even with a high-powered computer and a heavy-duty GPU. This will in turn make a deep learning machine difficult to train especially with the vast volume of hidden layers in its system in addition with the big data quantity. The techniques used in deep learning are the same as those used in neural networks where we used Convolutional Neural Networks (CNNs), Recurrent neural networks and feedforward neural network are to name a few.

IV. USING THE TEMPLATE

A. Headings, etc

V. CONCLUSION

APPENDIX

Appendixes should appear before the acknowledgment.

REFERENCES

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