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Artificial Intelligence and its Applications: Current Trends and Challenges

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Abstract:- Artificial Intelligence (AI) allows computers to learn from experience, adapt to new inputs and perform tasks of a human nature. The evolution in AI has enhanced the development of human society in our era, with extraordinary revolutions molded by both speculations and techniques. However, the various intricacies and emerging complexities of AI systems makes understanding it a challenging task. This paper reviews AI in a general sense by highlighting the benefits in a variety of applications as well as the growing challenges facing artificial intelligence and what to expect in the future with AI at the center.

Keywords:- *Artificial Intelligence, Human, Evolution.*

I. INTRODUCTION

Artificial Intelligence is an approach to developing a machine, a robot, or a device that can perform rational tasks as we can do, make decisions under uncertainty and connect in a natural language. AI is an analysis of how the human brain, when it tries to solve problems, thinks, learns and function. Artificial intelligence field contains systems that behave in a way deemed intelligent if a human would act accordingly[1]. As at the 1980's, AI researchers began to understand that creating artificial intelligence was a lot more complex than they thought. Given this, they realized the way forward in consciousness was for them to concentrate on creating individual units based on different aspects of the human brain, such as a planning unit, a memory unit and so on, which could later be merged together to create intelligence[2].

AI has expanded considerably and became more established in the 21st Century. In this age of interdisciplinary science, computer science, cybernetics, automation, mathematical logic, and linguistics, questions have been raised up about the specific concept of AI [3].

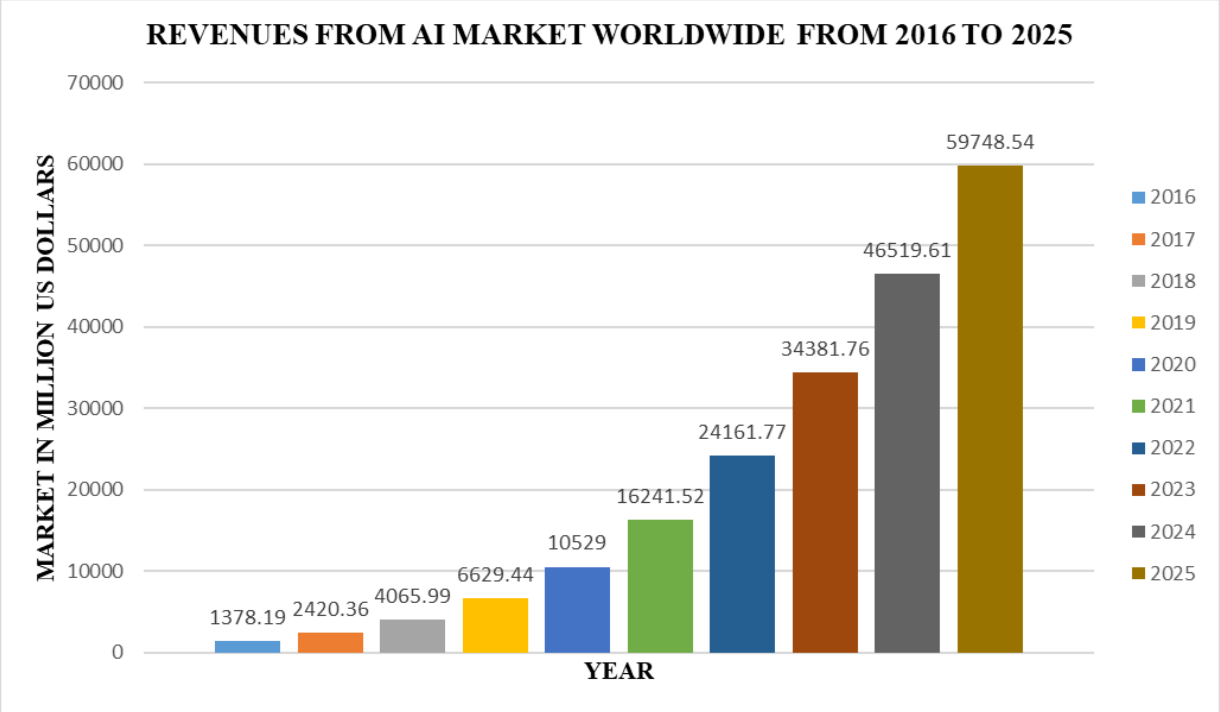

Fig 1:- Global revenues from AI market. (Source: Existek)

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Due to the quickened improvement of AI observed over the past decade, there is collective agreement that the field is set to have a substantial influence on civilization as a whole. There have been remarkable amounts spent in the growth of AI by government, and other sponsors. After seeing the effect and prospects AI extends, capital is pouring into its expansion and based on the chart in figure 1, it can be observed that there has been a steady increase in the past five years in the revenues from AI market worldwide. Granted that most of what has been attained by mankind is a result of human intelligence, it is obvious that the likelihood of augmenting intellectual capabilities with has enormous potential for developed decision intelligence in high-impact fields such as health, government, etc[4].

AI intends to broaden the capability and efficiency of humans in missions of reshaping nature and running the society using intelligent machines, with the final aim of achieving a society where people and machines co-occur amicably together[3].

Artificial Intelligence (AI) is a cutting-edge technology that rapidly transforms our society, economy and jobs. Social networks, self-driving cars, voice assistants, internet search engines, robot stock traders, etc. are some common examples of AI applications. Such systems may be installed in physical devices or operate in digital space as stand-alone software agents. The aim of AI is to advance computer functions which are associated to human intelligence, for example, reasoning, learning, problem solving, perception and linguistic intelligence. There are certain features that distinguish people from machines such as taste, smell, hearing, thought, vision, speech, and feeling. Currently, Data Scientists and Machine Learning Engineers are working hard to reinvent a machine's sense of thought, hearing, voice and vision.

According to John McCarthy, the progenitor of Artificial Intelligence, AI is “The science and engineering of making intelligent machines, especially intelligent computer programs”. The term’s adoption (AI) precisely indicates that we see ourselves as establishing in machines an intelligence roughly comparable to natural intelligence[5]. In recent years, artificial intelligence technology has been considerably advanced such that the new generation of AI technology is represented by big data AI, cross-media AI, and human-computer hybrid enhanced AI [2].

Artificial intelligence is important in various ways. Some include:

- Computerization of repetitive learning and discovery via data.
- Addition of intelligence, that is, rather than existing as a single product, it is integrated into already existing products like Siri was integrated into apple products.
- Achieving incredible accuracy through deep neural networks
- Adaptation through progressive learning algorithms

Significant Advances have taken place due to AI technologies and in coming decades, these technologies will transform almost every branch of human life, from agriculture and industry to finance and transport and radically change the nature of work[6].

The work in AI began after the World War 2; consequently, it is a new domain beside other spheres of science, an area that can be developed by the researches and according to recent researches, AI is being interfaced in next generation communication system as a result of the need to make a unified platform for multiple targets of optimization. There is need for the system to be smart, self-aware, self-adaptive and must be able to run the network services economically and manage and operate the networks autonomously[1][7].

Artificial intelligence and big data are becoming more predominant in society with applications such as tourism, education, behavioral modelling, and crisis management but there are issues around cybersecurity, ethics, human behavior, moral codes and the need for unceasing education of the populace[8].

II. BENEFITS OF AI

The advancement of AI over the years have bloomed in many fields like medicine, defense, etc and we are going to be considering a few of the benefits involved.

A medical decision-making structure can be a huge benefit of some advantages of technology: it is not disturbed by causes that are peculiar to human beings (anxiety, tension, fatigue, inattention), it is faster, more efficient, repeatable and can quickly store massive amounts of data while being able to make complex links between them[1]. People want maximum quality health care and this requires that doctors should have comprehensive medical knowledge. But due to various drawbacks such as the low retention efficiency human memory, they are incapable of gathering all the necessary information[9]. These systems can generate significant data that end up being very beneficial for the physicians.

Fashion and apparel industry(F&A) is one of the major waste producers worldwide because of challenges like overproduction and product returns. The main reason behind this is the customer's discontent with the products offered in terms of size, color, and style. F&A industry had to adopt sustainable production habits to lessen waste production and management. The best way of achieving this was by taking advantage of AI techniques for creating a sustainable digital supply chain. In the past decade, the F&A industry has exploited AI to a certain degree for refining supply chain processes like apparel manufacture, fabric assessment and distribution. This was very important as the F&A industry is unpredictable and it is always inspiring to quickly respond to change in trends and unceasingly evolving consumer's demands[10].

Finally, the introduction of advanced AI provides a new structure to develop the efficiency and precision of power grid simulation analysis. It also helps in solving problems such as analysis and numerical modification of simulation data of a large-scale power grid with high dimension, sparse and complex space-time correlation[11].

AI techniques were pertinent to deciphering the human interface problem of home automation products and unraveling the fundamental problem in the user interface of home automation systems was one of the greatest applications for AI[12].

III. CHALLENGES FACING AI

Due to the overwhelming and unpredictable self-development nature of AI, it makes it difficult to decipher the algorithmic ambiguity. According to [5], the industrial society take advantage of spatial intelligence and focuses on the production by workers using their "bodily-kinesthetic" intelligence and that the implementation of digitally controlled machinery weakened the role of human workers.

Despite the power and speed features that exceed the human ability to perform calculation, the technology is far away from the human judgment. For this reason, humans are still the best standard for the intelligent systems.

The advantages provided by AI systems are evident. Even though they can make things easier for the physicians by saving time and energy so they can concentrate on more significant activities, an AI system can discover things that are hardly perceived as the outcome of complicated computation and reasoning[1].

The knowledge chain in health have life-threatening faults at several points and professionals are making judgements based on most favorable knowledge and adding their instinct and in these situations, the implementation of AI, without combining with human perception, will lead to unpredictable results[13].

AI is based on complicated programming, and this means there is a high possibility of errors in codes. Assuming it was achievable to develop a completely reliable software, there are still moral predicaments that developers need to consider when designing. Take for instance, a self-driving vehicle could choose to run over an animal in order to prevent an accident that could injure its occupants.

Introducing advanced AI systems to establishments to make production more efficient will lead to need for less human workers and thus cause more unemployment. These moral predicaments are steering many AI experts to signify the need to control its growth.

IV. THE FUTURE SCOPE OF AI

In this new decade, there is increased usage of intelligent applications to help our day to day activities. Applications such as Siri, google assistant, Alexa, Cortana, etc serve as companions with human-like abilities. They can carry out tasks such as setting reminders, playing songs, even telling jokes among the numerous purposes. The results that are currently been witnessed, due to efforts that were focused on building AI, have been impressive particularly over the last decade, and this success is as a result of the availability of vast amounts of data and access to high-level computational means to evaluate it.

Self-driving (Autonomous) vehicles are in vogue and when examining them, the first thing that crosses one's mind is a compound combination of sensors, transducers, actuators, complex algorithms, and high performance computer systems[14]. These technologies are implemented to enable the car know basic things like the traffic lights, when to drive fast or when to move slowly, and so on.

According to [14], DARPA (Defense advanced research projects agency) was the first group to explore the idea and major advancements have been experienced since 2010. Since then, Self-driving -enabling technology has developed considerably in a variety of domains, including on-road (passenger-carrying) vehicles, etc. In some areas, these vehicles form a commercially significant part of the establishments that run them[15].

For AI to function effectively, it needs data, lots of data. Every piece of data generated has to analyzed closely to recognize behavioral patterns and a response could be generated based on this patterns. When humans interact, our brains store information about voice, expressions, appearance, etc. This is where data science comes in. There are other sub fields of AI including machine learning, deep learning, natural language processing, robotics, neural networks and fuzzy logic and so much more.

Considering all information on ground, one cannot exactly predict the future of Artificial Intelligence, therefore, as suggested by [16], a thorough study needs to be carried out to fully grasp the future effects of every technology employed on AI.

V. CONCLUSION

Artificial intelligence has gone from being a new discipline that had no name during the meeting that birthed the idea in June of 1956 on the campus of Dartmouth College. It is now the key that will unlock significant groundbreaking developments by surprising the world with new ideas that will enable us live a better and easier life and it will continue to improve. This paper has attempted to give a brief description of what AI is about, its workings, the benefits of AI in the world as it is today, the challenges facing AI and what to expect from AI in the future. The AI-enabled future could be bright, providing we use the technology for our benefit with thoughtfulness and care.

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