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A REVIEW ON ARTIFICIAL INTELLIGENCE TECHNOLOGIES

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ABSTRACT

Over the last 50 years Artificial Intelligence (AI) has been an active topic and has seen many breakthrough technologies. This paper reviews Artificial Intelligence technologies and achievements in different sectors such as medical, automation, security etc. This includes how AI is used in Big Data challenges also how IBM Watson and other such tech is used to help us in different sectors. This paper includes a organized information about Artificial Intelligence and how it is affecting our life. Our aims in this introduction are, firstly, to place these contributions in the context of the foundations of AI and its importance. It also considers the different parts of Artificial Intelligence such as Machine Learning, Deep Learning, Argumentation and how all of these technologies are working together to change our future.

KEYWORDS: Artificial Intelligence, Deep Learning, Machine Learning, Humanoid, Automation, Cognitive Computing.

INTRODUCTION

Over the last fifty years' artificial intelligence (AI)has been an active field [9]. Research on artificial intelligence in the last two decades has greatly improved performance of both manufacturing and service systems [6]. The intended purpose of this review is to introduce non-AI specialists to the reality and potential of applied artificial intelligence [1]. Engineering application of Artificial Intelligence have seen many breakthroughs in many sectors. [1, 5] Such as Automation of driving [3, 7, 9, 13, 21, 23], In medical sectors [10, 14, 17, 19], In Security [4, 20, 24, 25] etc. Road vehicle guidance based on video-signal processing has been picked up independently [3, 7]. Removing the human driver from the control loop through the use of autonomous vehicles integrated with an intelligent road infrastructure can be considered as the ultimate, long-term goal of the set of systems and technologies grouped under the name of Intelligent Transportation Systems (ITS) [3, 7]. Autonomous driving is already a reality. Fuzzy control has been proven effective in problems containing almost all of automation difficulties. Fuzzy is robust, adaptable, high-performing, computationally efficient, and provides an excellent framework to synthesize formal models for the purposes of verification and validation [13, 23].

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Artificial intelligence techniques to propose a new detection approach capable of dealing with the poor quality of PMMWIs using technique such as image enhancement file extraction etc. [21]. Artificial Intelligence has many importance in variety of medical cases such as Cancer. [10] Information overload in the health sector is becoming an increasing problem for clinicians , The contents of electronic health record (EHR) systems are largely composed of clinical notes (or clinical narratives) in the form of unstructured and unclassified text. [17, 19] Also a patient-oriented model is being considered, where patients are being equipped with knowledge and technologies to play a more active role in his/her health monitoring. [19]As Internet is trying to connect everyone, people share a lot of their data to website hence, security of this servers has become a major concern, and conventional methods are not enough to identify threats, and detect the threats. [4, 20, 24]. Also in human security like traffic control etc. can be done by AI, a traditional security system is based on active radar sensors used for surveillance and monitoring which can be improved with the use of AI [20].Biometric securities can be amplified with AI, face unlock uses AI to improve its accuracy over time using deep learning methods [24, 25]. Humanoids are also an important step for AI [15], also in the era of big data machine learning and, AI is used to solve huge problems machine learning, deep learning argumentation are important for that [1, 2, 5, 9, 26].

LITERATURE SURVEY

Artificial intelligence consists of natural language processing. The Digital Equipment Corporation (DEC) provide an overview of Excalibur. This is DEC's interface to XSEL and R1, the expert system that configured VAX computers. A very large database management problem can be solved with the help of AI.

Also, it is used in intelligent motion control, computer vision and autonomous mobile devices. Industrial robots and their applications like loading and unloading machine tools, handling in manual fracturing process, welding, spray-painting, assembly, machining and inspection are gifts of Airboats equipped with sensors are intelligent robot made by computer-aided design (CAD), computer-aided manufacturing (CAM) are also a part of AI [1].

Artificial intelligence along with making decisions, also can create new ideas, hence giving machines a way to think and react to situations more psychologically than mere mathematically. Broadly there are three types of creativity possible. Firstly, the combinational creativity, that deals with analogy and critical thinking which includes poetic imagery, secondly comes the 'exploratory' type creativity, that deals with generation of new ideas by exploring from pre-existing ideas, conceptually, and thirdly comes the transformational type creativity which works in combination with the exploratory type creativity, transforms those ideas of exploratory creativity into a whole new dimension in space. These forms of creativity found its way in several fields in the world like the architectural designs, VLSI designs and genetic mapping. The best examples of AI-creativity are AARON and BACON [2]. Artificially intelligent cars have become widely popular in the recent years. The new domain added to the functioning of artificially intelligent vehicles, both road and air, is the 4D-approach. The 4D-approach involves prediction error feedback for estimation of an object in 3D space time simultaneously in a closed loop. It makes use of recursive estimation applied to vision with the help of comparison between observation and Kalman filter realization. The 4D-approach helps in detection of objects by collection of features which are not assigned to any object. It also helps in tracking objects and estimate its state [3]. Cyber security has become a prime importance of everyone’s life. Since all our data are stored digitally, it is mandatory to keep it safe from wrong hands. The Artificial

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Intelligence is playing a huge role by eliminating the chances of being getting into wrong hands. The machine learning techniques tackle such unwanted properties and learn new techniques and keep the threats away [4]. Argumentation model refers to the computer's capability to produce argumentative statements in result of the inputs thrown in form of arguments. Machines deal the argumentation mathematically and logically using the techniques of Artificial Intelligence, logical reasoning, and mathematical proofs [5]. A very useful technique in the field of road safety can be done with the help of Artificial intelligence. The problems in traffic control system can be eliminated with the use of Route Guidance and Driver Information (RGDIS) techniques, which helps in improving the road traffic efficiency by providing alternative routes to drivers. Another use of Isolated and Co-ordinated traffic control can be made, which models a very small portion of the system and the techniques from control theory are employed to determine the signal cycles and hence reduce the time delay of vehicles. Several other techniques like the reservation of distance is used to avoid commotion on road [7]. The machine learning concept is being used widely used in industries due to the ability of a machine to learn both from experience and from explanation. The machines are completely accurate. They have the capability to recognize situations of a bias, and handles noisy data perfectly. There are a number of ways a machine can be made to learn [8]. The field of artificial intelligence has been discussed since years and many new methods of obtaining artificial intelligence has been done till date. Artificial embodied system, i.e. the consciousness of a machine has been introduced. Also the agent based artificial intelligence system, that deals with human emotions, depending on the four basic emotions, happy, sad, anger and fear [9]. Machine learning is used in several aspects of our daily life, from web search to online shopping. The main objective of Machine Learning is to produce a model which can be used to make predictions, estimations and classification of a similar task from formerly done task. This can be achieved by some techniques-(i)dimensionality reduction, (ii)feature extraction and (iii)feature selection. Once a classification model is obtained using one or more ML techniques, it is important to estimate the classifier's performance. The performance analysis of each proposed model is measured in terms of sensitivity, specificity, accuracy and area under the curve [10]. Deep learning was introduced due to the limitations of machine learning in tracking the raw data. Deep learning in a single word is defined as the representation learning. Representation learning is the technique in which the machine tracks raw data, that automatically allows detection or classification needed. Both Machine learning and deep learning uses another technique called the supervised learning. In this the programmers during the training feeds the machine with large amount of relevant data, or situation that the machine needs to deal with. The machine then produces output in the form of a vector of scores [11]. Machine learning is a process in which a machine learns techniques from experiences gathered. Here machine learning is subdivided into different categories. First comes the supervised learning, done by comparing computed outputs and learning from errors made in the past and thus correcting or adjusting them. Secondly is the Unsupervised learning. This is not from computed outputs, rather the machine tends to explores new ideas and uses them for solving problems and completing tasks. Third comes the reinforcement learning, which is more of a situation based learning. The machine learns from situations and applies them in similar situations where the effect of the machine solution may be high or low depending on the seriousness of the situation. Last but not the least comes the Recommender system. This is very much similar to the ratings we get to see while shopping in an E-commerce website, or reviews of a movie. Other users follow the recommendations of the former reviewers and

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choose their desired products [12].There has been many breakthroughs in fuzzy system , most important ones are Generic Fuzzy Tree methodology, which have allowed fuzzy logic base Artificial Intelligences to be able to grow and solve complex problem. There are many strengths in fuzzy system such are extreme performance, computational efficiency, robust to uncertainties and randomness, easy to design and implement [13]. Robots are expected to understand incrustations given to them by human and perform accordingly. In a Human-Robot interaction, the robot receives an instruction given in form of dialogue. The robot analyses the dialogue and converts it into its machine language, and finally does the job asked to do, In several cases the robot has to take certain decision which are absolutely dependent on the robot itself and there is no human intervention made. The ultimate function of the robot is to carry out the task given through dialogue. The architecture of a robot is dependent on three primary ideas- i.e. Beliefs, Desires and Intentions. When a task is instructed to a robot, it prepares a plan for itself in order to achieve the goal. The dialogues given by human implants desires in the robot which ultimately becomes an intention for the robot. Apart from this a robot can also use analogy of critical statements, and psychological answers are also expected [15]. Dealing with patients can be done by artificially intelligent machines. When a patient visits a hospital, the machines go through the diagnosis of the doctor and are capable of providing medicines in accordance to it. Even in the time of discharge, it summarizes all the issues of a particular patient to ensure if the patient is healthy enough to be released [17]. Artificial intelligence is now used widely in the field of medical developments. The mobile phone is used to detect the health of a person. Firstly, the health details of a person are studied using devices and the information is fed to the mobile phone. The mobile phone uses several sensors to monitor the health of the person like, the blood pressure, heart rate and other physical issues. The result is then sent to the person by the help of text messages or emails [18]. People suffering from chronic diseases increased exponentially in the last decade they need health care this situation express the need of development in health care to provide an innovative affordable and efficient solution. Health monitoring application is important now but they are not capable enough we need to implement AI with this to improve the health care system [19]. AI techniques can be used to detect small moving targets. For which neural detectors, are used to approximate the Neyman-Pearson in composite hypothesis problem. There are approaches based of generalized likelihood ratio were analyzed and that is compared with the conventional implementation of doppler filtering which is designed to filter clutter and improve signal noise ratio. [20] Wave images are used for security purposes' to locate threats. Machine learning can be use to improve the accuracy. Machine learning process is used to make certain classification in its obtained results and thus provide more security [21].The continuous-time fuzzy-model-based (FMB) control systems, with emphasis on state-feedback control techniques, received a great deal of attention in the fuzzy control community. Focusing on the stability analysis of FMB control systems, it summarizes the issues in the four fundamental and essential aspects, namely, the types of membership-function matching, types of Lyapunov functions, types of stability analysis and the techniques of stability analysis are discussed. Fuzzy Model Based control system is based on fuzzy logic. Here rather than being only true or false, logic can also be expressed as 'partially true'. [22]

RELATED TECHNOLOGIES

Artificial Intelligence have seen many groundbreaking technologies over time such as,

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Big Data, this is one of the most important technologies which is used to implement AI machine as large amount of data is needed to run a AI system this large data is known as big data their certain ways to process this data. A normal data to be considered as big data it must suffice a certain factor such as Volume, Velocity, Variety, Value etc. Volume, Quantity of stored or generated data, Velocity, In this context, the speed at which the data is generated, Variability, Inconsistency of the data set can hamper processes to handle and manage it, Veracity, The data-quality of captured data can vary greatly, affecting the accurate analysis etc.

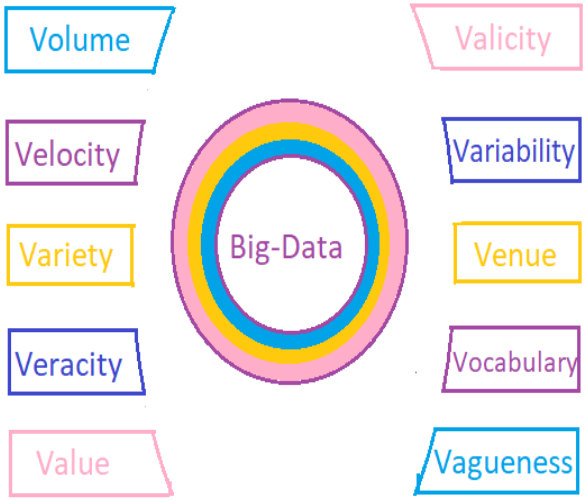

Figure 1.Big Data

NLP, Natural language platform This technology uses text analytics to understand the structure of sentences, as well as their meaning and intention, through statistical methods and machine learning. There are few type of NLP such are,

- ***Natural Language Generation***, This is a type of NLP, here we converts the provided data into text or speech to help computers work with accuracy. This helps computer to produce narratives and repots.
- ***Speech Recognition***, transcript and transformation of human language to formats that computers can use. Software that understand spoken language.
- ***NLU***, natural language understanding this helps computers extract information from written text. Also, can be called text mining or analytics system.
- ***Speech Synthesis***, this is a Text-to-speech system, capable of reading our text documents.

Machine Learning Platforms, machines can also learn. Its goal is to develop techniques that allow computers to learn.

Deep Learning Platforms, special form of machine learning involving artificial neural circuits with various abstraction layers. This is a special form of technique that helps the machines to mimic the human brain and pattern for decision making function.

IBM WATSON, is a question answering computer system capable of answering questions posed in natural language, developed in IBM's Deep project variety of company uses Watson to power their products list includes variety of products and humanoids Sofia and Pepper etc.,

- Holman, a pioneer in social robotics, develops software that enables real-world interaction between robots and humans with Watson API.

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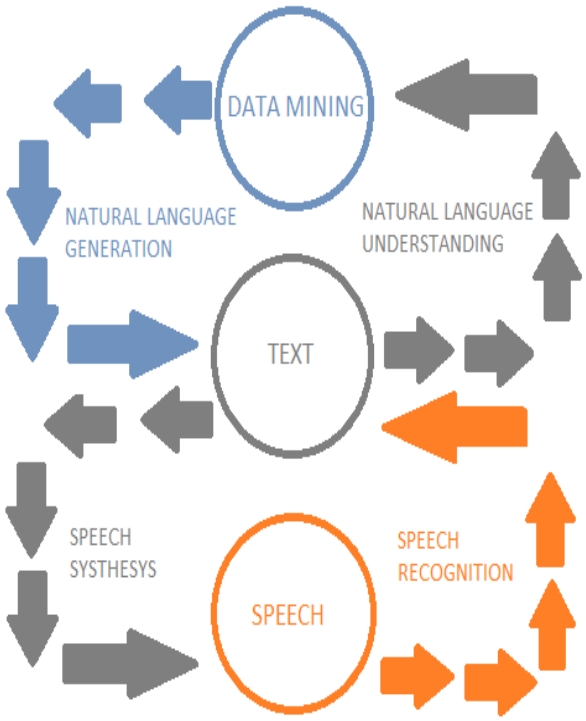

Figure 2.NLP overview

- IBM and Myxyty have created MyxyPod and Myxy Voice, two smart home voice assistants which use Watson's Natural Language Processing abilities.
- Natural Talk's solutions are based on various Watson APIs such as Personality Insights, Natural Language Understanding, Tone Analyzer, Document conversion, Twitter Insight, and Natural Language Classifier.
- Unman life, has developed an app dedicated to health and wellness improvement built with Watson Conversation, Speech to Text and Weather integration APIs.
- MICROSOFT PROJECT OXFORD, this is Microsoft effort towards the artificial intelligence and deep learning. This takes on facial recognition, speed recognition, to implement such functions into there computer and mobile system.
- GOOGLE DEEPMIND, Google DeepMind and tasked with building the best general-purpose learning algorithms in the industry.

APPLICATION

Artificial intelligence is a combination of both mathematical and conceptual algorithms to carry out a work by machines. In the recent years the use of artificial intelligence has been wide and successful. It is being used in several fields like the medical field, transportation, e-commerce and many more. There is no perfect algorithm or way an artificially intelligent machine works. The algorithms depend on the function the machine has to follow.

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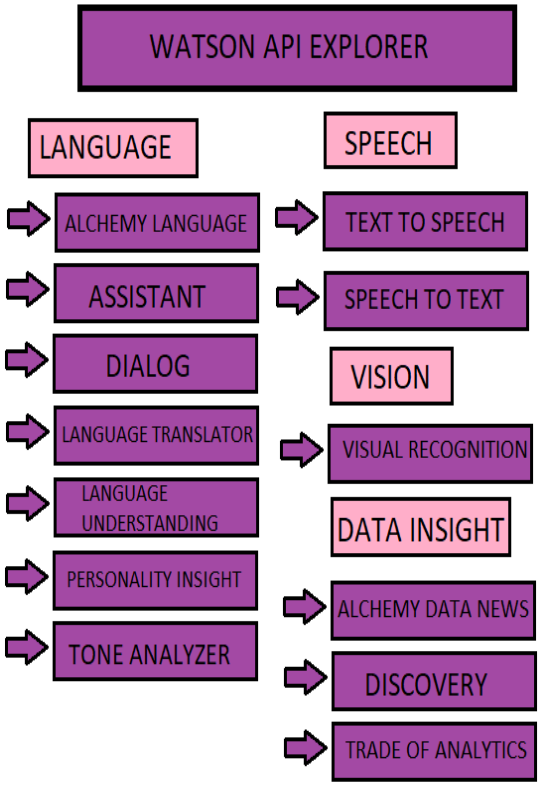

Figure 3.A collection of Swagger documentation for the Watson APIs

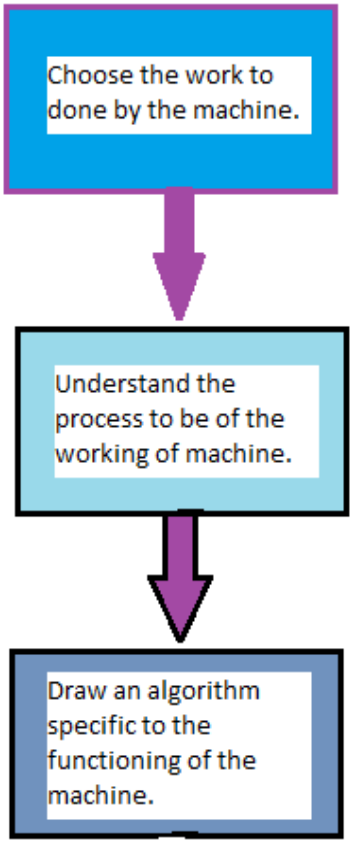

Figure 4.Steps to implement AI

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The use of AI in such fields are described below.

TRANSPORTATION

Fully automated cars have been designed to ensure safer transport. The cars use a number of different types of sensors to add perfection in driving. The visual sensors detect obstacles in their way, hence defend it by changing the car's direction. The speedometers, actuators and accelerometer are used to maintain the speed of the car. Perfection in motion of vehicle is brought about by the use of 4D-approach. The 4D-approach involves prediction error feedback for estimation of an object in 3D-space time. Another AI controlled transportation system is the concept of "Connected Vehicles". In this the vehicles are connected to each other and each vehicle can locate other and hence avoid collisions.

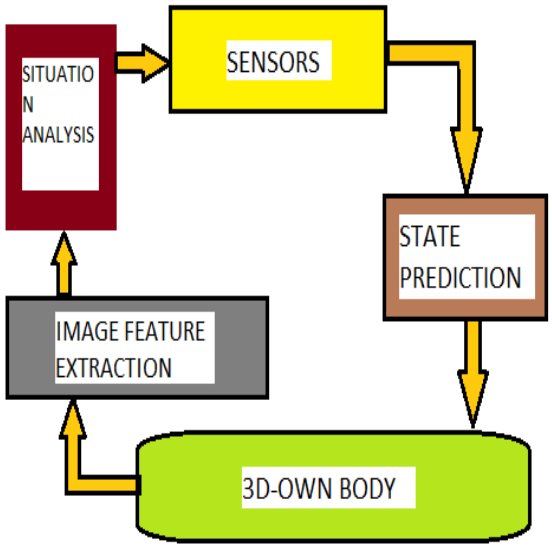

Figure 5.Shows the 4D-approach of vehicle transportation

Figure 6.AI controlled Cars

A modified part of the same idea is the distance reservation technique. In this if there are two cars running in the same track, one unable to overtake the other. When a cross road approaches, both the cars send request for reservation of space. The one sending request first, gets the space.

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FIELD OF MEDICINE

It has been observed that the use of artificial intelligence in the field of medicine makes made the study easier and more accurate. Suppose in the field of cancer, the diagnosis of it being a malignant or not, the use of AI along with machine learning is done. The main objective of Machine Learning is to produce a model which can be used to make predictions, estimations and classification of a similar task from formerly done task. This can be achieved by some techniques- (i) dimensionality reduction, (ii)feature extraction and (iii)feature selection. For improving healthcare, artificial intelligence in medicine is a great idea that can advance the patient communication and healthcare professionals. AI mainly enhance the capacity to process & store large amounts of data in an intelligent manner and translate that information into functional tools. To make sense of unstructured data, AI uses complex computer algorithms & puts a wealth of information at provider's fingertips. Medical artificial intelligence (AI) mainly uses computer techniques to perform clinical diagnoses and suggest treatments. AI has the capability of detecting meaningful relationships in a data set and has been widely used in many clinical situations to diagnose, treat, and predict the results.

BUSINESS

The use of artificial intelligence is wide in the field of e-commerce. They are used to track their customer likings, and thus recommend their customers similar products further. The use of Machine learning helps the e-commerce companies to get customer reviews and hence classify their product as good or bad. Advancements in Artificial intelligence application to a range of disciplines have led to the development of Artificial intelligence systems which have proved useful to marketers. These systems assist in areas such as market forecasting, automation of processes and decision making and increase the efficiency of tasks which would usually be performed by humans. The science behind these systems can be explained through neural networks and expert systems which are computer programs that process input and provide valuable output for marketers.

SOCIAL MEDIA

There are a number of social media networks that has emerged since the last decade. They use Artificial intelligence, deep learning and machine learning for their better and accurate performance. Facebook uses facial recognition technique, which helps to recognize a person from his or her picture without really seeing a picture before. There are several more uses of AI in the social media and how it has made our working easier and better.

ADVANTAGES

There are many advantages of a AI operated system such as,

- **Error Reduction,** low error rate compared to humans, they would have incredible accuracy and fast working rates.
- Replace humans in repetitive and dangerous works.
- **Digital assistant,** can help us with every day work.
- **Health care,** In the medical field also, we will find the wide application of AI. Doctors assess the patients and their health risks with the help of artificial machine intelligence. It educates them about the side effects of various medicines. Medical professionals are often trained with the artificial surgery simulators. It finds a huge application in detecting and monitoring neurological disorders as it can simulate the brain functions.
- **Daily Application,** digital as Siri, Alexa, Cortana can be help with our daily work. Also

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its widely used in e-commerce sites.

- **No Breaks, Machines**, unlike humans, do not require frequent breaks and refreshments. They are programmed for long hours and can continuously perform without getting bored or distracted or even tired.

FUTURE SCOPE

In last decade Artificial intelligence has been a aggressive concept of science, even though we have still a lot of work to do before we can reach out goal to achieve a proper AI reality but we are finally getting close to our goals. In last few year AI has seen many breakthroughs is different sectors and ML and deep learning technologies are improving faster than ever allowing machine to do many complex functions. And Big data is always playing important role in this improvement. We might start seeing integration of AI into our daily lives very soon.

- **Automated Transport,** this is already a reality with self-driving cars, needs to properly implemented as rivers are still required for safety purposes. This just need to be widely accepted by the users. Companies like tesla have already introduced self-driving cars for purchase.
- **Taking over job,** AI can replace humans for dangerous jobs such as bomb defuse which can be very useful but it can also replace humans for basic jobs such as manufacturing works, security job almost every other sector.
- **Cyborg Technology,** limitations of being human is simply our own bodies. in the future, we will be able to augment ourselves with computers and enhance many of our own natural abilities. Though many of these possible cyborg enhancements would be added for convenience, others might serve a more practical purpose.
- **Humanoids,** who do not want to personal robot like pepper, Sofia to help up with day to day work. Pepper and Sofia powered by IBM Watson is already thing although they are still work in progress but having a properly function robots as personal assistant is near.
- **Solving complex Problems,** With the help of big data technology AI is already being used in solving many complex problems as machine have access to bigger amount of data then any human can ever obtain it is being said that in future AI can be helpful to solve problems like climate change etc.
- **Health Care,** with the increasing number of people and diseases AI can help with diagnosis and help patients with solution with the needing to visit a professional. AI can also find cures for complex diseases.

CONCLUSION

In this review we have not attempted to detail any geeky technical factors in artificial intelligence but to report the importance that AI have in our lives. There is a major field in AI based technologies we have tried to make people aware of it.

We have taken into account all the AI technologies such a Machine Learning, Deep Learning, Cognitive Computing how all of these technologies have evolved over time and how that affected our life and what is the future of it.

We have discussed the concept of AI while we outlined their application in different sectors such as medical, automation, social network, E-commerce etc. We also discussed the development of it over the period of time.

After all of this information few basic conclusions must be drawn firstly, AI is still an untapped area and many possibilities are there to achieve so researchers are free to go forward their own way as there are no basic formalism to this. Secondly achievements of this field might looks slow and it might look disappointing at times as we still have long way to go before we make a functioning AI but still Artificial Intelligence is important and everyone needs to be very much aware of it.

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