

Artificial Intelligence: Science of Today and Technology of Tomorrow: Review

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Abstract

This paper on artificial intelligence corroborates the implications of AI on the future and hence verifies the veracity of its numerous techniques, having a positive impact on the lives of humans and improving the quality of life and the quality of environment that we live in. Therefore, in this paper we have discussed the techniques of AI, and the present day apprehension and ultimately, the bright future of AI. This paper will help us give a panoramic view of the various AI applications that will usher the technologies of the future. The future of AI rests upon different pillars or different disciplines like decision making, probability, logic making, management sciences etc. This paper will conclude with the future of AI with accordance to the current upturn in the field.

1. Introduction

Artificial Intelligence began with the conjecture that every aspect of learning or any other attribute of intelligence can be so precisely portrayed that a machine can be made to replicate it. The interpretation of AI is always shifting with the advancement in technology, but to put it in simple terms we can say that, AI is the ability of machines to think and learn. In general terms a machine which can mimic human cognition. The term Artificial Intelligence has been around for many years but the upsurge in this field is imminent, researchers have predicted that the era of super Intelligence is approaching, but there is still too much discussion on whether the dawn of Artificial Intelligence bring carnage or opulence. The term Artificial Intelligence was coined in the year 1955 by John McCarthy at a conference at Dartmouth college. He quoted "Every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it. An attempt will be made to find how to make machines use language, form abstractions and concepts, solve kinds of problems now reserved for humans, and improve themselves." Alan Turing often called as the father of modern computing once said: I propose to consider the question, Can machines think? Because "thinking" is difficult to define, Turing chooses to, replace the question by another, which is closely related to it and is expressed in relatively unambiguous words. Turing's new question is: "Are there imaginable digital computers which would do well in the imitation game?"

2. AI Techniques

With the advancement of computer technology and the magnification of its computational power, has led to the upsurge in the number of Artificial Intelligence Methods in the past few decades. Data-based or Artificial Intelligence techniques are used progressively as different ways to understand the working of the different more classical techniques employed in the field of artificial intelligence. We evaluate some of them and their environmental applicability, with respect to their different methodology. The techniques covered are artificial neural networks, fuzzy models, genetic algorithms, multi-agent systems, swarm intelligence, and hybrid systems. Some of these have been discussed.

2.1 Artificial Neural Network

Artificial Neural Network or connectionist systems is an information processing paradigm inspired by the biological network of our nervous system which constitutes the brain. Its adaptive learning and its proficient analysing capabilities are one of the foremost properties that make it one of the most advanced AI methods of our time.

2.2 Evolutionary Computation

Evolutionary Computation is a family of algorithms inspired by biological evolution. In technical terms they are a family of population based trial and error problems with metaheuristic and

stochastic optimization character. In these methods the less desired solutions in each new generation is stochastically removed which gives way for the better and more advanced final result.

2.3 Turing Test

Turing Test is the test of the machine ability to exhibit intelligence behaviour equivalent or indistinguishable from that of a human. It was introduced by Alan Turing in 1950. In this test a certain machine passes the test if a person is not able to differentiate between the machine and the human. In the test a person is made to interact with a machine and a person through a medium of keyboard and an evaluator is asked to evaluate the person taking the test, if the person is able to identify between the machine and the person a machine has failed the test and if the person is not able to identify between the person and machine the machine is set to have passed the test.

2.4. Fuzzy Logic

Fuzzy Logic is a computing method based on 'degrees of truth' rather than just true or false. It is employed on the concept of partial truth, where the truth may range between completely true and completely false. It is closer to the way our brains work in this method we aggregate the data of partial truths which we further aggregate into higher truths and when certain thresholds are exceeded the decision is made.

2.5. Swarm Intelligence (SI)

SI is the cumulative behaviour of self sufficient systems, natural or artificial. The concept is used massively in artificial intelligence. The concept was introduced by Gerardo Beni and Jing Wang in 1989, by noticing it from cellular robotic systems. Swarm Intelligence consists of a number of boids or bugs which interact with each other and form a network and learn from each other. The inspiration often comes from the environment, mostly the ecosystem. The boids follow basic rules, and although there is no main leader which controls all the boids but these form a network within themselves and lead to the formation of an intelligence network in which the different boids communicate and learn from each other which is referred to as Artificial Intelligence. Examples in various systems of Swarm Intelligence include ant colonies, bird flocking, animal herding, bacterial growth.

3. AI Methodology

Artificial intelligence (AI) is an field that focuses on the process of making machines intelligent mainly teaching them to think and react like humans some activities that are in use around us are speech recognition and many others.

Artificial Intelligence mainly depends upon machine learning and algorithms. The main objective of AI is to build agents. What denotes intellect in these agents is that they understand their environment and make the decision that benefits them the most in the form of a behaviour. That is how we apprehend their supposed intelligence. We can take the example of voice recognition systems such as 'siri' or 'cortana' which use Machine Learning and Deep Neural Network to mimic human interaction. The main objective of learning

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algorithms is to learn from data to produce highly accurate predictions and insights. We can argue that these predictions can be decisions and therefore perceive intelligence, but that is not the intent, our aim is that machines should be able to make the best decision based on the data that it analyses however substantial or meagre.

Machine learning is one of the major fields of artificial intelligence it basically is developed using advanced algorithms and it is the ability of a machine to learn on its own. This is usually done by using pattern discovering algorithms that analyse the data that is fed to it, it is used for mostly in decision making process. Every single step needs to be programmed specifically through the algorithm.

Deep learning, on the other hand, is similar to machine learning, being one of the most advanced and complex fields of AI it enables machines to think and work like humans do. In this process the learning can be supervised, semi-supervised and unsupervised according to the task assigned to them and the data that is input into the algorithm. Deep Learning being one of the major fields in artificial intelligence include speech recognition, audio recognition, machine translation, bioinformatics and many more fields. It mainly involves communication patterns and processing information, many of their functions and methodology is different from that of a human brain so it is still a challenge to apply this concept in neuroscience.

4. Impact of AI

It is evident that the experts think that AI is likely to reach the apotheosis of super intelligence which will have a similar capacity for logic as of humans, and which will make skilled use of reason. Though, the apprehension is the probability of the risks with the developments in AI. So the common denominator still remains whether AI will lead to big development or dominate in areas which would relegate the cognitive thinking of humans and lead to retrogression.

On comparison, it can be concluded that AI has both strong and weak points which are still being comprehended in various fields. AI will have to entail the philosophy of the human mind and adapt to change regressively for it to behave in a human like fashion; which is to analyse and perceive like a human mind.

Research in areas of medical field and air pollution is applicable as such areas are of our interest, and they're also in imminent need of regeneration. Therefore research in forecasting of Ozone episodes through AI will prove to be useful. Use of ANN models has also proved to be of extraordinary use, such as in retrieval of output on processing of various input signals.

4.1 Applications of AI

AI has a vast number of applications with the technologies around it being applied in various fields. These applications are being driven by great advances in technology. These applications can be incorporated in various types of data and can be used to extract the same. The huge amount of data can be handled efficiently and can be dealt with flawlessly.

Application of AI helps deal with raw data in a manner which is highly logical and accurate and is formulated to be more reliable. There are various modelling methods such as Artificial Neural Network (ANN), Fuzzy Logic, Multiple Linear Regressions (MLR), etc.

Currently extensive research has been done on topics such as-

- a) Application of AI in PSS design.
- b) Application of AI in Network Intrusion Detection.
- c) Application of AI in Medical Sciences, id est.–Diagnostic Science, MRI, Endoscopic Images, etc.
- d) Application of AI in Accounting Databases.
- e) AI techniques in Computer Games, Bayesian Networks, NPC movement using Path Finding, etc.
- f) Application of AI in Extraction of Data.
- g) Application of AI in Text Analytics.
- h) Application of AI to minimize operating cost in smart grid energy sources.
- i) Application of AI in Quantum Computation.

4.2 Future of AI

The future of AI extends towards a super intelligence which will probably take decades to surpass human cognition. The culmination of AI lies in such higher intelligence which is well beyond human ability, a development which is way beyond in the future. Though in the near future, research in AI could lead to such technology which would behave just like a human. And it is imperative that such technology evolves and adapts to change and entails ethical values such as empathy. The main question about this development is when to expect it, what the impact of it would be, in particular which risks it might entail, possibly up to a level of existential risk for humanity. Similarly Stephen has said, "Success in creating AI would be the biggest event in human history. Unfortunately, it might also be the last, unless we learn how to avoid the risks."

Future of AI is pretty accurate, as technology is only advancing, and constantly evolving. AI will make memory consolidation and cognition approachable; it will work more efficiently in a very less time. It will improve health care facilities and forge researching in medical sciences, more accurate. Though not much could be said about the impact AI will make in the future, whether it will be negative or positive. But surely, AI is bound to make a huge impact on the way we perceive and retrieve information, and the also way we handle it.

"We often think of our species as the most advanced in the animal kingdom. But what if there was a way to enhance our brain capacity? What if we could be smarter? Better? Is there a way to manipulate the human brain in such a way that we can create a "super-human"?"

Surely, extensive research and development in AI holds the answer key to such inevitable questions. Will AI be able to perform or hold the semblance to the function of motor and sensory neurons in a human body? Will it be able to adapt? And will there be any ethical implications? These are questions which are crucial for the future of AI and questions we can't be certain about, but only work towards the solution of.

5. Conclusions

Artificial Intelligence is a technology which presents to us the opportunity, to create machines which are able to think logically and systematically, ameliorating lives by using such methodical ways and methods which are ultimately proposed by researchers and scientists. Artificial Intelligence has made tremendous contribution to various areas since the time of its inception. These areas include medical field, user interface, weather forecasting, etc. AI will persist to engage with the lives that humans lead and will lead, decades from now. Therefore, it is crucial to understand the urgency, technology and the potential of Artificial intelligence, rather than being apprehensive about all that it engenders when and if it pervades every aspect of human life.

This review paper finds its basis on the different aspects of AI, id est. techniques, comparison, concepts and the future of AI, and how it will affect humans. There is a dazzling future in the analysis of applications of Artificial Intelligence, and its techniques. Creating more dextrous robots with the help of artificial intelligence would be a huge boon to variegated companies. We conclude that further reviewing of Artificial Intelligence pertaining to its different area should be incessantly done; accelerating only towards a positive aggregate which is of value to researchers and scientists. Though some of the people realize the true potential and wonder of Artificial Intelligence, many of us have not yet realized the full potential of AI as apprehension has somewhat enveloped our understanding of AI. If we use AI for the betterment of the environment, medicine and efficiency, AI will definitely have a positive impact on our future.

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