

FUNDAMENTAL PRINCIPLES OF ARTIFICIAL INTELLIGENCE

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ABSTRACT

In this fast-paced of life, everything like the systems and machines did work automatically. To make human life comfortable Artificial Intelligence plays a crucial role. All the electronic gadgets we see today, have Artificial intelligence functionality. Besides, the worth of automation, function, tools of AI surged dramatically. Artificial Intelligence is a newly emerging field that combines intelligence into a machine with computer science. After the recognized benefits of AI, it would use in all the sector of work such as teaching, entertainment, healthcare, business, and the list goes on. The main goal of Artificial Intelligence is to work and think like human beings, abstract all the information and provide the appropriate to the user. At a high level, AI can be described as a set of fundamental principles necessary for a successful system. The objective of this paper is to introduce Artificial Intelligence and to present its benefits and application in various fields.

Keywords: Artificial Intelligence, automation, gadgets.

I. INTRODUCTION

Artificial Intelligence (AI) deals with the study of computer systems that exhibits some form of intelligence. In simple words, a system that acts and thinks like a human in any circumstances. A system that solves issues or takes decisions automatically. The majority of individuals' mental activities such as solving mathematical problems, involve in commonsense reasoning, developing computer programs, understanding languages, and interpreting them are said "intelligence". Several computer systems are available today which have been built to perform tasks like mentioned above. Not only this but also, Artificial Intelligence can use in solving complex, compound, and quadratic equations, diagnose disease, speech, and text detection, and face reorganization. Perhaps, artificial intelligence includes data that provides training material for the software and algorithms. Artificial Intelligence applies to any intellectual task where the machine needs to take some decision or choose the next action, in short act intelligently or rationally. There are six major branches of Artificial Intelligence, which are Machine Learning, Neural Networks, Robotics, Expert Systems, Fuzzy Logic, and Natural Language Processing.

II. HISTORY OF ARTIFICIAL INTELLIGENCE

Until 1950 people were unaware of the concept of Artificial Intelligence. John McCarthy is the founder of "Artificial Intelligence" in the year 1955. Not only McCarthy but also Alan Turing, Allen Newell, Marvin Minsky, and Herbert A. Simon is also known as the father of Artificial Intelligence. In 1950, Alan Turing, an English mathematician, publishes "Computer Machinery and Intelligence" to test the machine's ability. And this test is known as the Turing test, from here the Artificial Intelligence takes place in the world. Therefore, the Turing machine is the first step towards AI. 1955 and the following year is the birth of Artificial Intelligence. Two well-known scientists Herbert A. Simon and Allen Newell developed the first Artificial Intelligence Program which was named "Logic Theorist". 38 of 52 Mathematical Theorems had proved by this program. In the year 1966, the algorithm was developed by researchers. In the same year, a chat bot was built by Joseph Weizenbaum. The first humanoid robot was created in Japan, named WABOT-1 in 1972. However, the achievement of Artificial Intelligent was not being easy enough. After several reports as well as the general public criticizing the progress of Artificial Intelligence in society. Funding and interest from governments dramatically declined from 1974 to 1980, and this duration is also known as the "AI winter". Gradually with time, people know the importance of AI in our day to day life. AI became faster, store a huge amount of information, and more affordable. Apart from that, the best part was they able to self-recognize, think abstractly, and achieved Natural Language Processing. After reviewing and seeing the progress of Artificial Intelligence government start funding again and also expand algorithmic tools. A year between 1993 and 2011, many inventions take place using AI. The first

computer that beat a world chess champion, a vacuum cleaner, and most importantly AI came into the business world. Netflix, Twitter, and other companies started using AI. 2011 to till now, a lot of changes are made. All these radical changes in the community are made to make human life simpler and comfortable. For instance, Robots, voice assistance like Alexa and google mini, and so on.

III. APPLICATION OF ARTIFICIAL INTELLIGENCE

Artificial Intelligence has plenty of applications in today's world. AI is used in almost every field of life and work Such as Education, Robotics, Entertainment, E-commerce, Social Media, Data Security, Agriculture, Transport, Finance, Gaming, Healthcare, and Astronomy. Even one finds it extremely difficult to get through a day without using an application of AI.

Some are the applications that are described in detail to understand the concept better.

Social Media - Social media applications like Instagram, Facebook, etc. use AI to improve user experience. From notifications to feeds are seen in the timeline everything is created using AI. It considers all your past web searches, behavior, and everything else done by us during our visit to the site and tailors our experience accordingly.

Smart home device - A significant amount of smart home devices that we buy use AI to learn your behavior and adjust their settings automatically. Smart home devices are fully controlled by using smart voice assistants which are a prime example of AI. There are smart lights that change intensity and based on time and thermostat that can adjust the temperature based on user preference.

Security and Surveillance - AI plays a crucial role in this domain. It is first impossible for humans to constantly monitor multiple channels with feeds coming from a huge number of cameras at the same time, but AI makes it possible. Technologies like, face recognition and voice recognition are getting better and have been used by a surveillance camera system.

Travel and Navigation - In both the travel and navigation industry, AI is steadily becoming one of the key tools for service providers as well as to choose. A huge percentage of user cleaning options and hook trips on the devices with the help of AI-powered travel assistants considers google maps, road information, and utilizes an algorithm to identify optimal routes to take. Model and Material which are used is presented in this section. Table and model should be in prescribed format.

Healthcare - It enables workflow assistants are aiding doctors to free up their schedules, reducing time and cost by streamlining processes, and opening up new allies for the industry. In addition, AI-powered technology and thus, hence, making a more accurate diagnosis.

Robotics - Robots means an artificial human, without feelings. However, due to the advancement in technology, the time is not so far in which robots have feelings like human beings. Scripts of AI has attached in robots to perform operation or task as per the operator operate. Robots can be used in dangerous circumstances where humans fail. For instance, in a fire or extremely bad weather condition. We must admit that robots can do everything from cleaning chores to plan schedule. In today's era robots are seen everywhere and in every sector of work such as healthcare, store, home, education, and so on.

Agriculture - Food is the basic requirement of human. To survive food is something mandatory. Due to the rapid growth in population as well as industrialization; the number of farmers getting a decline. And to feed the stomach of everyone robot do the work of dozens of workers at once. It means, needed less worker and work faster. Robots take care of the fertilizer, soil, and time to time watering along with proper pesticides and insecticides.

E-commerce - Artificial Intelligence is a boon for the customer. As whenever a customer looking for a product the AI will suggest the best option. Furthermore, the product suggestion display for a week even though the user did not search. It is because, if people search for something and computer fetch that and store it. And whenever a user any application, they get a suggestion.

IV. LIFE CYCLE OF ARTIFICIAL INTELLIGENCE

The life cycle of Artificial Intelligence consists of 7 phases. Machine Learning and Artificial Intelligence share the same life cycle.

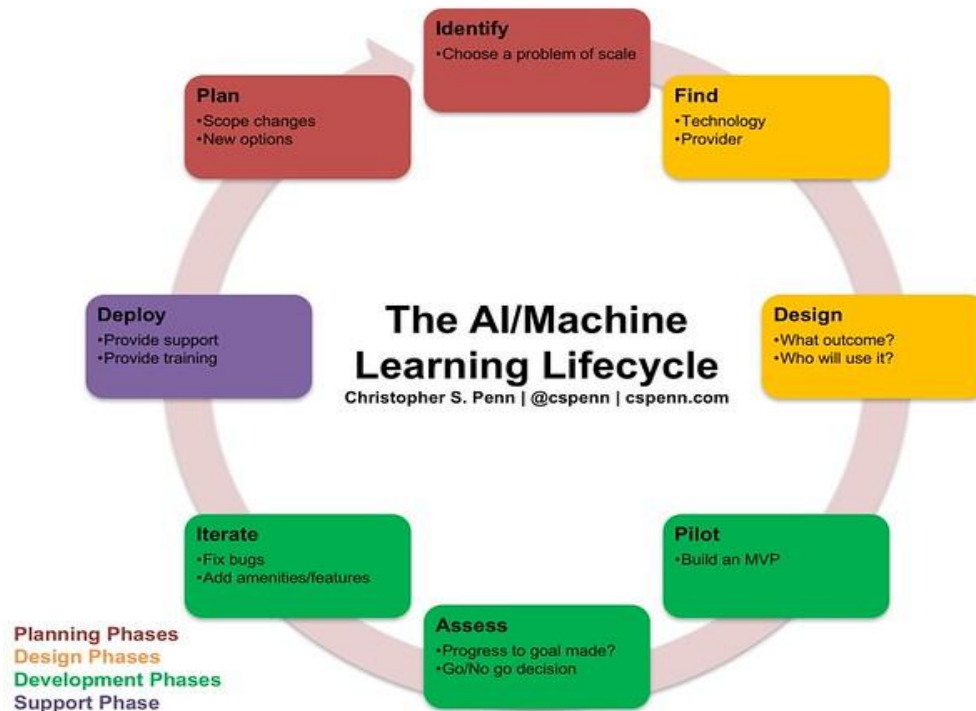


Fig.-1: Life Cycle Of AI.

1. Planning - Planning is the most important part of the success of any project. The goals of the AI project can be directly or indirectly depending upon the proper planning and scheduling. First and foremost, analyzing things, a human can also analyze but to some extent, whereas, AI machines able to analyze the huge number of data or information. For instance, it would be extremely difficult for a human being to count the millions of hours of video, but an AI system can do that. Planning is the foundation of a project to achieve the perfect project and success.
2. Requirements – A clarification first. Requirements involve asking questions, which means, what objective will the project serve? Who will be beneficial to the project? Who will be responsible for it? And most importantly how it will be done? In this phase developer concentrate on all these above-mentioned questions.
3. Design – After collecting the data, our next step is to put our data into a suitable place and prepare it to use in our system. Taking all the requirements together to make the project and know which what are the specification user required. This stage includes the low-level design of AI, algorithms, and development leads.
4. Development – In development you required a team, who use programming and technology skills to construct the appearance and user experience of a system. Extensive documents are available for all the AI development platforms.
5. Testing – In Project Evaluation testing is done, and we will see how the system or a project response to the data. Check if there any errors and see the system meets establish goals, that is an objective. Not only this, but this stage also involves modifying a project for ensuring that it is functioning according to the originally objected initiative or not. It also corrects the problem of over fitting. Over fitting is nothing but the system performs well with the past data by fails to do with unanticipated future data.
6. Deployment – The AI projects are either software or hardware, which are undertaken for solving a problem or addressing a concern. So, this means that they have to be deployed to make it effective. Most of the IT projects end with deployment, however, in the case of AI projects this will be followed by system tuning as well. Retraining or returning at regular intervals for ensuring accuracy and effectiveness.

7. Maintenance – In this stage, it includes post-deployment, where the project system ensures to take place, regular checking and updating of the project, and the long-term support is given by the developer side.

V. MAJOR COMPONENTS OF ARTIFICIAL INTELLIGENCE

Learning – Learning is distinguished into a variety of various forms. The only is learning by trial and error. The problem remembers the thriving move and next time the computer is given a similar problem it is ready to manufacture the solution right away.

Reasoning – To reason is to draw inferences applicable to the situation at hand. Inferences are classified as either deductive or inductive. The distinction between the two is that in the deductive case, it guarantees the truth of the conclusion by the truth of the premises whereas, in the inductive case, the truth of the premises lends support to the conclusion that the accident was caused by instrument failure. It is the act of deriving a conclusion from certain premises using a given methodology.

There are two types of reasoning: -

1. Monotonic reasoning – In which all conclusions are still valid after adding more information to the existing information. For example, theorem proving.
2. Non-monotonic reasoning – Some of the conclusions can be invalidated by adding more information to the existing information. For example, robot navigation.

Problem Solving – Problem-solving methods are divided into special purpose and general purpose. A special-purpose method is tailor-made for a particular problem and often exploits very specific features of the situation in which the problem is embedded. A general-purpose method applies to different problems. It uses AI as a means-end analysis, which involves a step-by-step reduction.

Perception – In perception, the environment is scanned through various sense organs, real or artificial, and processes internal to the perceive analyze the scene into objects and their function and relationships.

Learning Understanding – A language is a system of signs having meaning by convention. An important characteristic of full-fledged human language.

VI. PROBLEM CHARACTERISTICS OF AI

Decomposable to a smaller or easier problem -

The problem is broken down into a smaller problem. Solve each small problem using a few specific rules. For instance, in integration problems of calculus – at each step check to see if a small problem is immediately solvable if not check to see if the problem can be further decomposed and call itself recursively. Solving problems in the blocks world.

Classes of problems -

Ignorable – During which answer steps will be unnoticed. As an example, theorem proving. Ignorable issues use a simple structure that never backtracks.

Recoverable – During which answer steps will be undone. For example, 8 puzzles.

Irrecoverable – During which answer steps will not be undone. For example, chess. The irrecoverable problem needs planning since more effort is required.

Predictable Problem Universe -

In this, we know exactly what can happen. Possible to plan an entire sequence of moves from start to goal. A control structure that allows backtracking will be mandatory. The perfect prediction is detected in the open-loop approach. Uncertain outcome problems are computationally expensive.

A good solution is obvious -

Any path problem and best path problems are easier to solve. It is solved in a reasonable amount of time. Problem heuristic can be used to suggest good paths to explore.

Uses internally consistent knowledge base – Solution may be a state in which the problem is or a path that leads to a state. Problem definitions take care of these. Problem states correspond to situations in the world, not the sequence of operations. It may become necessary to record the path of the problem process as it proceeds.

Requires lots of knowledge -

Some problems require very little knowledge like chess. Rules to determine legal moves and simple control mechanisms to implement an appropriate search. However, some problems need a huge amount of knowledge just like newspaper story understanding. This requires a variety of facts and the complexity of constructs.

Requires periodic interaction between human and computer -

Computers are programmed to solve problems that most people can understand – a problem in solution out. When computers are to have Immediate interaction with a user. Use the

resolution. Following are the solution: –

1. Solitary – the computer has given problem description produces an answer with no immediate communication and demand for an explanation of the reasoning, additional input to program additional reassurance to the process.
2. Conversational – There is immediate communication between a person and a computer for assistance or additional information to the computer.

VII. AN OVERVIEW OF THE THREE IMPORTANT ASPECTS OF ARTIFICIAL INTELLIGENCE

Neural Networks, Genetic Algorithms, and Fuzzy systems are the principal areas of AI.

Brief descriptions of the major concepts are as follows:

Neural Networks - It is interconnected by edges, forming a neural network; and these networks are computational models. Similarly, to the brain, the network input and internal processes take places such as activation of the neurons and the network output.

Genetic Algorithms - Computational models of genetics and evolution. The basic three parts are a selection of solutions based on their fitness, reproduction of genes, and occasional mutation. The computer finds better solutions to a problem as species evolve to adapt to their environments.

Fuzzy Systems - A technique of "continuation", which mean extending concepts to a continuous paradigm, especially for a traditionally discrete discipline such as assets and logic. In ordinary logic, the proposition is either true or false, with nothing between, but fuzzy logic allows truthfulness in different degrees.

VIII. CONCLUSION

There is a constant need for Artificial Intelligence in today's world, to lessen the work effort and save a huge amount of time. We can conclude that Artificial Intelligence is an emerging multidisciplinary field with roots in mathematics, statistics, and computer science. AI has a large number of applications, from security to smart homes. For every project, there is a life cycle. Begins with the proper planning of resources, time, and manpower and ends up maintaining it with some specific time interval. Components of AI and some drawbacks too are mentioned in the paper. The main goal of AI scientists is to recognize and use meaningful insights from a system to help an organization in taking smarter decisions. During that process, they use different tools and methods. They also use the most powerful hardware, most efficient algorithms, and programming systems to solve any issue.

In this paper, we wanted to introduce Artificial Intelligence as a new, powerful field with various applications that can provide an effective advantage and long-term stability.

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