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Uses of Artificial Intelligence in Field of Research

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Abstract - It is the science and engineering of building intelligent machines, especially intelligent computer programs. AI is connected to the similar problem of using computers to comprehend human cognition, even though it is not restricted to medically detectable techniques. Today, both humans and machines generate far more data than humans are able to process, evaluate, and draw complex conclusions from. All computer learning is based on artificial intelligence, which is also the foundation for all complicated decision-making in the future. In order to push the limits of scientific understanding, engineering skill, and technological developments, AI technologies are becoming essential. This essay explores the characteristics, definitions, history, applications, development, and accomplishments of artificial intelligence.

Keywords- Machine learning, deep learning, neural networks, Natural Language Processing and Knowledge Base System, Research and Innovation, Science and Technology, Engineering, Empowering.

I . INTRODUCTION

The world we can see and anticipate now is not the same as t he impending world that predicts the futureperiod.Future ge nerations will be guided by artificial intelligence.
Robotic devices, broad automation, and self-driving cars will all become essential components of human daily life[1,5,14].
There will be a significant shift in employment, trade, and vocations.
The upcoming cohort will be greatly impacted by this shift, t hus quick adaptation is essential.
It is our duty as mentors to prepare them to use the technolo gies of the future with care and intellectual pride. The field of computer science known as artificial intelligence (AI) studies machine intelligence[6-7].

An intelligent agent is a system that acts in a way that maximizes its chances of success. Artificial intelligence is a rapidly developing field that permeates almost every aspect of contemporary life [8-9]; it is no longer a futuristic fantasy. It is the study of concepts that allow computers to do tasks that give the impression of intelligence. Reasoning, knowledge, planning, learning, communication, perception, and the capacity to move and manipulate objects are some of the fundamental concepts of artificial intelligence. It is the engineering and science [13] of creating intelligent devices, particularly intelligent computer programs.

II. ARTIFICIAL INTELLIGENCE METHODS

1 Machine Learning

Machine Learning (or AI) Approach On the contrary, in Machine Learning (ML), the input data and the output data are fed to an algorithm (Machine learning algorithm) to create a program. Unlike conventional programming, Machine Learning is an automated process where a programmer feeds the computer with 'The Input + The Output' and computer generates the algorithm as to how the 'The Output was achieved. It is one of the uses of AI where robots are automatically trained to learn from experience rather than being specifically programmed to carry out certain tasks. A branch of machine learning called "deep learning" uses artificial neural networks to do predictive analysis. Numerous machine learning algorithms exist, including Reinforcement Learning, Supervised Learning, and Unsupervised Learning. The algorithm in unsupervised learning does not act on categorized data without supervision. Supervised learning uses a set of input objects and the intended output to infer a function from the training data. Machines utilize reinforcement learning to determine the best option that should be considered by taking appropriate activities to improve the reward.

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2 Machine Vision

Visual data can be captured and analyzed by machines. In this case, the visual information is captured by cameras, the image is converted to digital data using analog to digital conversion, and the data is processed using digital signal processing. A computer is then fed the resultant data. Sensitivity, or the machine's capacity to detect weak impulses, and resolution, or the range to which the machine can differentiate objects, are two essential components of machine vision. Machine vision is used in medical picture analysis, pattern recognition, and signature detection, among other applications.

3 Robotics and Automation

The goal of automation is to use machines to complete tedious and repetitive jobs, which increases production and yields more economical and effective outcomes. Neural networks, graphs, and machine learning are used in many firms' automation processes. By utilizing captcha technology, such automation can stop fraud problems during online financial transactions. Robotic process automation is designed to carry out repetitive, high-volume activities that can adjust to changing conditions.

4 Natural Language Processing (NLP)

It is the process by which computers that have been programmed to process natural languages interact with human language. For Natural Language Processing to extract meaning from human languages, machine learning is a dependable technology. In natural language processing (NLP), a machine records human speech. Following the audio-to-text exchange, the text is processed to turn the data into audio. The machine then reacts to people using the audio. Natural language processing is utilized in contact center IVR (Interactive Voice Response) programs, language translation programs like Google Translate, and word processors like Microsoft Word to verify textual grammar. But because of the characteristics of human languages, there are so many difficulties in computer programming, However, because natural language has norms that are difficult for computers to comprehend, the nature of human languages makes natural language processing challenging.

In order to transform the unstructured data from human languages into a format that computers can comprehend, natural language processing (NLP) use algorithms to identify and abstract the rules of natural languages.

5 Knowledge-Based Systems(KBS):

A KBS is a computer system that uses the expertise of a human expert to provide guidance in a certain field. One characteristic that sets KBS apart is the division between the knowledge, which can be expressed in a variety of forms, including rules, frames, or situations, and the inference engine or algorithm that makes use of the knowledge base to reach a conclusion.

6 Artificial Neural Networks and Neural Networks:

'Artificial Neural Networks (ANN) can be described as layers of software units called neurons (also called node), connected with different neurons in a layered manner. These networks transform data from one neuron to another neuron until they can classify it as an output. Neural network is again a technique to build a computer program that learns from data.'

NNs are biologically inspired systems consisting of a massively connected network of computational "neurons," organized in layers. By adjusting the weights of the network, NNs can be "trained" to approximate virtually any nonlinear function to a required degree of accuracy. NNs typically are provided with a set of input and output exemplars. A learning algorithm (such as back propagation) would then be used to adjust the weights in the network so that the network would give the desired output, in a type of learning commonly called supervised learning.

III. MAIN APPLICATIONS OF AI

Artificial intelligence has several uses in today's society, some of which are listed below. Because it can effectively handle complicated issues in a variety of industries, including healthcare, entertainment, banking, education, etc., it is becoming indispensable in the modern era. AI is improving the speed and comfort of our everyday lives.

1. AI AND Agriculture

For the best results, agriculture requires a variety of resources, including labor, money, and time. Agriculture is becoming more computerized these days, and artificial intelligence is developing in this area.

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AI is being used in agriculture for robotics, crop and solid monitoring, and predictive analysis. Farmers can benefit greatly from AI in agriculture

2. AI AND Astronomy

Artificial intelligence has the potential to be a very helpful t ool for solving complicated problems in the universe.Unders tanding the universe's origins, mechanisms, and other aspect s can be aided by AI technology.

3. AI AND Automotive Industry

The billions of user profiles found on social media platforms like Facebook, Twitter, and Snapchat must be efficiently kept and handled. Massive volumes of data may be managed and arranged by AI. AI is capable of analyzing large amounts of data to determine the most recent trends, hashtag #, and user requirements. o The tourism industry is becoming increasingly dependent on AI. AI may do a variety of tasks linked to travel, including generating trip plans and recommending hotels, flights, and the best routes to clients. AI-powered chatbots are being used by the travel industry to communicate with clients in a human-like manner for quicker and better responses.

4. AI AND Data Security

Every business must prioritize data security, and cyberattacks are becoming more frequent in the digital realm. AI has the potential to increase the security and safety of your data. AEG bots and AI2 platforms, for instance, are used to more accurately identify software bugs and cyberattacks.

5. AI AND E-Commerce

AI is giving the e-commerce sector a competitive advantage, and its demands are growing. AI is assisting customers in finding related products with suggested brands, sizes, or colors.

6. AI AND Education:

Grading can be automated by AI, giving the tutor more time to instruct. An AI chatbot can act as a teaching assistant by interacting with pupils. AI has the potential to serve as a student's personal virtual tutor in the future, accessible from anywhere at any time.

7. AI AND Entertainment

AI is seamlessly weaving its magic across the vibrant landscape of the media and entertainment industry, notably revitalizing diverse domains such as music, film and TV, gaming, advertising, book publishing, and content creation. These use cases, each unique, illustrate a panorama where technological innovation harmoniously meets creative expression, augmenting the evolution of media production, distribution, and consumption in a digital age.

8. AI AND Finance

The finance and AI sectors work best together. Automation, chatbots, adaptive intelligence, algorithm trading, and machine learning are all being incorporated into financial processes by the finance sector.

9. AI AND Gaming

AI has applications in games. Artificial intelligence (AI) systems are capable of playing strategic games like chess, which need the machine to consider a wide range of potential locations.

10. AI AND Healthcare

AI is going to have a big impact on the healthcare sector in the next five to 10 years. AI is being used in the healthcare sector to diagnose patients more quickly and accurately than humans. AI can assist physicians with diagnosis and alert them when a patient's condition deteriorates so that medical assistance can be provided before the patient is admitted to the hospital.

11. AI AND Robotics:

Robotics plays an amazing part in artificial intelligence. General robots are often programmed to carry out repetitive tasks, but with artificial intelligence (AI), we can build intelligent robots that can carry out tasks based on their own experiences without the need for pre-programming. o The best examples of artificial intelligence in robotics are humanoid robots. Recently, Erica and Sophia, two intelligent humanoid robots with human-like speech and behaviour, were created.

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12. AI AND Social Media

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13. AI AND Travel & Transport

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IV. OTHER USES OF AI:

1. **Antivirus**: Antivirus detection has become more and more dependent on artificial intelligence (AI) techniques. Currently, a few key AI methods are used for antivirus detection. It enhances antivirus detection systems' performance and encourages the development of new AI algorithms and their use in antivirus detection to combine AI and antivirus detection.

2 In Fraud detection : Artificial intelligence has two applications in the financial services sector. AI is used in the first credit application scoring process to determine creditworthiness. In order to track and identify fraudulent credit card transactions in real time, more sophisticated AI engines are used.

3. In Heavy Industries : Large machinery are dangerous to operate and maintain by hand. Therefore, having a safe and effective operation agent becomes essential.

4 In Field Of Medicine: AI systems can be used by a medical clinic to offer medical information, schedule beds, and rotate staff. AI is also used in the domains of difficult internal organ surgeries, neurology (MRI), cardiology (CRG), and embryology (sonography).

5. In Music: Researchers are attempting to replicate the actions of a proficient musician on a computer. Among the main topics of study in music and artificial intelligence include composition, performance, music theory, and sound processing. For instance, Chucks, Orchextra, Smart Music, etc.

6. In Telecommunications: Heuristic search is used by many telecom businesses to manage their workforce. For instance, BT Group has included heuristic search in a scheduling program that offers the work schedules of 20,000 engineers.

7. In Virtual customer assistance (VCA) : VCA is used by call centers to anticipate and address consumer questions without the need for human involvement. The initial point of contact in a customer support query is voice recognition combined with simulated human dialogue. Higher-level questions are sent to a person.

V. SCOPE OF AI

We might stick with artificial intelligence given its many uses and features. Given the advancement of AI, is it possible that the world of the future will become artificial? The new paradigm of non-biological computing and intelligence is expanding rapidly, while biological intelligence is fixed due to its age and maturity. The human brain's memory capacity is likely around 10,000 million binary digits. However, the majority of information is likely utilized for somewhat useless purposes, such as recalling visual stimuli. We might therefore conclude that the world may now rely on computers for efficient operation because natural intelligence is finite and erratic. In the upcoming years and decades, artificial intelligence (AI), a genuinely breakthrough achievement in computer science, will be a fundamental part of all contemporary software. Both a threat and an opportunity are presented by this. AI will be used to support both offensive and defensive cyber operations. New cyberattack techniques will also be developed to exploit the unique flaws in AI technology. Lastly, AI's desire for vast volumes of training data will increase the significance of data, changing the way we think about data security. To guarantee that this revolutionary technology will result in widely shared safety and wealth, prudent global governance will be crucial.

Abbreviations

AI Artificial Intelligence

AGI Artificial General Intelligence

DL Deep Learning

IoT Internet Of Things

ML Machine Learning

NLP Natural Language Processing

CV Computer Vision

VCA Virtual customer assistance

WWTP Wastewater Treatment Plant

VI. CONCLUSION

We have covered artificial intelligence in brief thus far. We've talked about some of its tenets, uses, accomplishments, etc.The ultimate goal of organizations and scientists working on AI is to solve most issure or complete jobs that are directly beyond the capabilities of humans.There is no doubt that advancements in this area of computer science will alter the global landscape.The top layer of engineers is now in charge of advancing this field.

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