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Review

Research Paper on Artificial Intelligence and its Applications

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ABSTRACT

The science and engineering of developing intelligent machines, especially intelligent computer programs, is the main emphasis of the discipline. Though it is related to the same effort of studying human intellect via computers, artificial intelligence (AI) does not have to restrict itself to biologically observable methodologies. There may not be a single, agreed-upon definition of artificial intelligence (AI), but most people agree that it includes computational models that allow for perception, thinking, and action. Data created by humans and machines is increasing at a rate that outpaces our ability to handle, comprehend, and use it. There will come a day when artificial intelligence is the foundation for all computer learning and complex decision making. The article starts with a brief introduction to AI before exploring its background, definitions, traits, uses, development, and achievements.

Keywords
Machine learning, Deep learning; Neural networks; Natural language processing and knowledge base system.

INTRODUCTION

An intelligent agent is a system that acts in a way that maximizes its chances of success. Artificial intelligence (AI) is the subfield of computer science that deals with machine intelligence. In order for computers to mimic human intelligence, it is necessary to study concepts. Reasoning, information, planning, learning, communication, perception, and object manipulation and movement are the core elements of artificial intelligence. Machine intelligence (or AI) refers to the study and practice of designing and developing intelligent machines, most notably computer programs.

ARTIFICIAL INTELLIGENCE METHODS:

Machine Learning-

Machines in an AI application learn and develop themselves naturally via experience, rather than being programmed to carry out specific tasks. For predictive analysis, a subfield of machine learning known as "Deep Learning" use artificial neural networks. Unsupervised learning, supervised learning, and reinforcement learning are just a few of the many machine learning algorithms available. The algorithm in Unsupervised Learning does not rely on secret data to make decisions in the absence of human oversight. Using a collection of input objects and the intended output as training data, Supervised Learning is able to infer a function. With the help of reinforcement learning, computers can figure out what to do to maximize their reward and arrive at the optimal solution.

Natural Language Processing(NLP)

It is the interactions between computers and human language where the computers are programmed to process natural languages. Machine Learning is a reliable technology for Natural Language Processing to obtain meaning from human languages. In NLP, the audio of a human talk is captured by the machine. Then the audio to text conversation occurs, and then the text is processed where the data is converted into audio. Then the machine uses the audio to respond to humans. Applications of Natural Language Processing can be found in IVR (Interactive Voice Response) applications used in call centres, language translation applications like Google Translate and word processors such as Microsoft Word to check the accuracy of grammar in text. However, the nature of human languages makes the Natural Language Processing difficult because of the rules which are involved in the passing of information using natural language, and they are not easy for the computers to understand. So NLP uses algorithms to recognize and abstract the rules of the natural languages where the unstructured data from the human languages can

be converted to a format that is understood by the computer.

Automation & Robotics-

The goal of automation is to create more efficient and cost-effective processes by having machines do mundane and repetitive jobs. Neural networks, graphs, and machine learning are tools that many businesses employ in

machine control. Using CAPTCHA technology, this automation can avoid problems with online money transactions being fraudulent. Programmable robotic process automation can adapt to new situations and carry out high-volume repetitive activities.

Machine Vision-

Machines can capture visual information and then analyze it. Here cameras are used to capture the visual information, the analogue to digital conversion is used to convert the image to digital data, and digital signal processing is employed to process the data. Then the resulting data is fed to a computer. In machine vision, two vital aspects are sensitivity, which is the ability of the machine to perceive impulses that are weak and resolution, the range to which the machine can distinguish the objects. The usage of machine vision can be found in signature identification, pattern recognition, and medical image analysis, etc.

Knowledge-Based Systems(KBS):

A KBS can be defined as a computer system capable of giving advice in a particular domain, utilizing knowledge provided by a human expert. A distinguishing feature of KBS lies in the separation behind the knowledge, which can be represented in a number of ways such as rules, frames, or cases, and the inference engine or algorithm which uses the knowledge base to arrive at a conclusion.

Neural Networks:

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.

Applications of AI

Artificial Intelligence has various applications in today's society. It is becoming essential for today's time because it can solve complex problems with an efficient way in multiple industries, such as Healthcare, entertainment, finance, education, etc. AI is making our daily life more comfortable and fast.

Following are some sectors which have the application of Artificial Intelligence:

1. AI in Astronomy

o Artificial Intelligence can be very useful to solve complex universe problems. AI technology can be helpful for understanding the universe such as how it works, origin, etc.

2. AI in Healthcare

o In the last, five to ten years, AI becoming more advantageous for the healthcare industry and going to have a significant impact on this industry.

o Healthcare Industries are applying AI to make a better and faster diagnosis than humans. AI can help doctors with diagnoses and can inform when patients are worsening so that medical help can reach to the patient before hospitalization.

3. AI in Gaming

o AI can be used for gaming purpose. The AI machines can play strategic games like chess, where the machine needs to think of a large number of possible places.

4. AI in Finance

o AI and finance industries are the best matches for each other. The finance industry is implementing automation, chatbot, adaptive intelligence, algorithm trading, and machine learning into financial processes.

5. AI in Data Security

o The security of data is crucial for every company and cyber-attacks are growing very rapidly in the digital world. AI can be used to make your data more safe and secure. Some examples such as AEG bot, AI2 Platform,are used to determine software bug and cyber-attacks in a better way.

6. AI in Social Media

o Social Media sites such as Facebook, Twitter, and Snapchat contain billions of user profiles, which need to be stored and managed in a very efficient way. AI can organize and manage massive amounts of data. AI can analyze lots of data to identify the latest trends, hashtag, and requirement of different users.

7. AI in Travel & Transport

o AI is becoming highly demanding for travel industries. AI is capable of doing various travel related works such as from making travel arrangement to suggesting the hotels, flights, and best routes to the customers. Travel industries are using AI-powered chatbots which can make human-like interaction with customers for better and fast response.

8. AI in Automotive Industry

o Some Automotive industries are using AI to provide virtual assistant to their user for better performance. Such as Tesla has introduced TeslaBot, an intelligent virtual assistant.

o Various Industries are currently working for developing self-driven

cars which can make your journey more safe and secure.

9. AI in Robotics:
o Artificial Intelligence has a remarkable role in Robotics. Usually, general robots are programmed such that they can perform some repetitive task, but with the help of AI, we can create intelligent robots which can perform tasks with their own experiences without pre-programmed.
o Humanoid Robots are best examples for AI in robotics, recently the intelligent Humanoid robot named as Erica and Sophia has been developed which can talk and behave like humans.

10. AI in Entertainment

11. AI in Agriculture
o Agriculture is an area which requires various resources, labor, money, and time for best result. Now a day's agriculture is becoming digital, and AI is emerging in this field. Agriculture is applying AI as agriculture robotics, solid and crop monitoring, predictive analysis. AI in agriculture can be very helpful for farmers.

12. AI in E-commerce
o AI is providing a competitive edge to the e-commerce industry, and it is becoming more demanding in the e-commerce business. AI is helping shoppers to discover associated products with recommended size, color, or even brand.

13. AI in education:
o AI can automate grading so that the tutor can have more time to teach. AI chatbot can communicate with students as a teaching assistant.
o AI in the future can be work as a personal virtual tutor for students, which will be accessible easily at any time and any place.

SOME OTHER APPLICATIONS:

First, detecting fraud. Two distinct applications of AI exist in the financial services sector. Artificial intelligence is used to determine a borrower's creditworthiness in the first scoring process. To keep an eye on and identify any suspicious purchases made with a credit card, more sophisticated AI engines are used in real time.
2. Customer service using virtual means (VCA). With the help of VCA, call centers may automate the process of predicting and responding to client requests. The first point of contact during a customer support query is using voice recognition technology combined with human-like conversation simulation. A person is contacted for more complex questions.
3. Healthcare: AI systems may help healthcare facilities manage patient appointments, rotate personnel, and arrange medical records. AI is also useful in many other medical domains, such as difficult internal organ procedures, embryology, neurology, cardiology (CRG), and sonography.

4. Industries that deal with heavy machinery: Working with and maintaining these massive equipment may be dangerous. Having a reliable and secure operation agent is therefore an essential component of their functioning.

5. The telecom industry: BT Group, for instance, uses heuristic search in a scheduling software that gives the schedules of 20,000 engineers. This helps with labor management for many telecom organizations.

6. Music: Researchers are attempting to program the computer to perform like the accomplished musician. Some of the main areas of concentration for study in the field of Music and Artificial Intelligence include sound processing, composition, performance, and music theory. Just a few examples: smartmusic, Orchextra, chucks, etc.

7. Antivirus: The use of AI approaches in antivirus detection has grown in recent years. At the moment, there are a few of the most important AI methods used for antivirus detection. It boosts antiviral detection systems' efficiency and encourages the development of new AI algorithms for use in antivirus detection, which will eventually lead to AI-integrated antivirus detection.

Future of AI

Considering the features and its extensive use, we might end up sticking with AI. It seems that the world is going to be more and more artificial as AI develops. The biological paradigm of intelligence is set in stone as it is an established and long-standing one, yet the non-biological paradigm of computing and intelligence is seeing rapid expansion. An estimated 10,000,000,000 binary digits is the maximum amount of data that the human brain can store. However, this is likely used mostly for the purpose of recalling visual impressions and other rather inefficient processes. Given the inherent limitations and instability of natural intellect, it follows that computers may soon play a pivotal role in ensuring the world runs smoothly. The advent of artificial intelligence (AI) has been a watershed moment in the history of computing, and it will soon be an integral part of every computer program. Both opportunities and threats are brought out by this. Both offensive and defensive cyber operations will be enhanced by the deployment of AI. Furthermore, new forms of cyberattack will emerge to exploit the specific vulnerabilities of AI systems. Last but not least, artificial intelligence's insatiable need for massive volumes of training data will redefine our approach to data security by amplifying the significance of data. If we want this game-changing technology to lead to widespread security and prosperity, careful global governance is a must.

Conclusion

We have covered the basics of AI up to this point. So far, we have covered the basics, as well as some of its uses and accomplishments. Institutions and scientists engaged in AI research aim to solve most issues or execute activities that humans aren't good at. It is the duty of the top echelon of engineers to advance this area of computer science, and doing so will undoubtedly alter the global landscape.

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