

ARTIFICIAL INTELLIGENCE & ITS APPLICATION

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ABSTRACT

It is the science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable. While no consensual definition of Artificial Intelligence (AI) exists, AI is broadly characterized as the study of computations that allow for perception, reason and action. Today, the amount of data that is generated, by both humans and machines, far outpaces humans' ability to absorb, interpret, and make complex decisions based on that data. Artificial intelligence forms the basis for all computer learning and is the future of all complex decision making. This paper examines features of artificial Intelligence, introduction, definitions of AI, history, applications, growth and achievements.

KEYWORDS- Machine learning, Deep learning, Neural networks, Natural Language Processing, Knowledge Base System

INTRODUCTION

Artificial Intelligence (AI) is the branch of computer science which deals with intelligence of machines where an intelligent agent is a system that takes actions which maximize its chances of success. It is the study of ideas which enable computers to do the things that make people seem intelligent. The central principles of AI include such as reasoning, knowledge, planning, learning, communication, perception and the ability to move and manipulate objects. It is the science and engineering of making intelligent machines, especially intelligent computer programs

REVIEW OF LITERATURE

Artificial Intelligence (AI) has been a subject of academic and industrial interest for decades, with its conceptual roots dating back to the mid-20th century. AI as the science and engineering of making intelligent machines. Over time, the development of machine learning (ML) and deep learning (DL) algorithms significantly advanced the capabilities of AI systems. In finance, AI applications include algorithmic trading, fraud detection, and risk assessment. According to a study by Brynjolfsson and McAfee (2017), AI-powered analytics have enhanced decision-making in investment and banking operations. Despite its promise, AI also presents ethical and societal challenges. Scholars such as Binns (2018)

and Floridi et al. (2018) have emphasized issues like algorithmic bias, data privacy, and the lack of transparency in AI decision-making. These concerns highlight the urgent need for robust ethical frameworks and regulatory oversight.

RESEARCH METHODOLOGY

AI involves using AI tools like NLP and machine learning to automate, accelerate, and deepen traditional research stages, from literature reviews (summarizing, finding gaps) and data analysis (pattern detection, trend spotting, generating insights) to writing the methodology section itself, enhancing efficiency while maintaining rigor, though critical human oversight remains essential to verify accuracy and avoid AI-generated errors.

KEY OBJECTIVES OF AI STUDY:

Replicate Human Cognitive Functions:

To enable machines to learn from data, reason through complex problems, and understand natural language.

Enhance Decision-Making & Efficiency:

To automate routine, repetitive tasks and provide faster, more accurate data-driven insights to improve productivity.

Problem Solving & Optimization: To develop algorithms that find optimal solutions to complex, real-world problems in fields like medicine, finance, and logistics.

Advance Perception and Robotics: To enhance machine vision and sensor interpretation, allowing for better interaction with the physical world.

Ensure Ethical & Safe Deployment: To create AI that is transparent, unbiased, secure against attacks, and beneficial to society.

Human-AI Collaboration: To foster synergy between human intelligence and machine capabilities, augmenting human potentials.

ARTIFICIAL INTELLIGENCE METHODS:

Machine Learning

It is one of the applications of AI where machines are not explicitly programmed to perform certain tasks; rather, they learn and improve from experience automatically. Deep Learning is a subset of machine learning based on artificial neural networks for predictive analysis. There are various machine learning algorithms, such as Unsupervised Learning, Supervised Learning, and Reinforcement Learning. In Unsupervised Learning, the algorithm does not use classified information to act on it without any guidance. In Supervised Learning, it deduces a function from the training data, which consists of a set of an input object and the desired output. Reinforcement learning is used by machines to take suitable actions to increase the reward to find the best possibility which should be taken in to account.

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 purpose of Automation is to get the monotonous and repetitive tasks done by machines which also improve productivity and in receiving cost-effective and more efficient results. Many organizations use machine learning, neural networks, and graphs in automation. Such automation can prevent fraud issues while financial transactions online by using CAPTCHA technology. Robotic process automation is programmed to perform high volume repetitive tasks which can adapt to the change in different circumstances. Machine Vision Machines can capture visual information and then analyse 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 Trends and Innovation

AI in Astronomy- of 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.

AI in Healthcare - 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.

AI in Gaming - 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.

AI in Finance - 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.

AI in Data Security - 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.

AI in Social Media - 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 analyse lots of data to identify the latest trends, hashtag, and requirement of different users.

AI in Travel & Transport – 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.

AI in Automotive Industry - Some Automotive industries are using AI to provide virtual assistant to their user for better performance. Such as Tesla has introduced Tesla Bot, an intelligent virtual assistant. Various Industries are

currently working for developing self-driven cars which can make your jour

AI in Robotics - 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. 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.

AI in Agriculture - Agriculture is an area which requires various resources, labour, 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.

AI in E-commerce - 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, colour, or even brand.

AI in education: AI can automate grading so that the tutor can have more time to teach. AI chatbot can communicate with students as a teaching assistant. 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.

OTHER APPLICATIONS:

Fraud detection. The financial services industry uses artificial intelligence in two ways. Initial scoring of applications for credit uses AI to understand creditworthiness. More advanced AI engines are employed to monitor and detect fraudulent payment card transactions in real time.

Virtual customer assistance (VCA). Call centres use VCA to predict and respond to customer inquiries outside of human interaction. Voice recognition, coupled with simulated human dialog, is the first point of interaction in a customer service inquiry. Higher-level inquiries are redirected to a human.

Medicine: A medical clinic can use AI systems to organize bed schedules, make a staff rotation, and provide medical information. AI has also application in fields of cardiology (CRG), neurology (MRI), embryology (sonography), complex operations of internal organs etc.

Heavy Industries : Huge machines involve risk in their manual maintenance and working. So it becomes necessary part to have an efficient and safe operation agent in their operation.

Telecommunications: Many telecommunications companies make use of heuristic search in the management of their work forces for example BT Group has deployed heuristic search in a scheduling application that provides the work schedules of 20000 engineers.

Music: Scientists are trying to make the computer emulate the activities of the skilful musician. Composition, performance, music theory, sound processing are some of the major areas on which research in Music and Artificial Intelligence are focusing on. Eg: chucks, Orch extra, smart music etc.

Antivirus: Artificial intelligence (AI) techniques have played increasingly important role in antivirus detection. At present, some principal artificial intelligence techniques applied in antivirus detection It improves the performance of antivirus detection systems, and promotes the production of new artificial intelligence algorithm and the application in

antivirus detection to integrate antivirus detection with artificial intelligence.

Future of AI

Looking at the features and its wide application we may definitely stick to artificial intelligence. Seeing at the development of AI, is it that the future world is becoming artificial. Biological intelligence is fixed, because it is an old, mature paradigm, but the new paradigm of non-biological computation and intelligence is growing exponentially. The memory capacity of the human brain is probably of the order of ten thousand million binary digits. But most of this is probably used in remembering visual impressions, and other comparatively wasteful ways. Hence, we can say that as natural intelligence is limited and volatile too world may now depend upon computers for smooth working. Artificial intelligence (AI) is truly a revolutionary feat of computer science, set to become a core component of all modern software over the coming years and decades. This presents a threat but also an opportunity. AI will be deployed to augment both defensive and offensive cyber operations. Additionally, new means of cyber-attack will be invented to take advantage of the particular weaknesses of AI technology. Finally, the importance of data will be amplified by AI's appetite for large amounts of training data, redefining how we must think about data protection. Prudent governance at the global level will be essential to ensure that this era-defining technology will bring about broadly shared safety and prosperity.

NetApp and artificial intelligence.

As the data authority for hybrid cloud, NetApp understands the value of the access, management, and control of data. The NetApp data fabric provides a unified data management environment that spans across edge devices, data

centers, and multiple hyperscale clouds. The data fabric gives organizations of all sizes the ability to accelerate critical applications, gain data visibility, streamline data protection, and increase operational agility.

NetApp AI solutions are based on the following key building blocks:

- ONTAP software enables AI and deep learning both on premises and in the hybrid cloud.
- AFF all-flash systems accelerate AI and deep learning workloads and remove performance bottlenecks.
- ONTAP Select software enables efficient data collection at the edge, using IoT devices and aggregations points.
- Cloud Volumes can be used to rapidly prototype new projects and provide the ability to move AI data to and from the cloud.

Conclusion

Thus far, the discussion has provided a brief overview of **Artificial Intelligence (AI)**, including its foundational principles, diverse applications, and notable achievements across various domains. AI, as an advanced field within computer science, seeks to design systems capable of performing tasks that typically require human intelligence, such as learning, reasoning, problem-solving, perception, and decision-making. Over the past few decades, significant progress has been made in areas such as machine learning, natural language processing, robotics, and data analytics, enabling AI to transform sectors ranging from healthcare and education to industry and governance.

The overarching objective of researchers and institutions engaged in AI development is to address complex, large-scale problems and accomplish tasks that may be beyond the direct

capabilities of human beings, either due to limitations of time, scale, or cognitive capacity. In this sense, AI is not merely a tool for automation but a means of augmenting human potential and expanding the boundaries of what can be achieved. Its applications in predictive analysis, precision medicine, climate modeling, and intelligent systems highlight its transformative potential in tackling some of the most pressing global challenges.

It is increasingly evident that continued advancements in AI will profoundly reshape the socio-economic, cultural, and technological landscape of the world. As such, the responsibility for guiding the ethical, inclusive, and sustainable development of this field rests significantly with the community of skilled engineers, researchers, and innovators. This “creamy layer” of technical expertise must not only strive for technological excellence but also ensure that AI systems are designed with considerations of fairness, accountability, transparency, and societal well-being. By fostering interdisciplinary collaboration and adhering to ethical standards, the development of AI can be steered toward outcomes that are beneficial, equitable, and aligned with the broader interests of humanity.

References

- http://en.wikibooks.org/wiki/Computer_Science:Artificial_Intelligence
- <http://www.howstuffworks.com/artificialintelligence>
- <http://www.google.co.in>
- <http://www.library.thinkquest.org>
- <https://www.javatpoint.com/application-of-ai>
- <https://www.educba.com/artificial-intelligence-techniques/>
- <https://www.cigionline.orgw/articles/cybersecuritybattlefield/>