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A Study of Artificial Intelligence & Its Applications

Dr. Rampravesh R. Yadav, Prof. Pooja J. Yadav, Prof. Alok K. Singh, Prof. Deepshikha Sarjare, Prof. Dimpal Singh

Bhavna Trust Degree College pf Science and Commerce , Chembur,Deonar, Mumbai -400088

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 perceptions reason and action. Today, the amount of data is more so for a human it is not possible to make decision fast and in minutes so here AI plays a crucial role .AI not only helps in complex problem solving but makes our day to day life easier and efficient. It is broadly growing in every field 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.

INTRODUCTION:

Artificial Intelligence (AI) 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. Artificial Intelligence (AI) is the field of technology that enables the machines to automatically perform tasks that would otherwise require human intelligence. AI is a huge spectrum in the field of Computer Science and is developed and programmed through machine learning and deep learning.

Machine Learning:

Machine Learning (ML), is simply the field of study that deals with teaching computer programs and algorithms to keep improving on a particular task. Machines make use of insights extracted from data. In a world where machines complete most of the tasks, they need to learn how things are done and also anticipate. This is where machine learning steps in. It teaches machines to learn on their own and make predictions based on previous insights. Machine Learning is the science of getting computers to learn and act like humans do, and improve their learning over time in an autonomous fashion, by feeding them data and information observations and real-world interactions. There are three types of machine learning supervised learning, unsupervised and

reinforcement learning. Supervised learning is like teaching a child using a flash cards ,it is one of the easiest method. Unsupervised learning is more popular because it learns from unlabeled data and unorganized data it is used in recommendation system, to identify people habits and behavior. Reinforcement learning is different from supervised and unsupervised because it does not learn from labeled and unlabeled data but it run from its own mistakes. It is put in a environment where he learns from good and bad behaviors. Its is used in video games .

Natural Language Processing (NLP)

In simple words Natural Language Processing is a branch of artificial intelligence that gives machines the ability to understand human text and spoken words. Think of it like this: the way you are talking to your friend today, is the same way you are interacting with a machine and it has become possible because of Natural Language Processing.

It converts the “written text” into structured data; parsing, speech recognition and part of speech tagging are a part of NLP. NLP breaks down the language into small and understandable chunks that are possible for machines to understand.

NLP can be thought of as anything that is related to words, speech, written text, or anything similar. Google, use NLP to show the desired search results. Models in NLP are usually sequential models, they process the queries and can modify each other.

Lemmatization and Stemming (this process involves converting the word into its base form), tokenization (splitting the whole text into the list of tokens), Named Entity Recognition (identification of categories and their classification) are some NLP techniques that are employed for extracting information.

Automation & Robotics-

Robotic Process Automation or RPA is the use of Artificial Intelligence (AI) and Machine Learning abilities to deal with high volume, repeatable errands those earlier expected humans to perform. The fundamental objective of the RPA cycle is to supplant monotonous and exhausting clerical tasks performed by people, with a virtual labor force. Consequently, in simple words, Robotic Process Automation is the innovation that permits anybody today to arrange PC programming or a "robot" to copy and coordinate the activities of a human collaborating inside advanced frameworks to execute a business cycle.

RPA robots use the UI to catch information and control applications simply like people do. They decipher, trigger reactions and speak with different frameworks to perform on an immense assortment of redundant undertakings. Just significantly better: an RPA programming robot never dozes and commits zero errors. RPA robots are equipped for impersonating many–if not all– human client activities. They sign in to applications, move records and envelopes, reorder information, fill in structures, remove organized and semi-organized information from reports, scratch programs, and many more.

Machine Vision:

Machine vision uses cameras to capture visual information from the surrounding environment. It then processes the images using a combination of hardware and software and prepares the information for use in various applications. Machine vision technology often uses specialized optics to acquire images. This approach lets certain characteristics of the image be processed, analyzed and measured. The Machine vision systems are

advanced technologies designed to replicate human vision and perception in the context of automation and industrial processes. These systems integrate a combination of hardware and software components to capture and analyze visual information from the surrounding environment. The primary objective is to enable machines to make informed decisions based on the visual data they acquire.

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 Banking**

There are numerous applications for artificial intelligence in our banking system. It is heavily involved in ensuring the security of our transactions and detecting fraud. AI is at work behind the scenes when you deposit a cheque by scanning it with your phone, receive a low-balance alert, or log in to your online banking account. Whether you go to a shop for lunch and buy a new pair of trousers, artificial intelligence will verify the purchase to see whether it's a "regular" transaction and then either validate or refuse the transaction for fear that someone else is using your credit card.

2. AI in Finance

- Document capture technologies allow financial institutions to automate their evaluation procedures of credit applicants. Cyber and data breaches are one of the primary challenges faced by banks in today's times according to KPMG. As per its survey, over half the respondents reveal that they are able to reclaim below 25% of fraud losses, making fraud prevention an indispensable task.
- AI technologies have advanced significantly to keep track of fraudulent actions and handle system security. AI adoption in the Adopting AI for fraud detection can also boost general regulatory compliance matters, minimize the workload, and operational expenses by cutting down on being exposed to fraudulent documents.

▪ American Express, for instance, adopts fraud algorithms optimized with NVIDIA Tensor RT for monitoring each transaction on their platform in real-time for over $1.2 trillion spent annually. The platform has leveraged deep-learning-based models for detecting fraud and generating decisions within the blink of an eye.

3. AI in Content generation

- Regularly publishing excellent content is critical for any digital marketing plan. Unfortunately, content creation takes time, and not everyone has the writing talents or willingness to produce content every week. For example, if you own a business, you may have a blog with infrequent content updates, or you may have avoided starting one entirely since you don't have the time to write.
- Writing is not easy, yet it is necessary for all businesses. Blog entries, website copy, and social media postings demand you to roll up your sleeves, brainstorm ideas, and create unique, instructive content that resonates with your target audience. Unfortunately, writer's block can strike even the most experienced digital marketers.
- An AI content generator, also known as an AI writing generator or AI writer, generates and writes various sorts of content using machine learning (ML). It may help you boost your content strategy by writing articles, social media post descriptions, adverts, blog posts, landing page text, and even emails.
- AI content generating systems scan and learn from similar topics on the internet, then generate copy using natural language processing (NLP). Essentially, they rework current information from the web to produce new content; they can assist with content generation or write full blog entries for you using the information you enter into the system as a guideline.
- AI is becoming an increasingly significant tool in the healthcare industry since it can execute many activities faster, more precisely, and efficiently at a lower cost. AI can also boost operational efficiency, connect disparate healthcare data sets, and provide user-centric experiences.
- Healthcare providers, pharmaceutical firms, and life science companies are already using multiple types of AI, including rule-based expert systems, natural language processing (NLP), and ML, for different applications.
- AI helps medical workers better grasp the everyday patterns and demands of the patients they care for. Using AI, professionals may provide greater guidance, assistance, and feedback to patients, ensuring beneficial outcomes. Several diseases, including cancer, can be recognized more reliably in their early stages with AI.
- For example, AI may considerably faster and accurately translate mammograms, reducing unnecessary biopsies. Similarly, AI, when combined with consumer wearable's, can monitor and treat heart illnesses in their early stages, allowing doctors and careers to better detect, monitor, and avoid potentially fatal outcomes.

5. AI in Stock Market

- Stock sentiment analysis can be used to ascertain investors' attitudes towards a certain stock or asset. Sentiment can sometimes provide insight into future price action. This is also an example of how trading psychology can influence a market, serving as a forecasting tool for potential future price changes in a specific asset.

- Several factors influence stock mood, including news (economic, political, and industry-related) and social media. These factors influence stock sentiment by affecting stock market volatility, trade volume, and corporate earnings.

6. AI in Climate Science

Artificial Intelligence (AI) is a rapidly growing field that has the potential to play a significant role in addressing climate change. The capabilities of AI technology can help us better understand the complex interactions between the earth's systems, the impact of human activities on the environment, and the measures that need to be taken to mitigate the effects of climate change. In this blog, we will explore some of the ways in which AI can be used to tackle the issue of climate change and help achieve a more sustainable future.

7. 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 catboats which can make human-like interaction with customers for better and fast response.

8. AI use in NETFLIX

- AI is a technological advancement that has many sub-branches that specialize in different tasks. In general, AI relies on the history of algorithmic data to train itself to work efficiently and understand the needs of users. It employs tools such as NLP to provide users with a human-like interaction.
- Machine learning is a sub-discipline of artificial intelligence. Machine learning is the understanding of computer algorithms that automatically improve their workings when fed data and experience. In fact, most of these technologies don't even require human intervention to complete their tasks. It is used for personalized movie selection, create personalized thumbnail ,pre-productions locations for movies, provide high quality streaming.

9. AI use in Facebook:

- Facebook receives user comments and posts as text data, and by separating the messages into individual letters and even exclamation points, the machines should be able to automatically identify word associations.
- More than half of Facebook users, who are dispersed over the globe, do not speak English. The Applied Machine Learning team developed an AI-based automatic translation system to break down these communication obstacles, and 800 million users use it each month to see translated content in their News Feed.
- It can be challenging to recall the precise time that something occurred and the person who snapped the picture to record the moment while reflecting on your fondest recollections.
- Instead of simply categorizing the entire image, Facebook is developing systems that can analyze photos down to the individual pixel level. They can identify specific items in an image as well as their relationships using a process known as image segmentation. .

10 AI in Telecommunications

- One of the sought-after applications of AI in the telecommunication sector deals with radio signal optimization. As much of the network distribution in the telecom sector relies on radio signals, it is important for the service providers to keep up with the quality and provide the very best to their customers.

- The second use of AI in the telecom sector is that of gathering real-time data. With the help of machine learning tools and customized software, telecom service providers can very well accumulate data with respect to the on going trends. o As long as the world was relying on wireless telephones and calling capability, technology was doing just fine. However, with the emergence of the internet, transmission has become an essential component of the telecommunications field. o Now, it is no longer acceptable to the masses that their internet lags even by a minute. This has brought in the power of AI which has helped in the improvisation of transmission. As discussed above, radio signal optimization has been one of the best applications of AI.
- This particular application of AI using predictive analytics is a much-talked-about feature that AI has brought into this world.

11. 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, color, or even brand.

12. AI in aquaculture:

While aquaculture is a vast industry in itself that has spread across the world like a wildfire, it is not as simple as it may sound. With the emergence of innovative technologies in aquaculture, fish farming technology has fairly progressed in a bid to advance itself and make way for more technologies to invade its arena.

Artificial Intelligence in aquaculture is one such technology that can be used and applied for better outcomes and results in the long run.AI is used for Automated Feeding system, remote Monitoring and maintenance, smart sensors, human-less filtration, temperature optimization, water quality regulation.

SOME OTHER APPLICATIONS:

1. **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.

2. **Virtual customer assistance (VCA):** Call centers 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.

3. **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.

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

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

6. Music: Scientists are trying to make the computer emulate the activities of the skillful 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, Orchestra, smart music etc.

7. 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. A 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.

Conclusion :

Till now we have discussed in brief about Artificial Intelligence. We have discussed some of its principles, its applications, its achievements etc. The ultimate goal of institutions and scientists working on AI is to solve majority of the problems or to achieve the tasks which we humans directly can't accomplish. It is for sure that development in this field of computer science will change the complete scenario of the world now it is the responsibility of creamy layer of engineers to develop this field.

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