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Artificial Intelligence

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ABSTRACT:

In today's world, one of the booming technologies of computer science is Artificial Intelligence which is ready to create a new revolution in the world by making intelligent machines. The Artificial Intelligence is now all around us. It is currently working with a variety of subfields, ranging from general to specific, such as self-driving cars, playing chess, proving theorems, playing music, Painting, etc. This paper provides the reader with comprehensive understanding of artificial intelligence definition, brief history and the rise of artificial intelligence. The paper also provides information of various fields where artificial intelligence is being implemented throughout the world, then the paper traverses through various real life applications of artificial intelligence such as health care industry, manufacturing and production, security and surveillance, educational sector. The paper also consists of advantages and disadvantages of artificial intelligence which is based on the real life applications.

Keywords: Artificial Intelligence, self-driving cars, health care industry, manufacturing and production, security and surveillance

Introduction:

"Artificial intelligence is a branch of computer science by which we can create intelligent machines which can behave like a human, think like humans, and able to make decisions." "It enables computers and machines to mimic the perception, learning, problem-solving, and decision-making capabilities of the human mind." The word itself is composed of two parts **Artificial** and **Intelligence**, where Artificial implying *"manmade"* and intelligence implying *"thinking power"*, hence AI means *"a man-made thinking power"*.

AI has slowly sprung up and grown stronger in many fields such as engineering, mathematics, Physics technology all of which have led to the current tremendous shift in this field which we are

witnessing now. This is an idea that proposes that machinery can acquire intelligence. It encompasses areas like machines can learn on their own, adapt to a specific circumstance and self-correct their own mistakes. This form of intelligence is already integrated into our day-to-day life such as music recommendations based on browser search history, targeted ads, and self-driving cars.

History of AI:

The start of AI is believed to be made by Alan Turing with his question "CAN MACHINE THINK?". The Turing test, developed by Turing in 1950, is a test of a machine's ability to exhibit intelligent behavior equivalent to, or indistinguishable from, that of a human. The test set some requirements to build a truly intelligent machine that requires knowledge representation, natural language, machine learning, automated reasoning, vision, and robotics for the full test. Since then, the term AI was first introduced by John McCarthy in 1956 his first academic conference at Dartmouth on the subject and it was closely associated with the field of "symbolic AI", which was popular until the end of the 1980s. In the 1990s, the new concept of "intelligent agent" emerged. Now it is realized that we can make machines do whatever humans can do which makes our work easier and simple with the help of algorithms.

Growth of Artificial Intelligence:

Artificial intelligence plays a vital role in the growth of our country's economy and it also creates competitiveness between the leading companies present today. The use of AI in the national economy from both public and private sector is huge and it has no limits it can be used widely. The process of the companies is that to create a strategic plan with the help of AI this creates great competition between the leading companies in the production unit. Modern companies treat advancement in AI technology as means to measure a company's strength in this competitive world. AI is used for efficient planning of country's economy, big companies use it to analyze sales, target potential field of customers etc.

The implementation of AI in finding optimal use cases of a country's budget helps to stabilize various sectors of economy and enable sustainable growth of a country. AI is a versatile piece of technology that is used to enhance the efficiency, quality and safety of every industry. Many entrepreneurs entering into the health care for investing in order to find the new solutions in the health care systems. AI can be of greater use in the areas of imaging, health analysis, monitoring, risk analysis, virtual health assistance and further can be used in a wide range.

Artificial Intelligence in India:

In India Artificial Intelligence is an emerging priority that has the potential to make an easier life and prioritize digital technology. India's national strategy for AI prepared by NITI Aayog has

formulated the way forward to harness the power of Artificial Intelligence in various fields.AI practices and efforts benefit India in addressing societal needs in areas such as healthcare, education, agriculture, smart cities and infrastructure, including smart mobility and transportation using such dynamic data. The dawn of the 21st century saw electronics becoming pervasive in almost every manufactured object in the world. There are now incredible advances indata collection, processing and in computation power. Intelligent systems can now be deployed in a variety of tasks and decision-making to enable better connectivity and enhance productivity.

While AI is likely to bring substantial economic growth in India, it is being predicted that a number of jobs would be lostdue to the automation. Therefore, it is necessary to put required policy and infrastructure in place.India has one sixth theworld population. AI had definitely helped inthe growth and development of the society aswell as the economy. It would help in

improving infrastructure and other traditionalissues.
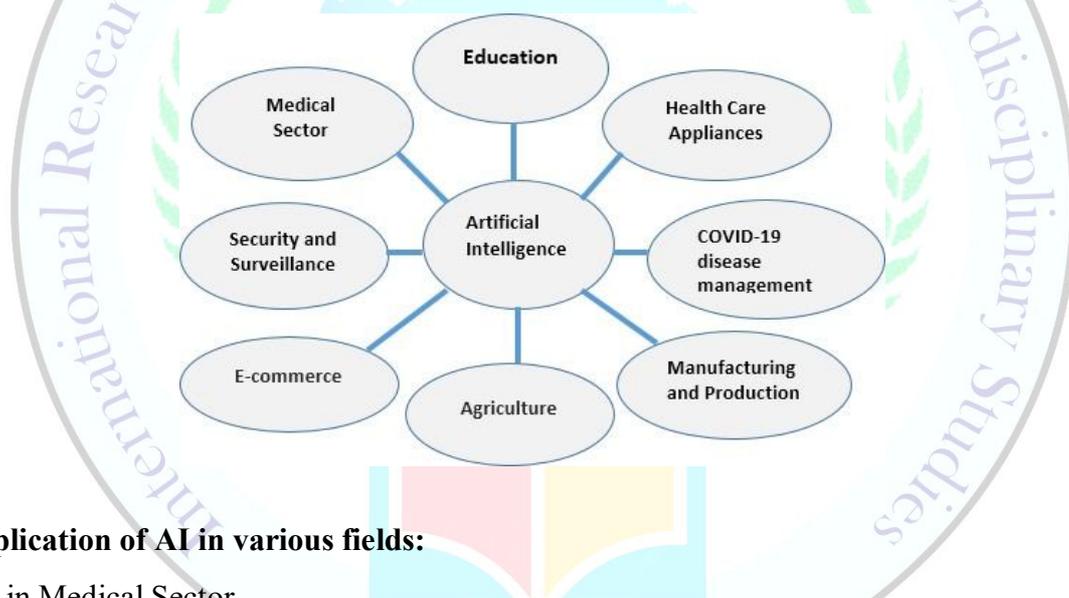
Applications of AI in various fields:

Fig. Application of AI in various fields:

- AI in Medical Sector

- AI in Security and Surveillance

- AI in Education

- AI in Health Care Appliances

- AI in COVID-19 disease management

- AI in Manufacturing and Production

- AI in Agriculture

- AI in E-commerce

Artificial Intelligence in Medical Sector:

Artificial intelligence (AI) and related technologies are increasingly prevalent in business and

society and are beginning to be applied to healthcare. These technologies have the potential to transform many aspects of patient care, as well as administrative processes within provider, payer and pharmaceutical organizations. AI is not one technology, but rather a collection of various technologies like machine learning, deep learning, natural language processing, rule based expert system, physical robot, robotic process automation etc. that defines high importance to healthcare.

Surgical robots, initially approved in the USA in 2000, provide 'superpowers' to surgeons, improving their ability to see, create precise and minimally invasive incisions, stitch wounds and so forth. In healthcare, the dominant applications of Natural Language Processing (NLP) involve the creation, understanding and classification of clinical documentation and published research. AI in radiology is playing a crucial role in detecting different types of critical diseases with the best level of accuracy making the medical diagnosis and treatment process faster.

AI in Security and Surveillance:

Artificial intelligence for surveillance and security is another one of AI's many life- altering virtues.As the National Security Implications are increasing, the requirement for the role of growing AI technology in Security purposes is also increasing as of prime importance. AI for video surveillance and security uses machine-based learning and algorithm to monitor and analyze the images, videos, and data recorded from the video surveillance cameras. Security surveillance cameras have been extensively used in the new cities in places traffic areas, healthcare and security monitoring needs. Network cameras are used in smart cities across the world to monitor the environment and even connected through internet of things. They have enhanced edge computing and fog computing, which in turn enhances the performance of the camera systems. It is also capable of recognizing and dissecting the movement of human beings, vehicles and a wide array of objects.

AI is turning into reality with development of intellectual digital assistants when can possibly perform the functions of a basic police force. This can increase the presence of police force in urban cities with which monitoring can be increased. Use of AI in cyber security provide improved overall security performance and protection from the modern-day cyber threats.

AI in Education:

Artificial intelligence is growing rapidly with the potential to change the face of the education sector massively. Digital Technologies have occupied a major part of our day to day life activities be it the way of communication. As a result, the educational system has also started to change. Now a days due to the pandemic, more and more educational institutions have incorporated digital culture into the curriculum. Most of the educational institutions have Leaning Management Systems (LMS) installed one such example is Moodle. The trend has changed as more and more students started using tablets, and teachers are using innovative platforms such as MS Teams,

Google classroom to interact with students. The trend is shifting towards MOOCs courses offered by Udemy, NPTEL, and course era platforms. The increasing graph of active users for MOOC courses shows the increasing demand for these distant learning platforms and some of the courses can be useful to earn a degree from reputed university.

AI in Healthcare Appliances:

Artificial intelligence can be defined as "[a] machine's ability to make decisions and perform tasks that simulate human intelligence and behavior." The techniques to incorporate AI methodologies in medical devices are based on the underlying algorithm. Today, there is a strong shift in the medical devices industry towards deep learning techniques using neural networks. Neural networks refer to a set of algorithms that are modelled loosely after the human brain and designed to recognize patterns. When exposed to data through neural networks, the deep learning techniques of machines are able to mimic human learning patterns and change without being programmed. AI in medical devices is employed to fulfil human capabilities in a variety of roles with deep learning technique using neural networks, which include, but are not limited to:

☐　　　　Prediction and identification of diseases

☐　　　　Data classification and analysis for disease outbreak

☐　　　　Optimization of medical therapy

☐　　　　Diagnostic support application

Cardiology is the big field that focuses on diseases related to heart, circulatory system, and function. AI is one of the latest trends in managing cardiac in enlarging and spreading the cardiologist's efficiency. AI is used to test screening results in machines like echocardiograms, MRIs, CT scans, etc. which have long been studied using more progressive methods in the field of technology. So when every field uses the artificial intelligence, medical, engineering, and research field, we collaborate in one to give the best medical facility to every citizen and many India one day the country with the best medical facilities.

AI in COVID-19 disease management:

AI is being successfully used in the identification of disease clusters, monitoring of cases, and prediction of the future outbreaks, mortality risk, and diagnosis of COVID-19, disease management by resource allocation, facilitating training, record maintenance and pattern recognition for studying the disease trend. Several applications of AI in the fight against COVID-19 are as follows:

AI in prediction & tracking: AI can be used to predict the spread of the virus and to develop early warning systems by extracting information from social media platforms, calls and news sites, and to provide useful information about unprotected areas and predict diseases and deaths. Healthmap collects publicly available data on COVID- 19 and makes it readily available for effective

tracking of its spread.

AI in contact tracing: AI can augment mobile heath applications where smart devices like watches, mobile phones, cameras and range of wearable device can be employed for diagnosis, contact tracing and efficient monitoring in COVID-19.

AI in monitoring of COVID-19 cases: AI techniques are applied for monitoring patients in clinical settings and prediction of course of treatment. Based on the data derived from vital statistics and clinical parameters, AI may provide critical information for resource allocation and decision-making by prioritizing the need of ventilators and respiratory supports in the Intensive Care Unit.

AI in Manufacturing and Production:

Manufacturers are frequently facing different challenges such as unexpected machinery failure or defective product delivery. Leveraging AI and machine learning, manufacturers can improve operational efficiency, launch new products, customize product designs, and plan future financial actions to progress on their transformation. Implementing AI in manufacturing facilities is getting popular among manufacturers. According to Capgemini's research, more than half of the European manufacturers (51%) are implementing AI solutions, with Japan (30%) and the US (28%) following in second and third.

Benefits of AI in manufacturing and production:

Robotics: Industrial robots, also referred to as manufacturing robots, automate repetitive tasks, prevent or reduce human error to a negligible rate, and shift human workers' focus to more productive areas of the operation.

24/7 production in dark factories: Factories without any human labor are called dark factories since light may not be necessary for robots to function. This is a relatively new concept with only a few experimental 100% dark factories currently operating. They have the potential to unleash significant savings, end workplace accidents and expand their production capacity.

Safety: Manufacturing is one of the highest risk industrial sectors to be working in with more than 3,000 major injuries and nine fatalities occurring each year. The involvement of robots in high-risk jobs can help manufacturers reduce unwanted accidents.

Cost Reduction: Leveraging AI technologies can enhance organizations' analytics capability so that they can use their resources more efficiently, make better forecasts, and reduce inventory costs.

AI in Agriculture:

In the agriculture sector, autonomous tractors and AI-based drones monitoring are used to enhance the productivity and crop yield of farmlands. Robots and automated machines are also used in these fields to monitor crop health conditions and harvesting. AI can help agriculture to boost crop

productivity with better plant health and weather monitoring systems while making the entire process trouble-free. And data is also gathered tofurther train such models to work in agricultural or farming-related fields.

AI in E-commerce:

E-commerce-backed automated warehousing and supply chain management is reducing the manpower and helping storage companies to manage the huge amount of stock or inventory with proper management and supply system. This system is also helping thee-commerce sector to operate with better efficiency and improve their operating margins. The AI-based automated warehousing management system is not only getting benefits but machine learning is improving the online shopping experience ofthe customers. Automated robots are handlingthe inventory performing various tedious withbetter efficiency allowing humans to get involved in decision-making tasks to improve the overall supply-chain and logisticsmanagement.

Advantages of AI

- AI can reduce human error because it uses some set of algorithms by gathering previously stored data, reducing the chances of error and increasing the accuracy and precision of any task.

- The technology of developing AI Robots can overcome many risky limitations of humans and do risky things for us suchas defusing a bomb, oil and coal mining and exploring the deepest part of the ocean, etc. So, it helps in any worst situation, either human or natural disasterstoo.

- Using AI we can make machines work 24x7 without any breaks and they don't even get bored, unlike humans. **Example:** Educational Institutes and Helpline centers.

- Daily applications such as Apple's **Siri**, Window's **Cortana**, Google's **OK Google** are frequently used in our daily routine whether it is for searching a

location, taking a selfie, making a phonecall, replying to a mail and many more.

- AI is applied in wide range of areas like engineering, manufacturing, security andsurveillance, medicine and variety of other applications which involves prediction, control and decision-making applications.

Challenges or Dis-Advantages ofArtificial Intelligence:

We know that AI is widely used in the military. Use of AI possess the challenge of providing transparency and trust to support end users in safety critical applications such as medicine or military. There exists the vulnerability in AI where the inputs or the model itself could be manipulated and compromised. AI has very wide applications in the nuclear medicine. Using the various techniques like neural techniques, AI has wide role in the healthcare field. But we cannot take automatic decisions of patients. The decisions must take by the physicians by observing the patients. AI education systemscan't express emotions which is an importantfactor in learning. As like

a human the robot can't form a team and also can't make a bondas like human, which is so essential in management of a team. Lot of time and money is needed to repair a faulty robot and human intervention is required to fix it.

The creativity in the work done by an AI system solely depends on the programmer who created the AI. This results in lack of human level creativity in a work by AI. No orlittle human touch in the work leads to increased unemployment and laziness in younger generations. In the police department use of AI is much in detecting the crimes and catching the culprits. However we cannot completely rely on AI but in some part it can be used to decrease the work load of the humans but it Human Intelligent cannot be replaced completely.

Conclusion:

In this paper, various aspects of Artificial intelligence have been discussed which givesus the insights of the history of AI and how AI has the potential to grow more. How countries such as India are benefitting from the application of AI has been discussed. Thispaper concludes that with the help of the AI we can achieve many things. The AI helps ineducation, industries, healthcare, security and surveillance. These are useful in our daily lifeand gives us a greater future. Proper use of AItechnology in various fields for the betterment of human life will definitely be advantageous. As AI has some disadvantages too, proper formation of policies should be in place before implementing any AI technology on a field to regulate it. Finally, AI is the kind of technology which is the boon and also a bane to the society and it depends on us how we utilize it.

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