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Strategies for Business Success in the Digital Era

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Artificial Intelligence and It's Applications

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Abstract--- Artificial Intelligence (AI) has rapidly emerged as a transformative force across various industries, driving innovation and efficiency. This paper explores the fundamental concepts of AI, focusing on its definition, core technologies, and the underlying principles that enable machines to mimic human intelligence. The applications of AI are vast, encompassing sectors such as healthcare, finance, transportation, and education, where it enhances decision-making, automates routine tasks, and offers predictive insights. In healthcare, AI algorithms assist in diagnosing diseases with high accuracy, while in finance; they optimize trading strategies and detect fraudulent activities. Autonomous vehicles in transportation rely on AI for real-time decision-making, improving safety and efficiency. In education, AI personalizes learning experiences, catering to individual needs. Despite its advantages, the widespread adoption of AI raises ethical concerns, including privacy issues, bias in algorithms, and the potential impact on employment. This paper concludes by discussing the future prospects of AI, emphasizing the need for responsible development and regulation to ensure that its benefits are maximized while mitigating associated risks.

Keywords--- Evolution of AI, Methods of AI.

1. Introduction

It is claimed that artificial intelligence is playing an increasing role in the research of educational technology, management sciences and operational research areas. Intelligence is commonly considered as the ability to collect knowledge to solve complex problems. In the near future intelligent machines will replace human capabilities in many areas. Artificial intelligence is the study of intelligent machines and software that can reason, learn, gather knowledge, communicate, manipulate and perceive the objects. John McCarthy coined the term in 1956 as branch of computer science concerned with making computers behave like humans. It is the study of the computation that makes it possible to perceive reason and act. Artificial intelligence is different from Psychology because it emphasis on computation and is different from computer science because of its emphasis on perception, reasoning and action. It makes machines smarter and more useful. It works with the help of artificial neurons and scientific theorems. AI technologies have matured to the point in offering real practical benefits in many of their applications. Major artificial intelligence areas are Expert systems, intelligent computer aided instructions, Natural language processing, Speech understanding, Robotics and sensory systems, Computer vision and scene recognition, Neural computing. From these experts systemize rapidly growing technology which is heaving huge impact on various field of life. The various techniques applied in artificial intelligence are neural network, Fuzzy logic, Evolutionary computing, Computer aided instructions and Hybrid artificial intelligence. 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.

2. Evolution of AI

Artificial Intelligence (AI) has undergone significant transformation since its inception, evolving from simple rule-based systems to complex, self-learning algorithms that permeate many aspects of modern life. The journey of AI reflects the broader development of computer science and cognitive science, with each stage of AI's evolution driven by advancements in computational power, algorithmic sophistication, and the availability of data.

Early Foundations: The Birth of AI (1940s-1960s)

The concept of machines that can think dates back to the mid-20th century, with the theoretical foundations laid by pioneers like Alan Turing and John McCarthy. Alan Turing's seminal 1950 paper, "Computing Machinery and Intelligence," introduced the idea of a machine's ability to simulate any form of intelligence, proposing the Turing Test as a measure of a machine's capability to exhibit human-like intelligence. During this period, the term "Artificial Intelligence" was coined by John McCarthy in 1956 during the Dartmouth Conference, which is often regarded as the birth of AI as a field of study.

The First AI Boom and AI Winters (1950s-1980s)

The initial enthusiasm in AI research led to significant achievements in symbolic reasoning, where early AI programs, such as the Logic Theorist and General Problem Solver, could solve mathematical problems and prove theorems. However, these systems were limited to specific, well-defined tasks and struggled with more complex or ambiguous problems. The limitations of these early systems, coupled with overestimated expectations, led to periods of stagnation known as "AI winters" in the 1970s and 1980s. During these times, funding and interest in AI research declined significantly due to unmet promises and the technological constraints of the era, particularly in terms of processing power and data availability.

The Resurgence: Machine Learning and Big Data (1990s-2000s)

The resurgence of AI began in the late 1990s and early 2000s, driven by advances in computational power, the rise of the internet, and the availability of large datasets. This period marked a shift from rule-based AI to machine learning, where systems could learn from data and improve their performance over time. Techniques such as neural networks, which had been explored since the 1950s but were initially limited by hardware, began to show promise. The development of more sophisticated algorithms, such as support vector machines and decision trees, further advanced the field.

The Deep Learning Revolution (2010s-Present)

The 2010s witnessed a dramatic leap in AI capabilities with the advent of deep learning, a subset of machine learning that involves neural networks with many layers (hence "deep"). This approach enabled significant improvements in tasks such as image and speech recognition, natural language processing, and game playing. Notable milestones include Google DeepMind's AlphaGo defeating a world champion in the complex game of Go, and the widespread adoption of AI in consumer applications like voice assistants (e.g., Siri, Alexa). The combination of deep learning with massive parallel computing (e.g., GPUs) and vast amounts of data led to AI systems that could perform at or beyond human levels in specific tasks. This era has also seen the rise of AI in various industries, from healthcare (e.g., diagnostic tools) to finance (e.g., algorithmic trading) and transportation (e.g., autonomous vehicles).

Current Trends and Future Directions

Today, AI continues to evolve, with ongoing research in artificial general intelligence (AGI) aiming to develop machines with human-like cognitive abilities, capable of understanding, learning, and applying knowledge across diverse tasks. While AGI remains a theoretical goal, narrow AI, designed for specific tasks, is increasingly integrated into everyday life. However, the rapid evolution of AI brings challenges, including ethical concerns about privacy, bias in AI systems, and the potential displacement of jobs. These issues highlight the need for responsible AI development and regulation to ensure that the benefits of AI are equitably distributed and its risks mitigated.

3. 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 into 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 centers, 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.

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)

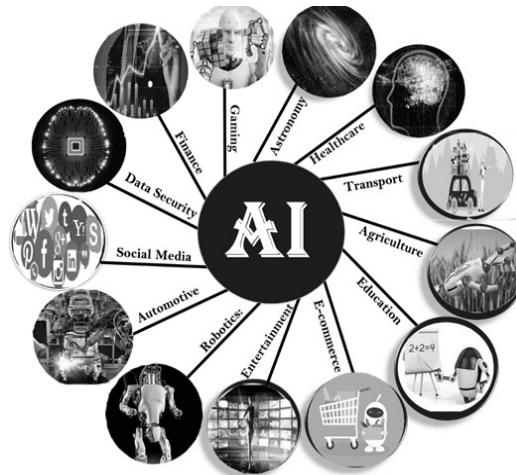
A KBS can be defined as a computer system capable of giving advice in a particular domain, utilizing knowledge provided by a human expert. A distinguishing feature of KBS lies in the separation behind the knowledge, which can be represented in a number of ways such as rules, frames, or cases, and the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

4. Applications of AI



AI in Astronomy

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. 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, Chabot, 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 AEGbot, 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 analyze lots of data to identify the latest trends, hash tag, 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 chat bots which can make human-like interaction with customers for better and fast response.

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 with outpre-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, 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.

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.

AI in Education

AI can automate grading so that the tutor can have more time to teach. AI Chabot 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.

5. Some 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 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.

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 (sialography), 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.

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, 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.

6. Conclusion

Artificial Intelligence (AI) has evolved from a theoretical concept into a transformative technology with wide ranging applications across various industries. Its ability to enhance decision-making, automate complex tasks, and provide predictive insights has made AI indispensable in fields such as healthcare, finance, transportation, and education. AI's potential to improve efficiency, drive innovation, and solve complex problems is enormous, but it also brings challenges that must be carefully managed. Ethical considerations, including issues of privacy, algorithmic bias, and the impact on employment, underscore the importance of responsible AI development. As AI continues to advance, it will likely play an increasingly central role in shaping the future of technology and society. However, to fully harness its benefits, it is crucial to establish robust regulations and ethical frameworks that ensure AI is developed and deployed in a way that is transparent, fair, and beneficial to all. Ultimately, the future of AI lies in striking a balance between innovation and responsibility, ensuring that this powerful technology serves as a force for good.

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Artificial Intelligence in Healthcare and Education

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Abstract--- Artificial intelligence (AI), supported by timely and accurate data and evidence, has the potential to transform health care delivery by improving health outcomes, patient safety, and the affordability and accessibility of high-quality care. AI integration is critical to building an infrastructure capable of caring for an increasingly aging population, utilizing an ever-increasing knowledge of disease and options for precision treatments, and combating workforce shortages and burnout of medical professionals. This is in part because the health data needed to train, test, use, and refine these tools are generally neither standardized nor accessible. This is true across the international community, although there is variable progress within individual countries. There is also universal concern about monitoring health AI tools for changes in performance as they are implemented in new places, used with diverse populations, and over time as health data may change. Healthcare workers spend a lot of time doing paperwork and other administrative tasks. AI and automation can help perform many of those mundane tasks, freeing up employee time for other activities and giving them more face-to-face time with patients

Keywords--- Artificial Intelligence, High-quality and Healthcare.

1. Introduction

In this era, the role of technology is very important. Technology plays a role and aims to ease human work and to make it more efficient. Besides, in the health sector, technology plays an important role in minimizing errors caused by human negligence. For instance, if there is no role of technology in surgical operations performed by doctors, the operation can be dangerous and lead to failure. In other words, AI is a simulation of human-made intelligence in machines programmed to think like humans. AI will improve patient diagnostics, prevention, and therapy and to improve clinical decision-making

2. AI in Health Care

AI has the potential to bring about positive changes in healthcare and to empower patients by providing them with more control over their health. In recent years, AI has been used to improve the delivery of healthcare in a variety of ways, from providing personalized health information to enabling virtual consultations and remote monitoring. AI in healthcare is the ability to provide personalized health information. By analysing patient data, such as medical histories and lifestyle factors, AI algorithms can provide patients with tailored recommendations for maintaining good health. This information can help patients better understand their health and make informed decisions about their care. Another important application of AI in healthcare is remote monitoring. With AI-powered remote monitoring systems, patients can have their vital signs tracked and monitored, alerting healthcare providers to any potential issues. This can lead to earlier intervention and improved patient outcomes, as well as reducing the need for in-person visits to healthcare facilities.

AI in medical radiology has the potential to bring about a significant improvement in patient outcomes and the accuracy of diagnoses. Medical radiology plays a crucial role in the diagnosis and treatment of various medical conditions, and the use of AI has the potential to enhance this important field in a number of ways. One of the key ways that AI is being used in medical radiology is through the analysis of medical images, such as X-rays and CT scans. AI