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WHY AND HOW ARTIFICIAL INTELLIGENCE IS THE NEW BLACK

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Introduction

Today, we live in a society which has aggravated problems thus posing the need for modern and intelligent solutions. Intelligent solutions further need genius and capable minds and hence artificial intelligence was birthed. Even though AI was discovered a long time ago, it wasn't until the recent times that serious and advanced research on AI was in work. The aim of AI is to replicate human minds to solve real world problems. The different domains of AI are discussed in detail in the following sections.

What is AI?

[1] Artificial intelligence is the learning of human minds with the help of simulations run by the computer.The mention of the word "Intelligence" in the term Artificial Intelligence is deceptive. Usually, this word is used to refer to demonstration of any extraordinary accomplishments requiring rare cognition. Consequently, it follows that "artificial intelligence" is a technique for replicating a treasure of clever insights using computational models built using relevant data of past experiences. However, the challenge for AI comes from the computed efforts to replicate the mental faculties of "ordinary" people, such as vision and natural language. The basic premise of AI is the following:

The brain is assumed to also use similar computation based on past experiences to arrive at insights and decisions.AI is usually put into use to replicate the general attitude that goes along with intelligence, while it does not assure a specific way of fabricating the outcome as the AI methods may not be closely what humans follow). [2] Artificial Intelligence (AI) is a broad term that indicates use of a computational model to simulate intelligent behaviour with negligible human intervention.

AI is considered a culmination of both science and engineering to build intelligent machines. This idea was envisaged as early as 1956. The concept is applied in a broad range of fields including Health industry in the form of robotic surgeries, aid medical diagnosis, medical statistics etc.

History of AI

[3] AI began as make-believe invention, science fiction and promise. Those who authored Science fiction utilised their imagination of smart machines to develop the fantasy of intelligent inanimate objects serving their fantasies based on our own human features and properties. Although their imagination was limited and were to serve the curiosity of their audience.The early invented AI skill was Chess which was broadly used as a measure for studying interpretation mechanisms in the early years of AI research. During twentieth century innovations in electronics and after World War II advent of modern computers at Harvard, Bell Laboratories the IBM showed possibilities of fictious demonstrations. This resulted in tremendous computing power. During the latter half of the century, computational devices and computer languages powerful enough to develop tests of concepts came up. Artificial Intelligence does not only mean robots. But it is very much about being empathetic about nature of intelligence and feat using computers as experimental machines.[4] Leonardo Da

Vinci drafted designs for a robot in the form of a primitive cavalier in the year 1495. It is not known if his contemporaries tried to replicate his design. His design was expected to be able to move its limbs, sit, stand and open its mouth wide open.In the book Leviathan, Thomas Hobbes wrote that it is possible to build an artificial animal.

Growth of AI

[5] Artificial Intelligence is engineering science comprising of a set of computation technologies that are motivated by operating out of the box from the usual patterns people use their cognitive skills and senses to understand, apply reason and act. While the rate of advancements in AI has been irregular, there have been noteworthy developments since the field's commencement several years ago. This was once mostly an academic research topic; the ongoing century AI empowers mainstream technologies that are having impressive impact on our lives every day. Futuristic vision and AI planning drive the video games are now a profit-making entertainment industry than the mostly popular Hollywood. Deep learning is a form of ML that is based on layered representations of different possibilities also known as neural networks. It has made understanding voice commands possible on devices, and Deep Learning can be applied in various ways of applications that count on pattern recognition. Natural Language Processing (NLP) has powered machines to carry out effective web searches.[6] Artificial intelligence (AI) has been progressing swiftly in last few years. It is measured in context of resources devoted to it and the quality of different outputs.

Recent indication suggests that AI is having a big impact on the economy. A variety of statistics show robotics shipments, AI start-ups, and rising number of patents. A review of recent research shows that AI and robotics have the possibility to increase productivity and may have combined effects on labour. These rapid progressions apply not to the field of AI, but to all the connections including and not limited to robotics, sensors via digitization (known as "Industry 4.0"). These improvements have started to appear themselves in a variety of applications, including AI conquering humans at complex strategy games.

AI in Healthcare Appliances

[7] Pressure, is force divided cross-sectional area over which it exerts. Inside the human body, regular physiological activities build various pressures, suchblood pressure *etc*., all of which are vital health measures. Pressure sensors can produce signals and function in a manner. AI can hence help in the successful execution of this product.Artificial intelligence is human-like intelligence displayed by machines and algorithms is an important research area for sensors. As technology is progressing, remarkable development has been observed in this field with impressive advantages like its pliability and economic cost.Another outstanding invention is organic pressure sensors whose sensing capabilities transcend that of human skin which is the most widespread organ of the body. This has been a huge breakthrough in the development of electronic skin, popularly known as e-skin. [8] Internet of Things, popularly known as IoT, is a part of AI and is an essential key to building smart homes. Recent innovation of IoT in healthcare is the observation of a baby's actions through intelligent multimodal system which makes use of control charts.RaspberryPi is the technology used to create these control charts. A control chart is created in real time and linked to vision sensors. The baby's behaviour is monitored through indications on the chart. If the value is above a certain value or below a certain value, it implies abnormal baby behaviour. This data is transferred to special IoT devices in smart healthcare centres, specifically to the person incharge of taking care of the baby, so as to give the necessary treatment and attention. This model has been a

huge success in observing baby(ies) using advanced technology. [9] Orthognathic surgery is a surgery performed to correct jaw or lower face conditions.Prognosis and treatment methodology is crucial for a triumphant surgery and good recovery. Hence, accuracy is very important. Since AI had already been used to tackle different problems in the medical fieldwhich also turned out to be successful, it was decided to innovate models based on AIthat can be used to decide the mode of treatment for orthognathic surgeries. 316 patients were studied under this framework. The model prescribed invasive mode of treatment for 160 patients and a non-invasive approach for156 patients.It worked with 2 neural layers and 1 hidden layer. There were 3 different stages to decide which approach was the best and based on these stages, 4 models seemed to perform exceptionally well. These models had an accuracy rate of 96% in terms of deciding treatment plan and 91% accuracy in terms of detailed explanation and final outcome. This suggests that AI can be used to study orthognathic patient and can also be used to devise the optimum treatment plan.

AI in Manufacturing and Production

[10] Based on research into the applications of artificial intelligence (AI) technology in the manufacturing industry in recent years, we analyze the rapid development of core technologies in the new era of 'Internet plus AI', which is triggering a great change in the models, means, and ecosystems of the manufacturing industry, as well as in the development of AI. We then propose new models, means, and forms of intelligent manufacturing, intelligent manufacturing system architecture, and intelligent manufacturing technology system, based on the integration of AI technology with information communications, manufacturing, and related product technology. Moreover, from the perspectives of intelligent manufacturing application technology, industry, and application demonstration, the current development in intelligent manufacturing is discussed. Finally, suggestions for the application of AI in intelligent manufacturing in China are presented.[11] Manufacturing is awaiting a great challenge - the challenge of Artificial Intelligence (AI). We are witnessing the proliferation of applications of AI in industry, ranging from finance and marketing to design and manufacturing processes. The AI tools have been incorporated into computer-aided design software, shop-floor operations software, as well as in entering the logistics systems. The success of AI in manufacturing can be measured by their growing number of applications, releases of new software products, companies developing and distributing these products, conferences and new publications. [12] Series of constant production is intelligent production. They are classified into 3 categories: digital manufacturing, digital-networked manufacturing, and new-generation intelligent manufacturing. New-generation intelligent manufacturing corresponds to incorporating AI into production and manufacturing technology. This helps in driving the production and manufacturing value to heights and increased outputs beneficial to all.

AI in Security and Surveillance

[13] AI has seen tremendous growth in the world. Different sectors of every country are trying to come up with strategic plans to implement AI to increase their security. Businesses use artificial intelligence to improve systematic transformation; city officials are using AI to control the traffic situation. This technology is proliferating at a fast speed. At least 75 out of 176 countries are using it for monitoring and inspection for example, facial recognition systems, smart and safe city, policing. One such country which has put AI to a very intelligent and beneficial use is China. Chinese companies—particularly Huawei, Hikvision, Dahua, and ZTE— are supplying AI surveillance technology in 63 nations. Huawei is in charge of supplying AIS technology to at least 50 countries

in the world. Other companies based in—France, Germany, Israel, Japan—are also playing a significant role in growing this technology to the nations use.[14] AI has gained a lot of attention on the international front. Most of the developed countries are trying to understand AI better and are trying to implement it to increase their security. One such example is China. China's officials believe in mastering and conquering AI technology to protect their citizens and country. Their community policies focus on the AI strategies of other countries like the United States of America. One of their assigned communities dissect everything that is to be known from the reports of AI strategies used by USA. [15] AI surveillance is used to track the growth of COVID 19 cases, prognosis of the cases and trace its reach. This is done by collecting information from all citizens irrespective of their health status. There are many foundations that can support and help health care officials. These foundations are not exactly invented to suite the pandemic scenario, they can be used to answer any worries related to rights, privacy etc.

AI in Education

[16] In the age of modern technology, AI has impacted the working of a nation including the education sector. It has influenced the teaching methodologies in massive ways. The footprint left by AI on education can be explored in 2 sections – First, what is supposed to be taught to students in AI and second, how it can remould education. Let us tackle the first question. Modern education must focus on developing the following qualities in students in order to make the most out of life and the resources provided –

1. Ambidexterity to be confident and tackle challenges with an optimistic attitude.
2. Applicability which serves as an incentive.

These qualities can be embedded in the students by emphasising on present day skills, judicious attention on traditional skills and practice of concepts learnt in the classroom in real life problems.

Moving on to the second question, education can be remoulded by using EdTech and AIED (artificial intelligence in education). Of course, these should be implemented in a phased manner in order to expect maximum output. Companies like Google, Amazon and Facebook have invested millions in AIED to create technologies that focus on empowering students to get hold of their learning therefore making this interactive mode of teaching more fun and engaging, in a way that students have a broader perspective on gaining knowledge, in the right way.[17] AIED has undergone a lot of transformation over the past few years in order to develop the perfect teaching methodology for students that brings out the best in them. The main objective of AIED is to innovate new ways to replace the old school face to face teaching and to our benefit, there has been progress towards this target. ILE (interactive learning environment) has shown that AIED has been successful in increasing productivity of the students by modifying the traditional old school methods of learning. It also aims to evoke qualities of metalinguistic, reflective and logical reasoning among the students. There have been several papers written for a long time now, addressing the system evaluation, modelling approach, short comings and the potential problems that we might face and solutions to tackle these problems. Some of the essential things to keep in mind while developing a strategy are – type of assignments given to students, whether they work in groups or individually, schooling target, type of technology used and academic environment.

1. The type of assignments given to students can be stepwise problems that require application ofonly one skill for several problems and intricate problems which require application of several skills.

2. Independent students can use their own computers or a group of students can use one computer ormany students can use different computers and technology and work together to solve a problemwhich will help them not only in contributing individually to the solution but also to learn from one another hence broadening their perspective.
3. Educational realms that incorporate joint learning strategy have significantly shown to improve learning experiences of students.
4. Schools need not be coerced into switching entirely to a computer-based learning in order to implement AIED. We can broaden our perspective to include other technologies and gadgets like mobile phones, tabs and other inventions in the field of robotics. These new technologies will help revolutionize the education sector.
5. Learning goals should shift from the final product to the necessary actions that need to be taken. This includes self-supervision, joint learning strategy and inspiration.

STEM education is rising in popularity as many schools have started adopting it. STEM stands for Science, Technology, Engineering and Mathematics. It helps students to develop higher thinking to solve real life problems in a sophisticated manner.

Hence, AIED adopts a comprehensive view on education in the modern world.

[18] AI is a revolutionizing technology that aims to replicate the human mind and its responses to solve real world problems. It is taking over the entire world by a storm, by replacing old school methodologies by new mind-blowing innovations that specializes in abstractive thinking, complex idea comprehension, flexibility, versatility and analysing real world problems. And its application in revolutionizing the educational realm is no exception. Artificial intelligence has been adapted by the world of academia in many ways like switching to online mode of teaching with the help of ground breaking technology, utilizing robots for teaching with the help of real-world teachers. This has significantly helped the teachers to upgrade their quality of instruction, to monitor and give one on one focus to students and help them tap their higher potential, and also to evaluate tasks accurately and intelligently. Not only does it benefit the teachers, it also gives the students an upper hand in personalizing their curriculum, hence improving their learning experience and also boosting their confidence, motivation them to reach heights. [19] The success of AIED in the near future is dependent on three factors.

1. The transition from old school, black board teaching to joint learning strategy needs the use of different learning models which are ahead of the typical statistical models. These models need not be analytical or logical.
2. The existing syllabus needs to be updated while keeping a broad perspective and include topics of modern education. The teachers also need to be trained accordingly to make the best out of this new system of teaching. Smart classrooms need to be established and one on one teaching needs to be emphasised in a smart manner.
3. Mock-ups can be used to strategically plan the approach and limiting the resources that the students can use. It can give clarity on the schemes that it supports and does not support, help in application of theory and also come up with new resources for the students to work with. For example, the ITS program incorporates all the above-mentioned points which has made its transition and implementation very easy and effective.

[20] Robotics is a sector that is very fast growing in terms of innovations and applications for its wide range of utility. The application of robotics in the education sector has been proven to be very effective and educational. One such application is educational cobots which is an assistant that

assists teachers. Sometimes students can struggle with concentration and teachers may tend to give less attention to those who are slow paced and have a hard time in grasping concepts. In such cases, cobots come into play to help students concentrate and aid the teachers in distinguish between students who have different learning speeds so as to provide equal and fair learning opportunities to all. Students can take part in ILEs (Intelligent Learning Environment) and be engaged in all the activities.

Advantages of AI

[21]One of the strongest characteristics of AI is that it is designed to think like a human. Which means it can perform tasks that humans can do. But the best part is that emotions will not be involved during decision making which makes it easier to take tough decisions. It is purely based on the truth and reality. We often face this issue of not being able to take the necessary steps or decisions because our emotions cloud our judgement which leads to bad choices. With AI, this is no longer a problem, thus resulting in accurate decisions for the best. As humans, there is a limit as to how much we can work and sometimes this can be a disadvantage. But AI based gadgets do not require any resting time which s huge asset especially when crucial work needs to be done last minute. Passing on the information from one person to another can also be very tedious and time consuming but this is not at all a problem if AI based gadgets are used. They can be copied and transferred to as many devices as required thus being time efficient. [22] Artificial intelligence offers dependability and constancy while being economical. Because of its wide range of applicability, it has been used to restructure different fields such as healthcare, engineering, manufacturing and production, education, economics and legislation. It has been meticulously used in search engines to categorize, search content, webpages, videos and other relevant content. The data stored in it is never lost, in case the organization loses employees due to various reasons, which makes it reliable. Problem solving is also faster and time efficient depending upon the intricacy of the problem. Another useful application of AI is that it can be used to replace traffic polices. These traffic robots can monitor the traffic situation, study it and foretell the traffic conditions. They can report accidents too, if any. AI has been used to increase security as well. It can identify where security laws are violated, formulate new and creative security laws. [23]AI can be applied to psychiatry as well. Some of the profitable and prosperous projects that have been executed are –

1. PARRY is a prototype explaining delusional behaviour in psychiatric patients. It was founded by K. L. Colby.
2. EMYCIN is a set up that administrates psychiatric illnesses. It was founded by B. Mulsant.

Some of the advantages of applying AI to psychiatry are –Patients feel more comfortable in sharing their medical history, symptoms and their private information to a computer than a human; It is cost efficient compared to the traditional face to face psychiatric therapy; Increased productivity with minimum to no flaws is also observed.[24]One of the advantages of AI which is lesser known and talked about is its application in suicide care. Unfortunately, rate of death from suicide is growing every year causing 8 lakh deaths every year. What makes it difficult to prevent suicide is that it is highly unpredictable as there no single specific cause. This is the driving force behind the innovation of programs, which are based on artificial intelligence, to prevent suicides. The systems are designed in a such a way that after entering the relevant data, it will study that past suicide outcomes, create a pattern and be able to discover the major threat factors, recognize individuals or a group of individuals who are suicidal or at high risk and design a proper and effective care system for those individuals. A system was designed by scientists from Vanderbilt University to predict

whether an individual is suicidal or not using data from the patient's health records. This system displayed a precision of 84-92% in 7 days and 80-82% in a year therefore making it accurate and reliable.

Due to the high success rate of these models, it can be implemented on a large scale and expand its reach to individuals who are in critical need of help and care. It is not only accurate, but also time and cost efficient, better than face to face psychiatric therapy sessions and can be set up in various locations. [25]Applications of AI in healthcare is another advantage as it is helping huge masses.

Setting up a consultation, reminders for the re-examinations, warning signs against drug medication, booster dose reminders for all individuals, doctor's appointment for pregnant women is made easy through just a few clicks. It is used to record and store the patient's medical history, prognosis, diagnosis etc and also help in deciding the optimum treatment plan. Robots, which are AI based humanoids, are also being used to assist surgeons in surgeries and aid the senior citizen. Many intelligent devices like prosthetic control systems have been developed to aid disabled individuals.

The field of medicine that is most accepting of AI and its applications is radiology. Through this wonderful invention, imaging will be accurate and radiologists will be able to analyse them efficiently. AI is also used to monitor health and immediately notify the concerned authorities if there are any changes in the patient's condition. [26] Due to the increasing population, the demand for food resources is also increasing. Increasing demand also means increasing prices. Without food resources, it becomes a game of survival of the fittest, and in this case survival of the wealthiest as they can easily afford it. This huge social inequality which could lead to global hunger is therefore a global problem that need immediate attention. It is impossible to meet the current food requirements without the intervention of modern approaches. The field of artificial intelligence, once again, shines as it can be implemented to solve this crisis. AI can be used in crop selection to help the labourers in picking a fertilizer. Information about crops and their preferred fertilizers for optimum yield are entered into the data warehouse which can be accessed later. This process of entering relevant data into the machine and equip it to make decisions when presented with problems is known as deep learning. It is thorough and extensive. Internet of Things (IoT) is the basis of Smart Agriculture. AN example of one such application is watering networks which uses soil, moisture, IR, water sensors and a motor to perceive environmental data and use that to pump water to the crops when it is necessary. This way we control irrigation and conserve water. Soon robots can also help in agricultural tasks such as weeding, spraying etc. This is not only time efficient compared to manual work, but will also decrease labour which is a huge plus point considering the fact that agriculture is a labour-intensive occupation. Hence artificial intelligence in agriculture has a lot of benefits.

Challenges or Dis-advantages of AI

[27] It is true that AI, being able to replicate the human mind and its responses, has revolutionized many areas, but it is not always advantageous. It lacks in many departments like creativity, common sense, logic and reasoning. It lacks true understanding of the world and human emotion which is very essential in some cases. Most of the decisions made by AI cannot be explained as it fails to give us a fair reasoning. As it lacks common sense, it may also not be able to identify when a problem does not have a fixed solution. If there is flaw, AI can produce incorrect answers and we will never know if it is right or wrong as it does not provide any explanation.

[28]Some of the disadvantages of AI are mentioned below:

1. If it falls into the wrong hands, it can be very dangerous.

2. AI is so powerful with a lot of capabilities that it can soon replace people and hence increases the problem of unemployment.
3. Excessive use of AI gadgets can make us very lazy as we might become heavily dependent on them.
4. To create gadgets and technology which are AI driven is too expensive and time consuming.

[29]Advancements in the field of technology has birthed artificial intelligence, a technology which has reformed several domains. It is being thoroughly studies and researched in developed countries like the United States, in Europe and developing countries like China and India. Recently, new technologies have been developed under artificial intelligence – Information communication technology (ICT) and Robot technology (RT). Though proven to be quite impressive, it has some drawbacks.

1. Prototypes based on ICT are elaborate, heavily reliant on user data and is deficit in creativity.
2. They can affect jobs of individuals.
3. As most of the tasks are made easy by ICT, their users might adopt a lethargic lifestyle.
4. Lesser social interactions.
5. Initial cost of setting up is expensive. Repair and maintenance of RT is also quite extravagant.
6. As humans are evolving, problems are evolving too. This calls for an update of programs to keep up with the changing scenarios.
7. RT models are constrained to programming entered by users thus they lack in creativity.

[30] Artificial intelligence in medicine has made tremendous progressive which is quite impressive. From surgery, radiology, oncology to administration, AI has conquered each one of these domains to make much needed and productive advancements. However, AI in medicine has its shortcomings which are equally hazardous. Some of them are –

1. The use of AI can bring up some legitimate disagreements. The 'Black-Box' algorithm causes medical negligence and product liability as the machine driven by AI given no explanation or reasoning on how it reached the final answer.
2. AI-developed face recognition technology can be at a disadvantage here as patient's image can be put at stake due to the lack of rules and regulations protecting sensitive and personal data. [31]One of the lesser talked about disadvantage of AI is no presence of human touch. For example, when we see a personality on the television, most of us can recognize them elsewhere even if we have seen them for one fleeting moment. But the same is not true if the situation was reversed. So, if we were to instruct AI to recognize who-is-who in huge masses, it is very time consuming and exhausting. So, what advantage do we have over AI machines? Humans are capable of registering information in a single shot whereas AIs are bound to deep learning only. We work in a compliant manner which is very much needed but deficient in AI proving that natural intelligence of the human brain is essential. [32] Some of the disadvantages of AI in education are -
    - Robots are emotionless which can prove to be quite unfavourable to both teachers and students and hence unwelcome. Students might lack the basic human emotions that they need to express and may feel detached from the human world.
    - Teachers can be replaced easily therefore increase the chances of unemployment which.
    - Robots cannot keep track of each student's academic records personally and parents will be unhappy as there is no two-way communication.

- Robots are not personalized nor personally invested in seeing the children's success and cannot provide what the child truly needs. Whether be it giving extra attention to a slow achiever or making sure to give extra push to average students or making sure that high achievers are utilizing their talents and opportunities perfectly, nothing can beat a human teacher.

Conclusion

In my opinion, AI is an advanced and futuristic technology which has the capacity to take over the world and change many lives for the better only if used for the right causes. Today, we live in a society which has aggravated problems thus posing the need for modern and intelligent solutions and I believe that AI is the answer that we are all looking for. Be it simple day to day tasks such as driving to work, turning on the heater, cleaning, listening to music, or, complex and heavy matters which need to be dealt with intricately such as healthcare solutions, national security, education etc, AI steps in to save the day. But it is not always rainbows and butterflies! Just like any other technology out there, it is no exception that AI has its disadvantages. But these can be carefully dealt with provided we have the right knowledge and motive. Thus, I conclude my thesis by saying that AI is definitely a positive influence in our world which should be accepted openly. It can open new doors and opportunities for us to upgrade ourselves into high thinking and high living individuals.
Hence, Artificial Intelligence is the new black.

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