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Ai Driven Development: Challenges And Future Prospects

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ABSTRACT

Artificial Intelligence (AI) is a dynamic field at the intersection of computer science, mathematics, and numerous other disciplines, with the potential to revolutionize various sectors of society. This article provides an overview of AI, including its history, fundamental concepts, and its rapid advancement in recent years. It highlights the challenges AI presents, such as privacy concerns, job displacement, security issues, and ethical considerations. Additionally, it addresses the potential impact on society, including the widening wealth gap and its effects on the economies of developing countries. The future prospects of AI, emphasizing its role in enhancing agriculture, enabling robotics communication, and transforming the job landscape.

While acknowledging the potential for job displacement, it also highlights the collaborative relationship between humans and AI as a likely future scenario.

INTRODUCTION

Artificial intelligence (AI) is the discipline of computer science that deals with machine intelligence, where an intelligent agent is a system that performs behaviors that optimize its chances of success. It is the study of concepts that allow computers to accomplish things that make people appear clever. AI's fundamental concepts include reasoning, knowledge, planning, learning, communication, perception, and the capacity to move and manipulate objects. It is the science and engineering of creating intelligent machines, particularly clever computer programs (Neha ,2023).

John McCarthy, who first used the term "Artificial intelligence" in 1956, is credited as its founder. McCarthy stated that "It is the combination of science and engineering to make intelligent devices for human welfare." "Artificial intelligence is an intellect that, in almost every area, including computer science and linguistic logic, is significantly smarter than the best human brain."It is a contemporary technique that uses machines to perform physical labor and "intellectually" convey complicated problems. It addresses topics in philosophy, computer science, mathematics, linguistics, biology, neuroscience, sociology, and other fundamental and crucial areas of our lives. AI is crucial for displaying intelligent behavior, learning, demonstrating, and providing users with recommendations. Artificial General Intelligence, or AGI, is a concept that states that a computer is capable of intellectual behavior similar to how humans are capable of multitasking. A more comprehensive understanding of artificial intelligence suggests that it can combine learning, sensing, problem-solving, and adapting new solutions to the system. Additionally, linguistic thinking and logic are involved (Rupali & Amit ,2017). Since the industrial revolution, technology has seen great progress and has been given top priority in both production and expansion. (Li *et al.*, 2017) (Ali *et al.*, 2022). Technology developments in machines have advanced human growth by replacing laborious and manual work. (Kaplan and Haenlein, 2020). Beyond the assistance that robots provide for physical labor, artificial intelligence (AI) is a significant technical development that has allowed people to replace manual labor in a variety of industries with employment that requires higher levels of intelligence and mental acuity. (Chen *et al.*, 2020) (Kumar *et al.*, 2023). Recently, AI has advanced quickly, and it has been used to provide many benefits across a variety of industries, including the crucial health-care sector (Minz & Mahobiya,2017) (Strachna &Asan, 2020).In many sectors, the manual health system has already been digitally turned into an automated one by AI. In some applications, people are now only needed to handle more basic tasks in medical practice, such as managing patients and medical supplies. (Comito *et al.*, 2020) (Yu & Zhou, 2021) (Bernardini *et al.*, 2021). Recent AI innovations use Big Data, machine learning software, and robots to track, identify, and evaluate risks and advantages in the healthcare sector. (Hossen & Armoker, 2020) (Duan *et al.*, 2022).

CHALLENGES

Although AI has a lot of potential as a cutting-edge technology, individuals and society face serious threats from it. Risks stem mostly from challenges with data security, job replacement, trust and adoption, and ethical and governmental considerations, as well as privacy issues, explicit and transparent algorithms, and job replacement. The worry is that as AI becomes more sophisticated, it will expose people and society to increasing threats. For instance, AI might come to a judgment that people are unable to influence or comprehend. Additionally, AI may increase unemployment and economic inequality. (Siau and Wang, 2018).

Recently, many well-known figures in science and technology have voiced worries about the dangers posed by AI, in part because major milestones in the field have been accomplished that were previously thought to be decades away by experts. According to many AI experts, human-level AI will exist before 2060. (Tegmark, 2016).

1. Challenges Related to Privacy/Legal Issues.

It is clear that using, sharing, and accessing patient data raises privacy concerns. AI and cloud computing are frequently used in a variety of health-related applications. These programs gather, process, store, track, and exchange health information. (Zerka *et al.*, 2020) (Vold *et al.*, 2020) (Jumelle *et al.*, 2014).

Inequality, unemployment, humanity, devotion to cause, regulatory approaches, behavioral biases, population biases, and connecting biases are further ethical concerns with AI in the healthcare and larger industries. (Jameel *et al.*, 2020).

There are studies on avoiding adverse side effects, reward hacking, safe exploration, and robustness in order to reduce ethical difficulties in AI applications in the health sector. (Zerka *et al.*, 2020) (Esmaeilzadeh *et al.*, 2020).

Some machine learning algorithms are used to diagnose, treat, and predict diseases in their early stages. They can also make decisions or assist doctors in making judgments. Concerns about these automated methods' potential to violate patients' rights have been raised by governments. A number of policies regarding data collecting, processing, technological use, quality of such data, and gathering and analysis methodology have been created as a result of these concerns. Researchers in the healthcare field should also pay close attention to data testing, documentation, and quality control. (Jumelle *et al.*, 2014) (Shaban-Nejad *et al.*, 2021).

2. Challenges Related to Data Integration.

Some AI techniques need a lot of data to process. Due to the ethical ramifications of collecting data, especially patient data, it might be challenging at times. Some classification and clustering techniques may produce very good accuracy when applied to relatively small amounts of data, but they may not be practical or relevant. (Patii and Iyer, 2017; Murray et al., 2019; Bennett et al., 2011). To be employed in AI approaches, the gathered data needs to be preprocessed. Text

data in particular needs extensive natural language processing before usage. One of the hardest issues in medical data processing is integrating several types of data, such as text, quantitative, image, and video, sometimes utilizing the same algorithm. (Murray *et al.*, 2019) (Bennett *et al.*, 2011).

3. Security

Secure approaches like those described in (Tsai et al., 2009) are frequently created using AI-based systems, (Tsai *et al.*,2009) but from another angle, it is clear that any piece of software, including learning systems, could be compromised by malevolent users. (Biggio *et al.*,2013) (Barreno *et al.*,2006) (Yampolskiy ,2018).The security challenge is a crucial subject that has gained a lot of attention in the design of intelligent systems. Take ant-based path planning as an illustration, where the pathfinding procedure is manipulated by hacking the pheromone update function. Refer to (Yampolskiy, 2018) for more information if you'd like to learn more about how security issues in AI may bring about a number of additional issues that aren't mentioned in this work. (Yampolskiy ,2018)

4. Predictability

Is it possible for an AI-based agent to foresee its decision in every circumstance? This is a significant problem that may never be solved. (Dawson, 1996) (Yampolskiy ,2019) We can determine whether or not future smart bots can be secure (or trustworthy) as a direct result of this issue, including the ability to control intelligent agents. Because of the predictability challenge's nature, tackling this problem is not a straightforward undertaking. We briefly discuss some of it in what follows. Due to the nature of reinforcement learning algorithms, it should be emphasized that unpredictable behavior can be noticed in an agent using these types of algorithms. (Musiolik & Cheok,2021).

5. Safety

A learning model's activities could easily harm people in both explicit and implicit ways. The AI community has faced this difficulty before, but its scope has expanded due to the extensive use of intelligent systems. (Gordon-Spears,2003) (Haddadin,2013) (Murphy *et al.*,2020). Several Asimov's laws-based algorithms have been put forth in an effort to evaluate an agent's activities while taking human safety into account. Although Asimov's laws are reactive in nature, other people may want to organize proactive approaches. (Varshney,2016).

6. Robustness And Reliability

An AI-based model's resilience is defined as the stability of the model's output following unusual changes in the input data. It's possible that a hostile attacker, background noise, or the failure of other AI-based system components is what caused this change.(Hanif *et al.*,2018) (Qayyum *et al.*,2020) (Bhagoji. *et al.*,2018). For instance, during telesurgery, an unidentified crash in the machine vision component may allow an HLI-based agent to mistakenly identify a patient's kidney as a bean. The resilient model is given a greater priority in deployment among various

models with comparable performance. This area is in its early stages since conventional processes like replication and multi-version programming may not function with intelligent systems. Some papers, like those, discuss the distinction between a learning model's resilience and accuracy. (Rozsa *et al.*,2016).

7. Verifiability

Software engineers utilize verification as one tactic to build credibility(Menzies& Pecheur.2005). In, AI was used to solve this issue. The lack of code verification may not be tolerated in many AI-based system applications, including medical healthcare and military services. So, recently, there has been a lot of interest in validating and verifying AI-based models. (Xiang *et al.*,2018) (Wu *et al.*,2020). It should be noted that existing solutions have generally been regarded as "black boxes" because they do not provide any information about what exactly causes them to appear in their predictions and decision-making processes. This is due to some characteristics like the non-linear and complex structure of AI-based solutions. For example, Among children with pulmonary disorders, for instance, the goal of was to assess the use of learning algorithms for the identification of breath sounds in a genuine clinical environment. Verification challenges have received very little attention, thus it would seem that many things, including theories and implementations, should be published in this area shortly. Verifying the HLI-based agents won't be an easy task because they can display self-organized capabilities. (Zhang *et al.*,2021).

8. Wealth Gap and Inequality

Companies can significantly reduce their reliance on a human workforce thanks to AI. The wealth of those who control AI-driven businesses will soar, while the unemployed will lose their source of income. The wealth disparity is already getting wider. The three biggest businesses in Silicon Valley and Detroit produced nearly the same amounts of revenue in 2014, but Silicon Valley had ten times fewer workers. In other words, there will be an abundance of products and services if robots and AI undertake the majority of the job and maintain high productivity (Bossmann, 2016).

9. Economy of Developing Countries

Unemployment is one of the economic risks that AI systems directly pose. Emerging economies, such as those in Africa and South America, find it more difficult to experience economic growth as a result of industrial automation. Many developing and undeveloped nations provide cheaper labor in the manufacturing sector, allowing them to expand and advance. However, the necessity for businesses to outsource their production to nations with less expensive human labor has considerably lessened as a result of factory automation , Countries may need to develop distinctive, human-centered service businesses for the sizable population of less educated employees, which may be challenging. Even worse, developing nations might be forced to rely on robots or AI systems built in wealthier nations. Additionally, the AI system's underlying algorithms and databases could not be applicable to the circumstances of emerging nations. It is

difficult for these nations to carve out their own niches inside the AI ecosystem (Rita, 2019)(Lee, 2018).

10. Job Displacement and Replacement

In the next 20 years, 35% of occupations, according to Deloitte and Oxford University, might be at risk (Wakefield, 2016). At a high risk of being replaced by robots are 54% of employment in Europe and no less than 47% of all American jobs, according to Oxford University scholars (Bregman, 2017). "According to McKinsey, there may be 700 million fewer employment available by 2030. In comparison to 38% in the US, 21% in Japan, and 77% in China, PwC claims that 30% of those in the UK might be automated . For instance, Foxconn, which produces parts for well-known companies like Apple, recently replaced some 60,000 Chinese people with robots. People still think that new employment or chances for human-robot collaboration will be developed even though AI already replaces humans in numerous occupations, including insurance assessment, accounting, truck driving, and healthcare assistants. At least human employment won't just vanish. Routine, repetitive, and predictable jobs are those that have a high chance of being replaced by AI. For instance, E-Z Pass and other automated systems have already replaced some toll booth employees, while McDonald's and Wendy's kiosks have taken the place of cashiers, and Amazon Go does not even have a checkout counter or cash register. However, because AI is developing quickly and the employment landscape is constantly shifting, people will need to find new ways to make a difference in society and find purpose in activities other than work (Sherman, 2015).

11.Trust and Adoption

In interpersonal connections, interactions between humans and technology, and other types of relationships, trust is essential. (Siau et al., 2004). When it comes to the acceptance of new technology, it is crucial. (Siau and Shen, 2003). Although AI can handle information far more quickly and efficiently than humans, it is not always competent, impartial, or dependable. The risks associated with AI, such as AI biases and catastrophic self-driving car accidents, have raised questions about how much and if to trust AI. Because it is more difficult for people to trust something they do not understand and cannot control, the black box nature of AI and machine learning algorithms has also impacted these technologies' reputation. Singularity is a worry that limits people's capacity to trust AI. Humans won't longer be the most intellectual creatures on planet after AI surpasses us in intelligence!

FUTURE PROSPECTS

The importance of AI has recently been discussed much more, which will likely lead to future discussions regarding whether artificial intelligence actually exists. The goal of AI development is to simplify human life (Muller *et a*l.,2016) (Esteves et al.,2003). Simply said, artificial intelligence is the next stage of automation, allowing robots to perform functions that previously required human intelligence and attention. In the short term, it can take the place of people, but

more importantly, it alters the type of work that people undertake. Automation eventually leads to the creation of more and various kinds of jobs, which is why not everyone is currently employed (Shabbir *et al.*, 2018). The reality that AI systems will soon play a larger role in our daily lives asks the questions of whether regulation is required and, if so, in what form. Although AI is fundamentally impartial and without bias, this does not exclude systems built on AI from having biases. In fact, any bias existing in the raw data used to train an AI system endures and might even be magnified due to the nature of the technology. Research has revealed, for instance, that decision-support tools used by judges may be racially prejudiced or that self-driving car sensors are better at recognizing lighter skin tones than darker ones (owing to the types of images used to train such algorithms) (wilson *et al*.,2019).

Institutions and testing organizations play a crucial role in these shifts by adapting to the demands of AI and technological improvements. Usually, educational structures are developed to promote regional technical advancement. After all, the implant's creative abilities have already been assessed by computer programs and in-person learning environments. Regardless of its particular, AI has grown significantly in value during the last 270 years. In order to make people more inclusive, the study in suggested that both intellectual and non-intellectual intelligence systems need advance beyond science and design limitations. Colleges should assume the initiative in managing this multi-sectoral field of view because businesses are in dire need of social and specialized talents that can function in multidisciplinary scientific teams. (Arinez *et al.*,2020). Similar to healthcare, marketing, education, criminal equality, housing, and banking, a facility's cleverness, mechanical technology, and computing efficiency appear to be beyond its ability to combine items like computer hardware, cars, and consumer electronics. With these developments, businesses and customers will continue to have access to a variety of inviting and open environments, including ones that are more productive, more customizable, higher-quality, and have longer lead times. Nevertheless, there are challenges in life that must be conquered. These concerns include, but are not limited to, the need for human instructors to divide up the task, the concurrent development of human and robotic safety, the creation of a framework to guarantee robotic systems, and the advancement of artificial insemination technologies to inspire trust. (Salau *et al.*,2022)

AI-enabled workplaces have changed the way people think and do their jobs, enabling workers with a variety of abilities to collaborate, share data, and develop amazing ideas and results. It's time to change people's perceptions about AI, ML, and high-tech tools, starting with the educational system and in particular the way exams are administered. Due to its rapid development, AI is now an essential part of business across many industries, and its benefits in reducing cybersecurity risks are clear (Salau *et al.*,2022).

The increasing usage of AI will lead to decreased demand for white-collar workers and even highly qualified professional occupations, much like how the automation of manufacturing processes has led to the loss of blue-collar jobs (Markoff and J.,2011). The development of federated learning and privacy-perceiving machine learning has shifted the focus of AI

technology to the intersection of healthcare and privacy (Kairouz *et al.*, 2021). To answer the most challenging issues in computer science and other disciplines, researchers in AI have developed a variety of methods. The performance of modern AI can be classified as below, at its best, or above human levels. In addition to surpassing human intelligence in games like Go, Chess, Dota 2, and StarCraft II, AI apps can tackle a wide range of tasks, such as facial identification, speech recognition, object recognition, image categorization, and object recognition (Kulhanek *et al.*,2019) (Furuta *et al*.,2019) (Zhang *et al.*, 2021) (De witt *et al*.,2018).

AI is utilized in robot companions, computer-aided medical image interpretation, and clinical decision support systems for diagnosing illnesses. Computer-generated music can even create music suitable for use in a medical setting to relieve tension and discomfort. Additionally, projects like Google Magenta, run by the Google Brain team, aim to determine whether AI is capable of producing captivating art and music. The use of AI to develop additional AI is one more active area of AI research. This includes Google's AutoML project, which aims to develop new topologies for neural networks. utilizing novel topologies and architectures outperforming all previously documented ImageNet performance (Deng *et al.*,2009). Additionally, AI will possess all the advantages necessary to populate the globe without the aid of people. Self-replicating AI may be developed in the near future, preventing human colonies beyond the earth from engaging in essential space combat (Shabbir *et al* 2018).

1. Future Trends in Forensic

AI is a general computer science issue; in digital forensics, this is crucial for the comprehension and admissibility of evidence in court. It should be noted, though, that there is some nuance to this. As an illustration, an AI algorithm reporting that a system contains illegal activity must be able to offer a highly detailed justification for that conclusion. However, law enforcement calls for a human-in-the-loop method that is intended to emphasize to an investigator data that is probably relevant but does not necessarily have the same explainability criterion (Sanchez *et al*.,2019). There is still a risk because prejudice can cause issues with investigations in general (Messiner *et al* .,2002).

But an investigation could be skewed by a system that emphasizes "relevant evidence." Validation, which is becoming more important for techniques employed in a digital forensic setting, is a related issue. This means that a technique must be used on data that is already known in order to yield the desired outcome. Following validation, that method can be applied. New software versions or, in the case of AI models, new models necessitate the re-validation of the methodologies. When an AI model is being updated in real time, this is the edge situation. Using ongoing case processing as an example, you may speed up evidence discovery in subsequent instances. In this situation, the approach may generate results that fluctuate regularly, creating a considerable validation issue. In some circumstances, it should also be thought about if sharing models is appropriate. examine AI-trained models in the context of GDPR and a description of threats such "model inversion" and "membership inference." Therefore, it is important to take

this into account when creating digital forensic solutions that use AI and possibly sensitive training data (Veale *et al*.,2018).

2. Future Of Ai in Agriculture

The application of AI to agriculture represents a significant advancement for the industry, enabling it to move into a new phase of development as a result of its ability to significantly cut resource use. A more profitable and sustainable agriculture sector emerges from even more competent crop management, which is made possible by AI (Ruiz et al., 2020).

3. Emerging Robotics Communication

Everything around us will soon be connected to the internet, including computers, smart devices, mobile phones, and a wide range of partially and fully autonomous robots. IoIT therefore goes farther to transform commonplace objects into intelligent things that converse with one another and with people. Pervasive middleware was needed to achieve the same for data receiving from sensors as well as data moving into actuators. Additionally, middleware can distribute data from AI processing among terminals, objects, and the cloud depending on the needs. The future of communication between intelligent robots will revolve around QoS and quality of control. To maintain the needed QoS and enough quality of control from many robot systems in the future, a combination of AI, ad hoc architecture, and control infrastructure will be necessary. One of the issues is the development of UAV clouds with increased capacity. To support a high number of users throughout a wide coverage area, UAVs can be utilized in massive formations. However, applying AI will assist in processing large amounts of data and dealing with the formation, protocols, and mobility of various 8 UAVs in various circumstances. In order to improve the management issues with UAVs in 5G technologies, the architecture of IoT and UAVs must be specified (Alsamhi *et al*.,2018).

4. The Effects of Robotics and AI On Future Jobs

In more recent times, robotics and AI have achieved remarkable levels of worldwide cooperation for a variety of goals. Living is made easier by robotics' rising fame and significance (Van alsenoy.,2019) (Salau *et al*., 2022). The amount of human labor will decrease when robots eventually replace all employment in the industrialized world. Robotics improves efficiency but also diminishes employment opportunities. Robots have supplanted humans in all blue-collar occupations. White-collar jobs are now being threatened by robots. Robots are artificially created partners that can conduct low-paying work during unsociable hours while bringing great comfort to everyone on the planet. Once the robot learns emotions like compassion and improved reaction detection, future generations may view it as a teacher and caregiver (Aaron Smith., 2014) (Kamran.,2020) (Strack.,2021). As the variety of applications and levels of automation expand, it is expected that organizations will employ AI technology at higher rates. According to studies, 70% of organizations are projected to have implemented AI technology in their operational procedures or industrial settings by the year 2030(Ayakwah *et al*., 2022). Increased AI usage has been suggested to have benefits across a variety of applications, with manufacturing,

healthcare, and digital marketing sparking the most academic attention. As production becomes more automated and industry transitions to a more intelligent platform leveraging AI and cyber physical systems, the factories of the future are anticipated to make substantial use of AI technology. (Wang & Wang, 2016).

Researchers have suggested novel applications of AI in medical diagnostics and pathology where menial duties can be automated more quickly and accurately in healthcare-related investigations (Reza Tizhoosh & Pantanowitz, 2018). AI systems connected to sensors placed on or close to the human body can monitor health and wellbeing by using human biofield technology (Rubik & Jabs, 2018). Numerous life-signs metrics will be monitored by AI technologies via Body Area Networks (BANs), where distant diagnoses requiring specialized clinical input and assistance will be reviewed by a person (Hughes *et al*., 2012). Researchers have claimed that a collaborative relationship between humans and AI is more likely to develop in the future than the widespread replacement of humans by machines (Katz, 2017) (Kumar, 2017).

CONCLUSION

Artificial Intelligence (AI) has emerged as a transformative force with immense potential to revolutionize various industries, from healthcare to agriculture, and it is poised to play a pivotal role in shaping the future. However, this technological advancement also presents a myriad of challenges and ethical considerations that demand our attention.AI's profound impact on privacy and legal issues cannot be overlooked. The collection and utilization of vast amounts of data, especially in healthcare applications, raises significant concerns about data security and patient privacy. Ethical concerns related to bias, discrimination, and the potential for AI systems to violate patients' rights must be addressed through robust regulatory frameworks and data quality control measures.Data integration remains a challenge, as AI systems often require extensive data preprocessing and struggle to handle diverse data types effectively. The security of AI-based systems is another critical issue, as malevolent actors can compromise them, leading to potential risks. Predictability and safety concerns persist and ensuring that AI systems can foresee their decisions and prioritize human safety remains a complex task.The wealth gap and economic implications of AI adoption are also noteworthy. While AI can lead to increased productivity, it may also result in job displacement and economic inequality. Developing countries face unique challenges in adapting to automation, potentially leading to further disparities in global economic development.Trust and adoption of AI are vital factors in its successful integration into society. The black-box nature of AI algorithms and concerns about their reliability and biases impact public trust. Addressing these issues and promoting transparency will be crucial for widespread AI adoption.Looking ahead, AI's future prospects are promising but must be approached with caution. Regulatory frameworks must adapt to the evolving landscape of AI, ensuring accountability and addressing ethical concerns. AI's potential in various sectors, such as agriculture and digital forensics, offers opportunities for efficiency and innovation.The future of work will undoubtedly be influenced by AI, with the potential to enhance collaboration between humans and machines. It is essential to strike a balance between automation and human

involvement, creating new opportunities for meaningful work.AI represents both a remarkable opportunity and a formidable challenge for society. As we navigate the evolving AI landscape, it is imperative to prioritize ethical considerations, data security, and inclusivity to harness the full potential of artificial intelligence while mitigating its risks. Embracing AI's transformative power while safeguarding human values and rights will define our path forward in this era of technological advancement.

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