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Contemporary issues in applying AI applications: challenges and opportunities

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Abstract The broad acceptance and incorporation of artificial intelligence (AI) have significantly influenced a country's economy and human life. AI is used in industries, government, and even academic institutions to make decisions that have a direct and potential impact on lives. The integration of AI technology is a necessary step in developing intelligent manufacturing and the future smart factory. Improve diagnostic accuracy and screening time savings on business challenges are possible with artificial intelligence. This research helps to identify the superior AI technologies used in various areas, comprehend AI technologies and how they are applied, and determine AI opportunities and challenges. The deployment of AI in different sectors affects both producers and consumers. To reduce resistance of employees due to fear of technology, employers must make them aware of the usage of AI applications. One of the data challenges is a lack of quality of input data. The sharing of data and lack of trust are ethical challenges. There are challenges to the adoption of artificial intelligence all over the globe. Artificial intelligence-based start-ups face challenges due to the need for more suitable infrastructure. The increasing use of artificial intelligence can potentially change many aspects of human existence.

Keywords: artificial intelligence, fear of unknown, lack of knowledge, robustness, trust deficit

1. Introduction

Artificial Intelligence (AI) has started impacting humans and economies across the globe (Solos and Leonard, 2022). AI techniques are becoming increasingly complicated in spheres of life astonishingly (Karamitsos et al 2020; von Eschenbach, 2021). AI tools are used in industries, government, and even academic institutions to make decisions that have a direct and potential impact on human lives (Jason and Ayanna, 2020). The functionalities of AI have been integrated with the growing range of information systems (Hornung and Smolnik, 2022; Rana et al 2021; Tarafdar et al 2020). Humans defined, AI as innovative things for automating many processes that help them to perform activities without their intervention. AI applications are used in agriculture, automobiles, manufacturing, etc. Implementing AI in the agricultural system inceases agricultural operations' productivity and efficiency (Liu, 2020). According to Pavan Vadapalli, by 2030, AI may add about 15.7 trillion dollars to the world economy.

Several manufacturing companies predict that using AI increases productivity by up to 40% of the economy. Increased AI development, particularly in high-risk and essential application domains such as healthcare (G. Smith, 2021) as well as in the military (Dawes, 2021), has sparked public opinion on the threats and unanticipated adverse significances of mismanagement backbox algorithms (Jobin et al 2019; Liang et al 2021; Shneiderman, 2020). Many studies have outlined numerous potential obstructions to the explaining ability of AI systems (Anjomshoae et al 2019), from technical hurdles to the limitations of human logic (Asatiani et al 2020) to outright secrecy (Burrell, 2016). This gives designers and specialists in AI system communication an excellent place to begin grasping the enlightenment requirements of end users. AI offers guidance on conveying information about AI applications in a way that is accessible, reliable, open, and under the user's control. This research aims to identify superior AI technologies used in various areas. This study also comprehends AI technologies and their applications and determains AI opportunities and challenges. AI systems can process significant amounts of data in a human capacity. However, it may be important that specific data remain inaccessible, unavailable, or unrecorded, restricting what AI systems can learn. The absences that arise may create more questions than answers. Data processing may also reflect social prejudices and have a constant detrimental impact on some groups of individuals. Data is not just about what machines learn from it; it is also about what people do and who gives the data to machines (Barocas and Selbst 2018; Keyes 2018; Rieder 2018).

2. Literature Review

Technology use has recently increased in sectors like automobiles, manufacturing, healthcare, etc. Using innovative technologies generates enormous amounts of data, and by utilizing that data. AI provides suggestions to technology users and promoters. In various contexts, the study of adopting AI technology is essential across the globe (Pillai and Sivathanu, 2020). Many studies have analyzed the potential impact of AI and replacing human beings with intelligent machines in the

manufacturing, supply chain, and construction industries (Kusiak, 2016; Muhuri et al 2019b). AI-powered solutions can control and manage operations in real-time, resulting in considerable savings over human procedures (Jain and Mosier, 2007; Zhong et al 2017). Several sectors have thus identified the incorporation of artificial intelligence technology as a vital phase in developing intelligent manufacturing and the future smart factory. (Li et al 2017; Nikolic et al 2017).

Khanna et al (2013) emphasized the importance of AI in medicine, notably in medical informatics. There is an increasing demand for innovative technology that can comprehend. The intricacies of hospital operations offer essential productivity increases in using resources and providing patient services. There is a potential that AI may lead to improvements in patient care and diagnosis, in addition to the analysis of medical images in domains like radiology (Dreyer and Allen, 2018; Kahn, 2017). Using AI technology might result in improved diagnostic accuracy and screening time savings for breast cancer stages and other ailments associated with them. Houssami et al (2017) thoroughly explored the potential for AI applications in breast cancer screening, emphasizing the crucial need to reduce the incidence of false positives and minimize errors that human practitioners may make during detection. Some significant ethical and social trust aspects are acknowledged in the research. However, the limits of AI dependency and appropriate human-in-the-loop engagement must be defined. The rapid expansion of AI and associated digital technologies in public health is undeniable. However, the large-scale collection, storage, and distribution of vast data sets generated by AI technology have given rise to various ethical concerns, particularly in governance, data quality, safety standards, privacy, and data ownership. These issues are of critical importance and must be thoroughly addressed to ensure AI's responsible and enthical use in public health (Zandi et al 2019). Thesmar et al (2019) proposed the advantages of using AI technologies for claiming insurance against healthcare. AI can dramatically improve claim filing, adjudication, and fraud analysis. The literature has underlined the potential advantages of AI technology solutions to education and information search. Chaudhri et al (2013) examined how AI may be used in the educational sector to increase teacher-student engagement.

The research looked at the possibility of artificial intelligence in education through intelligent environments, instructional systems, and clever storytelling technologies. The importance of packages and applications in the current technological age has been highlighted in recent literature (Arlitsch and Newell, 2017) and addressed in terms of how artificial intelligence may alter procedures, personnel needs, and library customers. To deliver a richer user experience, libraries must concentrate on human traits and the value contributed by human Interaction mixed with AI. However, Mikhaylov et al (2018) deliberated using AI applications to educate the public on the policy as a highly efficient approach to dealing with high-uncertainty settings.

2.1. Prospect for India

This opportunity focuses on the economic effect of AI on India. Regarding economic impact, AI may generate development by automating complicated industrial operations that need effective agility and broad adaptability. The dilemma of capital and labor augmentation may be solved by complementing human skills. AI will be able to generate economic value for services and innovation as well (Chatterjee 2020)

2.2. AI for the greater good

AI should not be limited to economic effects but should be utilized to enhance the general quality of life. AI can give farmers real-time output guidance. It may generate efficient and smart cities by recommending infrastructure development to hasten urbanization (Alzoubi et al 2017). These are some instances of how artificial intelligence may be used for the benefit of society. The Government of India is also responsible for putting the promise of AI into action in these fields. It would bring India a significant amount of benefit.

2.3. Actions of Government and Policy Frameworks

As mentioned in the literature, achieving the "AI for AII" objective should be the government's inherent goal. AII stakeholders must have a long-term, intimate, and true institutional engagement to accomplish this. Citizens, who are intended to be the ultimate beneficiaries, are among the stakeholders. The government must be committed to achieving joint success. In doing so, authorities must concentrate attention so that the private sector is not overcrowded. If this occurs, it will solely focus on profit, ignoring the general enhancement of the quality of life of Indian inhabitants. Given this critical stance, it is inevitable that the role of the government is essential. The government should serve as both a promoter and a facilitator. The government should act like an owner wherever possible. If this is strengthened, the objective of "AI for All" may be realized.

2.4. AI in Robotics and its Challenges

HeartMath is a system that focuses on heart intelligence, health, and well-being. The social challenge, researchers (Pribram 2013; Schwartz and Russek 1997) supported this psychotherapy system. This system demonstrates that such a heart communicates various dynamic, vibrant patterns via movement-to-movement heart rate variability communication. (Stephen, 2019). Evidence from laboratory studies shows that trained people achieve higher coherence than others (Leskowitz 2006; McCraty 2017; Morris 2010).

Table 1 Micro and Macro Challenges.

Challenges of AI		Application Areas
Macro	Micro	Robotics
Trustworthy	Social	Healthcare and informatics
Fear of unknown	Economic	Digital image
Lack of knowledge	Data and Ethical	Education and Policy
Robust	Managerial and Technological	Manufacturing
Lawful	Political, legal, and policy	IT Sector
		Public Sector

2.5. AI in Healthcare and Informatics and its Challenges

There is an increasing demand for innovative technologies to comprehend the intricacies of medical operations and equip essential efficiency improvements in resource utilization and patient amenities (Muhuri et al 2019a). The vast potential for artificial intelligence lies in its ability to enhance patient care, expedite accurate diagnosis, and provide clear explanations of medical imaging in the field of radiology (Dreyer and Allen, 2018; Kahn, 2017). A societal issue in the deployment of AI in healthcare affects both the patient and the doctor. To reduce patients' phobia of technology, a doctor must learn to communicate with AI technology and provide patient education. Thrall et al (2018) contended that literacy is a crucial barrier to AI adoption within radiology, as patients may be reluctant to interact with AI technologies. Treatment methods will be improved, and we can find treatments for unexpected patterns (Manne and Kantheti, 2021). Economic challenges to healthcare refer to the high treatment costs, and AI requires substantial financial investment in organizations. A clinician has to be aware of interacting with AI systems and analyze the results given by the system. Ethical challenges refer to the sharing of data and less trust in a decision made by an AI system. Data challenges include diseases that can be diagnosed early (Manne and Kantheti, 2021), validation of data by AI systems, and a lack of quality input data. Pooling data onto insufficient size leads to the wrong decision. Managerial challenges refer to a better understanding of patient's needs, human workforce replacement threats, the scarcity of interdisciplinary talent, and inadequacy in developing AI systems medical records and drug delivery (Manne and Kantheti, 2021). Technological challenges include needing expertise and specialized people to diagnose problems with AI system-generated data. Political challenges refer to copyright issues; collecting data is not a safety or national security threat from foreign companies.

2.6. AI in Digital Images and its challenges

AI is vital in diagnosing dangerous diseases like cancer (Stephen, 2019). The combination of big data and AI has a lot of attention and interest in the literature, which shows how it can change industries and how we solve complex problems. Several studies have demonstrated the advantages of applying AI technology to considerable data challenges and the associated value of analytical knowledge and predictive power in various situations (Rubik and Jabs, 2018). Based on research in the field of healthcare explores the impact and role of big data and AI. It has been found that these cutting-edge technologies have the potential to improve diagnostic and predictive capabilities related to patient health significantly. (Beregi et al 2018; Malhotra et al 2009). Big Data Analytics systematically examines enormous data structures, often classified as variety, value-adding, velocity, and volume. By providing enhanced insights within a predictive environment, BDA paired with AI can potentially alter domains such as manufacturing, health, and business intelligence (Abarca-Alvarez et al 2018; Spanaki et al 2018). In response to the exponential data growth, organizations are increasingly adopting data visualization tools and techniques to effectively comprehend and interpret their vast data structures, facilitating informed decision-making and enhancing performance. Using AI technology to analyze and present data makes it possible to gain a deeper understanding and more clarity, mainly when human vision and cognition are limited. This makes it possible to find patterns and insights that would otherwise go unnoticed (Olshannikova et al 2015). It is difficult to analyze and interpret complex and diverse data. Using innovative AI-based visualization tools, organizations may extract considerable value and important management insights from huge data sets (Zheng et al 2016; Zhong et al 2017).

2.7. AI in education and its challenges

The education system faces issues such as harvesting and upgrading skills in the digital age. The benefits of AI technology developments to enhance the classroom education process, updating student skill sets to match societal improvement, and contributing their abilities to future digitalization growth (Vincent-Lancrin and Vlies, 2020). Digitalization has become one of the critical drivers of innovation in classroom educational practices for the past decade (Vincent-Lancrin and Vlies, 2020). Now, AI systems are built with varied degrees of autonomy in mind. The AI life cycle involves planning, designing, processing collected

data, and building and interpreting models in phases 1 and 2, validation and verification, deployment, and operation and monitoring (OECD 2019). (Richards and Dignum, 2019) When smart technology features are progressively provided, social and ethical challenges arise. The usage of AI systems in the classroom has impacted (a) privacy, (b) human replacement, (c) influence on children, and (d) responsibility (Serholt et al 2017). According to the Organization of Economic Cooperation and Development (OECD), the government must take the appropriate measures to guarantee transition-fair employees deployed in AI, such as training programs, displaced person assistance, and new labor market possibilities. Political factors often influence the degree to which certain technologies are adopted and promoted in educational institutions (Jandri, 2017; Selwyn, 2020). Economic challenges refer to the lack of funding to successfully adopt AI in education (C. Kayembe, 2019). The viability of AI is thus no longer determined just by financial gain but also by how it ties significantly to human well-being. Placing human well-being at the center of development gives a guaranteed formula for novelty, a realistic objective, and a concrete way of measuring AI's influence (Dignum, 2021). Ethical issues include teacher-student privacy and surveillance systems that collect precise information about students' and instructors' behaviors and preferences. Bias and discrimination are significant problems when adopting AI in education (Akgun and Greenhow 2021).

2.8. AI in manufacturing and its challenges

There is an increasing demand for innovative tools that comprehend the intricacies of hospital operations. AI provides essential efficiency improvements in resource utilization and patient amenities (Rana et al 2021). AI can enhance patient care, diagnosis, and the analysis of medical images of radiology (Dreyer and Allen, 2018; Kahn, 2017). A social challenge to adopting AI in healthcare impacts the patient and clinician. A clinician must know how to interact with AI technology, and the patient must educated to mitigate the fear of technology. Theall et al (2018) claimed that culture is a crucial barrier to adopting technologies like AI within radiology, as patients may be reluctant to study AI technologies. Treatment methods will be improved, and we can find treatments for unexpected patterns (Manne and Kantheti, 2021). Economic challenges to healthcare refer to the high treatment costs; AI requires substantial financial investment in organizations. The clinician has to be aware of interacting with AI systems and analyze the results given by the system.

Ethical challenges refer to the sharing of data and less trust in a decision made by an AI system. Data challenges include diseases that can be diagnosed early (Manne and Kantheti, 2021), validation of data by AI systems, and a lack of quality input data. Pooling data onto insufficient size leads to the wrong decision. Managerial challenges refer to understanding the needs of patients in a better manner, human workforce replacement threats, the scarcity of interdisciplinary talent, and inadequacy in the development of strategies for AI systems (Manne and Kantheti, 2021). Technological challenges include needing expertise and specialized people to diagnose problems of AI system-generated data. Political challenges refer to copyright issues; collecting data is unsafe and poses national security threats from foreign companies.

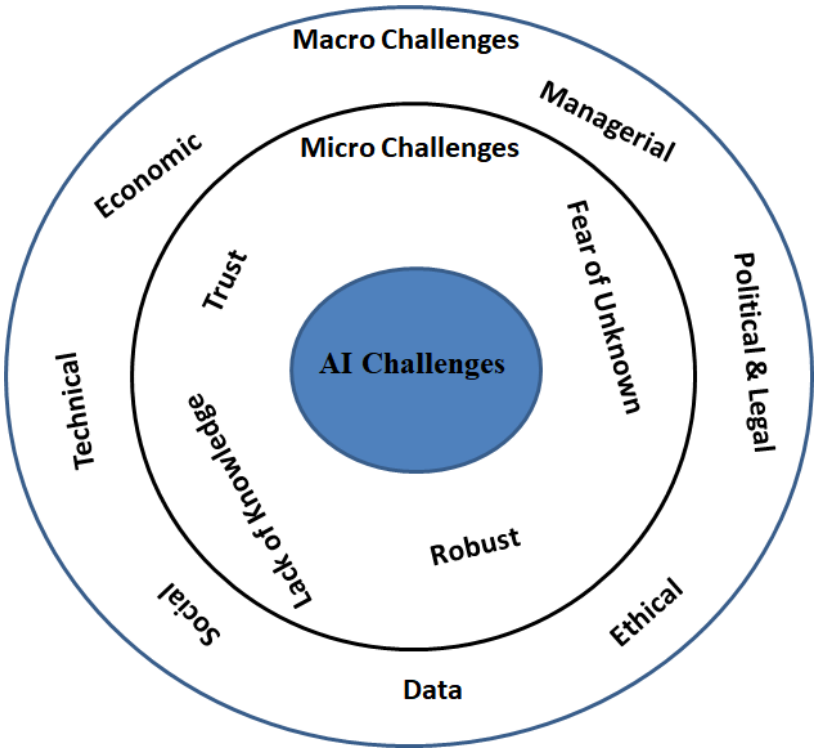

Figure 1 AI Challenges.

2.9. Challenges to the adoption of AI in India

While attempting to use AI, India may confront vital hurdles in access to industry-specific data restricted due to the following factors: Major industrial sector participants are traditionally regarded as being in the industrial sector and are usually considered a privileged class in India. Consequently, most of the critical industry-specific data required for developing solutions and tailored platforms has been centered on India's major companies. The dominance of these established firms creates a barrier that prevents start-ups from succeeding. This is challenging for start-ups to overcome hurdles in adopting AI. The low availability of infrastructure and high cost are appropriate for computing infrastructure availability. This requires training for the proper deployment of AI-based services. In India, cloud infrastructure is accelerating in its development. But it has a limited capacity. The scarcity of suitable infrastructure presents challenges to AI-based start-ups.

Consequently, it is difficult for Indian scholars in this sector to refresh their knowledge in the practical field. Moreover, because sufficient infrastructure is scarce, its utilization becomes prohibitively expensive. This is also one of the obstacles to AI adoption. The shortage of good talent in the field of IT is known, and only an inadequate percentage of AI professionals in India can work on AI technology. The insufficient accessibility of skills in AI created an impediment to its adoption. Moreover, there is a dearth of Ph.D. scholars in this domain.

2.9.1. Lack of Knowledge

To interact with AI technology, users should know the possibilities about how it reacts when input is given; if not, more or less, the result will be arbitrary(Lieberman and Lieberman 2008). AI-powered machines lead to deadly consequences when ambiguous input combinations are given(Robbins 2019).

2.9.2. Robustness

The AI system that receives unexpected or abnormal instructions will malfunction and serious harm could be caused when the system malfunctions. The area of engineering has a long history of guaranteeing the safe operation of nuclear reactors, chemical plants, and other safety-critical systems under extreme situations ranging from sensor failure to natural catastrophes. For example, a cancer detector misdiagnoses black users; skin cancer can be detected using a smartphone app. Bus and triggers a facial recognition system—an AI-based system to see human faces, decelerate speed, and cause less harm (Zachary Arnold Helen Toner 2021).

2.9.3 Trust Deficit

One of AI's most significant concerns arises from the inherent uncertainty of how deep learning models predict outcomes. For laypersons, comprehending how a specific combination of inputs intricately crafts solutions to various problems presents a formidable challenge, given the lack of specialized knowledge or expertise in the field. Countless individuals worldwide are blissfully unaware of AI's widespread adoption and omnipresence, not to mention the intricate and seamless integration it achieves in our everyday lives.

2.9.4 Fear of the Unknown

Fear of the unknown is a mental condition. Fear is formed when specific emotions are generated in the mind in response to an occurrence. Fear of the unknown is the inclination of an individual to experience fear induced by the apparent absence of knowledge at any level of awareness or processing point (Carleton, 2016). Dubrin and Ireland (1993) presented the idea of fear as the common factor in change resistance. Fear of the unknown disquiets how a person reacts to a circumstance in which they are expressing their opinion and responds to a situation in which the consequences are unknown and the effect of their activities is unpredictable. Entities react to circumstances differently (Azizpour et al 2018). When presented with unclear conditions, those with a high phobia of the unknown feel incredibly uncomfortable (Kahn, 2017). According to Nitschke and Grupe (2013), fear of the unknown affects the perception and demand for predictability and controllability and, if managed, can change the situation's outcomes. Similarly, Jamiland Bano (2016) studied classroom instructors and identified fear of utilizing technology as the intrinsic (teacher-level) barrier that may lead to user resistance.

2.10. Opportunities

The opportunities for AI applications are legion. Many researchers are concerned about AI technologies (Capgemini Report, 2018b): "Almost any existing or new application can deliver more value by augmenting it with a touch of 'smart."' This study provides enormous opportunities in numerous categories. A massive amount of data is available to help organizations understand the opportunities for AI viz customer need, preferences, attitudes, and real-time context increased enormously. The threats are security, reputation, and fraud.

2.10.1. Data Analytics for business operations and Interaction

Analyzing data on repositories like procedures, partners, and supply chains, predicting them, responding to incidents and malfunctions, and improving reliability and efficiency. Using AI interacting with people (like employees, service agents, and customers) through natural language processing is very effective and provides information in no time.

2.10.2. Case management automation

Advanced AI algorithms and machine learning help determine which cases are simple for machines to handle and require a human specialist's assistance. This gives us valuable information about when and how these problems can be solved. AI helps us determine which cases can be handled by computers and which ones need the help of a person with specialized knowledge. It also shows us when such support is necessary, speeding up processes and solving problems easier.

2.10.3. Governance

Improving the quality of information available to support decisions (automated or human beings) points out by Kahneman (2011) that, without conscious intervention, human beings are "radically insensitive to both the quality and quantity of information that gives rise to impressions and intuitions."

2.10.4. Adaptiveness

Improvement of an organization's responsiveness to changes in its environment by, for instance, re-learning business standards is the best example. Typically, AI assists organizations in developing operational and strategic condition cognizance and linking that awareness to action implementation quickly, efficiently, and effectively to increase productivity.

3. Final considerations

The use of technology has increased in several sectors. Integrating artificial intelligence technology is necessary while developing intelligent machines for manufacturing and future smart firms. Improved diagnostic accuracy and screening time savings for breast cancer are possible with artificial intelligence. Supervision Changes in a company are critical to its success, and a lousy occurrence might have detrimental implications. The purpose of this study is to highlight seven perceived difficulty aspects that arose from an analysis of data framing by distinct patron groups (managers and doctors in the health sector, managers in IT firms, and policymakers in government): social, economic, ethical, political, legal, and policy; organizational and managerial; data; and technological. Social obstacles include concerns about current cultural conventions and approach to using AI in the health sector. Profitability and financial sustainability issues are among the economic difficulties impeding AI implementation in healthcare. Ethical problems include moral ideals and concerns implicated by using AI in industries. Political, policy-related, and legal challenges include political tenets, legal rules, and public policy issues impacting the use of AI in organizations. Organizational and administrative hurdles in deploying AI in healthcare are tied to each organization's strategy, people resources, and management practices. Data challenges, including quality and quantity of data, standard protocols, and database creation, all influence AI adoption in the healthcare industry. Finally, technical issues about how each stakeholder perceives the nature and qualities of AI technologies in the health sector.

In line with Dwivedi et al (2015b), this research gives consolidated but diverse opinions on many areas of AI from petitioned professionals from the public, industry, and academia sectors. The workshop named "Artificial Intelligence (AI): Emerging Challenges, Opportunities, and Agenda for Research and Practice" was conducted on June 13, 2019, at the "School of Management," Swansea University, UK. Viewpoint has emphasized the possibilities, problems, and possible research agenda presented by AI's fast rise. As the writers wrote, each expert was invited to make distinctive contributions. This strategy produces an inconsistent logical flow, but it captures the various perspectives and suggestions of the experts. This study's results and research questions have been stated and aligned with the academia literature. The trend towards increasing development of applications of AI has the potential to transform many facets of human existence and have a high impact on society as well. However, the way ahead is hazy, as is the prospective blueprint. AI has the potential to provide many advantages, but there are also huge dangers that it may disenfranchise large segments of society. Decisions taken in the following years about AI's future will likely influence the lives of future generations of human beings and industries.

4. Limitations

There are many exciting possibilities for the application of artificial intelligence, but several limitations and challenges must be addressed. AI systems are only as good as the data they are trained as, and the quality and availability of data can be a significant limitation on many applications. AI systems can perpetuate existing biases and inequalities, and ensuring fairness and equity in their development and deployment is a major challenge. Many AI models are complex and difficult to interpret, which can limit their adoption and acceptance in specific contexts. AI development has often outpaced regulation and governance frameworks, leading to potential risks and uncertainties. As AI systems become more pervasive and interconnected, ensuring security and privacy is a growing concern. Despite rapid progress, AI still has natural language

processing, reasoning, and creativity limitations. AI raises complex ethical questions around issues such as autonomy, responsibility, and the value of human labor.

5. Future directions

It is imperative to address the current challenges and opportunities surrounding the application of artificial intelligence. One potential direction is to focus on improving the interpretability and transparency of AI models, which will enhance trust and facilitate more effective decision-making. Another avenue is to develop AI technologies to better integrate with existing systems and processes, allowing for more seamless adoption and integration into various industries. Additionally, there is a need to explore the ethical implications of AI and develop frameworks for responsible and ethical AI practices. Finally, increasing access to AI education and training will be crucial to fostering a diverse and inclusive community of AI practitioners and users. As the field of artificial intelligence continues to evolve rapidly, there are several promising directions for addressing contemporary issues, advancing the application of these technologies, and developing more sophisticated and intelligent AI algorithms that can adapt to new and complex situations and incorporate human-like reasoning and decision-making capabilities advancing the integration of AI with other emerging technologies, such as blockchain, the Internet of Things (IoT), and quantum computing, to unlock new possibilities for data analysis, automation, and predictive modeling. Focusing on improving the interpretability and explainability of AI models to increase transparency, build trust, and promote accountability. Addressing AI's ethical, legal, and social implications and developing frameworks for responsible AI development and deployment. Enhancing collaboration between different sectors and stakeholders, including academia, industry, government, and civil society, to foster innovation, knowledge-sharing, and multi-disciplinary approaches to AI research and application. Promoting diversity, equity, and inclusion in AI development and deployment and addressing the potential biases and inequalities arising from these technologies. Expanding the scope and application of AI beyond traditional domains, such as healthcare and finance, to address broader societal challenges, such as climate change, food security, and social justice.

Ethical Considerations

Not Applicable.

Conflict of Interest

The authors declare no conflicts of interest.

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