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AI and Its Dual Impacts on Society

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Abstract*: His paper delves into the examination of the aware- ness, beneficial outcomes, and hurdles associated with contemporary AI technologies. This paper delves into the examination of the awareness, beneficial outcomes, and hurdles associated with contemporary AI technologies.
Keywords: AI, Artificial Intelligence, Future of AI

I. INTRODUCTION

Artificial Intelligence (AI) has many different definitions. It can be thought of as a technology that allows machines to have human intellect, or it can act as a machine that can replace human labor for speedier results, or a machine that collects data and makes sense out of it for us to make use of that information. The inception of AI traces back to philosophical discourse, wherein scholars depicted human thought as the mechanical manipulation of symbols and conceptualized the human brain as an electrical circuit transmitting signals. Today, Artificial Intelligence (AI) signifies the replication of human intelligence within machines, empowering them to execute tasks typically associated with human cognitive abilities. These tasks include learning, reasoning, problem-solving, perception, understanding natural language, and interacting with the environment. These systems are designed to mimic cognitive functions associated with human minds, such as learning from experience, adapting to new situations, and making decisions based on data. In simple words, AI can be thought of as a machine that behaves like a human and which helps mankind in problem-solving and speeding the solutions. The applications of AI in today's era are huge ranging from simple virtual assistants like Siri and alexa, to complex autonomous vehicles and humanoid robots. Since its development, AI has helped people in various applications and day by day this technology is becoming integrated in our daily lives. Despite the fact that AI holds tremendous potential to revolutionize industries, improve efficiency, and enhance quality of life, its widespread adoption also raises significant questions about its societal impacts. In this paper, we embark on an exploration of the intricate relationship between AI and society, examining how this technology is reshaping economies, transforming labor markets, and influencing social interactions. We delve into the different flavors of AI deployment across various sectors, analyzing its implications for employment, privacy, and equity. Moreover, we confront the ethical dilemmas posed by AI, addressing concerns surrounding bias, accountability, and the loss of human agency. By critically examining both the promises and challenges of AI, this paper aims to contribute to a deeper understanding of its role in shaping the future of society. Through empirical evidence, theoretical insights, and real-world case studies, we seek to inform policymakers, researchers, and the general public about the opportunities and risks associated with AI advancement. In doing so, we hope to foster a dialogue that promotes responsible AI development, ethical decision-making, and inclusive societal progress.

II. OBJECTIVE

Artificial Intelligence (AI) has emerged as a revolutionary phenomenon that is redefining numerous facets of society, economics, and the human experience. In just a few years, the evolution of this technology has been remarkable. Initially, it was reliant on human intervention for its operations. But today it has advanced to such an extent that in many instances, it can autonomously function with minimal human involvement. While AI holds immense potential to revolutionize various industries and improve human lives, it also raises ethical, social, and economic concerns, such as job displacement, algorithmic bias, privacy issues, and the potential for misuse or unintended consequences. This paper explores the multifaceted impacts of AI on society, delving into its benefits, challenges, and ethical implications. By examining current research and case studies, this paper analyses how AI technologies are reshaping industries, altering employment landscapes, and influencing social dynamics. Furthermore, we discuss the importance of responsible AI development and regulation to mitigate potential risks and ensure equitable distribution of benefits. Ultimately, this paper seeks to provide a comprehensive understanding of the complex relationship between AI and society, shedding light on both its promises and pitfalls.

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III. AI FOR THE GREATER GOOD

As every technology has its own benefits, AI is one of the advancements that has made life far easier than before. AI can read and analyze large volumes of data and help decision-making in the blink of an eye. This ability of AI helps in solving many real-world problems optimally.

A. AI IN BIOLOGY

AI can be used in biological research for identifying trends and patterns in DNA structures. This can help differentiate a normal DNA molecule from a diseased one in the blink of an eye. While it's relatively easy to identify affected DNA molecules, it's difficult to identify the linkage between the molecules and the cellular parts and processes that they affect. AI can accurately and efficiently predict the three-dimensional structure of an unknown protein using just the DNA structure. The shape of the protein determines what role it would perform in the human body. This can help identify which part of the human body is diseased by simply looking at the infected DNA molecule. This can now help biologists to design custom proteins to fight these illnesses. Decades of biological research have laid the groundwork for this advancement, yet the ability to accurately fold amino acids into their final protein structures remained elusive until the advent of AI. A prime example of AI's impact in this domain is evident in the recent elucidation of the SARS-CoV-2 protein structure, a feat made possible through AI-driven research efforts. Companies like Insilico Medicines are using AI to design drugs for a new disease called idiopathic pulmonary fibrosis. They are not only using algorithms to design the drug but also to identify the diseased protein that they want to work on. If this works, it could significantly increase the speed of drug development.

B. AI IN FINANCE

AI along with big data analysis revolutionizes credit management within financial institutions, facilitating well- informed decisions supported by robust data insights. The profound influence of AI on risk management is undeniable, attributed to its remarkable processing capabilities that efficiently manage extensive datasets within reduced timeframes. Through sophisticated embedded algorithms, AI facilitates comprehensive analysis of historical risk cases, enabling early detection of potential future issues. Furthermore, AI systems conduct real-time analysis of market trends, leveraging both structured and unstructured data to generate accurate predictions on investment opportunities while proactively mitigating risks posed by dynamic market conditions. Financial institutions frequently incur substantial losses due to fraudulent activities, amounting to billions of dollars. To combat this growing threat, modern fraud detection systems leverage AI algorithms to identify patterns and trends, particularly in location and spending behaviors. Consequently, any unusual activities trigger immediate security measures, enabling proactive intervention to mitigate potential financial losses thus safeguarding financial assets and ensuring the integrity of transactions. AI helps financial institutions to improve trading, provide personalized banking experiences and automate processes, reduce operating costs, increase the quality of service, ensure convenience, achieve profitability, and reduce the waiting times for customers. Intelligent trading systems are fundamentally transforming data-centric investment strategies. AI systems provide near to accurate and profitable stock trend predictions as algorithms utilize huge volumes of historical data and various other aspects before making predictions hence reducing the associated risks and increasing the profit margins in trading. AI-powered systems can assist financial institutions in ensuring compliance with regulatory requirements. These systems help streamline compliance processes and reduce the risk of regulatory violations.

C. AI IN CLIMATE CHANGE

Renewable energy holds the key to a sustainable future, yet its intermittent nature poses challenges for continuous power supply. Take wind energy, for instance; the unpredictability of wind patterns complicates the task for electricity system operators striving to meet demand around the clock. However, while we cannot control the wind, we can harness the power of AI to predict its availability with accuracy. By leveraging historical climate data and turbine performance metrics, AI algorithms can forecast wind availability and its capacity to meet energy demands. These advanced predictions enable proactive energy storage solutions, ensuring a reliable power supply in real time. Moreover, combating climate change requires not only harnessing renewable energy but also optimizing material usage for sustainability. Historically, the discovery of sustainable materials has involved extensive trial and error, resulting in significant resource wastage. When Thomas Edison created a lightbulb, he developed the original filament by testing thousands of materials to find the best one that worked. Today, AI revolutionizes this process by efficiently identifying optimal materials without exhaustive experimentation.

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By analyzing vast datasets and simulating material properties, AI algorithms streamline the discovery of eco-friendly materials, accelerating progress towards sustainability while minimizing resource consumption. Additionally, large industrial systems consume 54% of the global energy. These industries have thousands of machines each having several set points such as temperature and pressure that can be manipulated to improve energy efficiency. Manual optimization of these parameters often falls short of achieving optimal energy efficiency due to the complexity and scale of the task. Here, AI intervenes, offering a transformative solution. Screenshots of the industrial systems can be provided to the AI model after specific time intervals. These AI systems can then find the best move that ensures safety and minimizes energy consumption without compromising on the performance. The recommendations about which set points to change and by how much can then be provided to the industrial operators. This system, first developed by DeepMind helped reduce 40% of the energy consumption upon trial and as we know AI systems are capable of self-learning, these numbers would increase with time.

IV. DARK SIDES OF AI

Every innovation comes at a cost. But how much does this cost affect humans is the main concern. In this section, we explore the dark sides of AI and evaluate whether these costs outweigh the benefits.

A. OWNERSHIP OF DATA FOR TRAINING MODELS

AI's efficacy heavily relies on data. To perform optimally, AI models demand vast amounts of data for training. This raises pertinent questions: where does this data originate? Who holds rightful ownership over it? And is it morally acceptable to utilize another individual's data for AI training purposes? Consider a scenario where an AI design model generates images based on textual prompts, such as 'Beautiful Bride.' The resulting image is often a blend of various faces, devoid of a singular existence. However, the source of training data remains a crucial concern. It could be sourced from purchased model photographs or scraped from social media and search engines. Consequently, ethical dilemmas surrounding data ownership and consent surface prominently. As the data never appears in its true form, another question that arises is how can one discern between legitimately purchased data and stolen content? For instance, OpenAI recently made headlines by deleting two extensive datasets due to the absence of proper copyright permissions. While the matter is controversial, this proves that there are chances that copyrighted content be used illegally for training models.

B. AI AND ENVIRONMENTAL SUSTAINABILITY

AI doesn't exist in a vacuum. It is part of society and has impacts on people and the planet. AI models are powered by vast amounts of energy. Training AI models typically involve significant computational resources, often provided by data centers powered by electricity. For example, the electricity consumed by these data centers is often generated through various means, including fossil fuels like coal, natural gas, and oil, which release carbon dioxide (CO2) when burned for energy. Additionally, the manufacturing and disposal of hardware components used in AI infrastructure can also contribute to carbon emissions. Every time an AI model is trained, it comes at a cost to the planet. Research proves that, training AI models like Gpt-3 consumed 1287 MWh of electricity and emitted 502 tons of carbon, equivalent to driving 112 gasoline-powered cars for a year. According to a research held at the University of Massachusetts in 2019, training large language models can emit over 626,000 pounds of CO2, equivalent to the emission of five cars over a lifetime. During inference, when the model processes new data to generate responses, it consumes even more energy than in the training phase. Google reports suggest that inference alone accounts for 60AI technology has advanced 2000 times in last 5 years, and so is the cost. As we are putting these models into mobile phones, search engines and intelligent speakers, the environmental costs are piling up quickly.

C. AI AND DEEP-FAKES

Deep-fakes are audios, videos or images that are manipulated to make someone do or say things that they never said or did. With the rapid advancements in generative AI and other technologies, deep-fakes are becoming more realistic with each passing day. We are moving towards a society where it has become easy to make fake reality and also to dismiss reality as possibly fake. While there are plenty of useful and creative applications of deepfake like translating audio in multiple languages, the problem is when deep-fakes are made of people without their consent and very often this means women. A study in the Netherlands found that 96% of the deep-fakes online were non-consensual porn targeting women (Source: deeptrace). Deep-fakes go beyond undermining someone's reputation and respect like sparking wars, financial frauds, and so on. What increases the complexity is that these deep-fakes are difficult to identify.

To sue someone, you need proof, and to prove that a certain video is a deepfake is difficult. The deep-fakes rapid response task force recently received 3 audio clips from Sudan, West Africa, and India claiming it to be a deepfake. In the Sudan case, experts used AI models trained on over a million examples of synthetic speech only to find that it wasn't a deepfake. In the West African case, they couldn't reach a definitive conclusion because of challenges in analyzing audio with background noises. In the Indian case, it was found to be at least partially real. The point here is that we still do not have robust models to identify between a real and a deepfake. Many tools online for detecting deep-fakes are biased either towards voices with larger wavelengths or towards people of color. The technology is enhancing so rapidly that any tip you know now to identify a deepfake is already outdated. Like if you say deep-fakes don't blink their eyes, they do. I you say deep-fakes have blurred edges, they no longer have blurred edges.

D. AI MALFUNCTIONING

AI technology has undeniably revolutionized various aspects of our lives, yet instances of malfunctioning machines continue to surface. In an incident in Moscow, a chess-playing mechanical bot injured a child during a game. When the child attempted to intervene during the AI's turn, the bot smashed the child's finger resulting a fracture. Such incidents, however, do not imply AI consciousness; rather, they show the risks of malfunction. Similar case was seen when a self-driving Volvo car hit a group of people in high speed. Recently, Saudi Arabia made headlines with the debut of its first humanoid male robot, which garnered attention for inappropriately touching a female reporter. While this action may be a normal robotic move or a flaw in the AI's training model, the crucial issue lies in accountability. Who is responsible for such malfunctions—was it a result of erroneous training data or a self-learned behavior post-deployment? AI models are trained to achieve certain goals and needs to be provided proper instructions. Let us take an example and understand this. When an AI model is asked to bring a cup of coffee its only goal would be to bring coffee even if it costs a thousand rupees. When AI is integrated in the environment, such malfunctioning could lead to serious damages and even threat to life. With self-learning AI systems, even developers may struggle to comprehend the exact mechanisms driving the model's evolution in open environments. These incidents underscore the pressing need for comprehensive regulations governing AI technology, as the potential consequences of unchecked AI malfunctioning pose significant ethical and safety concerns.

E. AI'S IMPACT ON HUMAN INTELLECT

AI tools themselves don't inherently reduce human intellect. Rather, the impact of AI on human intellect depends on how these tools are integrated into our lives and the choices we make in utilizing them. AI has the potential to augment human intellect by providing access to vast amounts of information, streamlining tasks, and enabling more efficient problem- solving. However, there are concerns about over-reliance on AI leading to a decrease in critical thinking skills or a loss of certain abilities due to disuse. For example, if individuals become overly dependent on AI for decision-making or problem-solving, they may neglect to develop and maintain their own analytical and problem-solving skills. If we are getting answer to every question with the help of AI, why would someone bother even thinking about it. This could affect student's ability to build logic, understand problems and implementing solutions. why would people create art and design when they can get it with a single prompt. If we rely too much on automated vehicles, we may lose our ability to drive safely. Similarly, the convenience of AI-powered tools for tasks like spell-checking or mathematical calculations might discourage people from practicing and retaining these skills themselves. Eventually over reliance on AI could make us completely dependent on machines for tasks that humans were known to solve. This could result in a society that is less resilient and adaptable, making it more susceptible to unexpected events and crises.

F. WILL AI TAKE AWAY JOBS

The evolution of AI aligns with Darwin's Theory of Evolution: only the highly skilled will survive. If you had asked someone 12-15 years ago about the kinds of jobs AI would take over, they might have said it would start with labor-intensive work in factories, then move on to low-skilled white-collar jobs, followed by highly skilled jobs like programming, and finally creative jobs. However, the reality is unfolding in the opposite direction. Numerous AI tools, both free and paid, can now generate highly creative, high-quality images with just a few prompts. When considering the probability of AI taking over creative jobs, it's important to revisit the discussion on the ownership of training data (as noted in section 3.1). To create and refine AI models for creative tasks, human input is still essential for providing initial and ongoing data. Thus, while AI may reduce significant job opportunities in creative fields, it will still require human assistance. For this you can take the example of hand embroidery and machine embroidery.

Even when machine embroidery has become so common still we have a portion of consumers who like hand-made embroidery but the market for this has shrunk greatly after machine embroidery came. For traditional handicrafts, there is still a huge market. In customer relations and call centers, AI-based chat and voice assistants are already in use. However, customer issues often cannot be fully resolved by bots alone. People express and explain their problems in diverse ways. Although AI can overcome language barriers, it still struggles with understanding human emotions and tone. While chatbots can handle many queries simultaneously, reducing the need for human operators to a greater extend, complex issues will still require human intervention. In the medical field, AI will primarily serve as high-tech support tools for humans. As noted in section 3.4, AI malfunctions have been documented, and in the critical context of hospitals, where life and death are at stake, AI's role will be limited. At most it may reduce the need for low-level cleaning and support staff but cannot replace medical professionals. Data entry and content writing jobs are particularly vulnerable. The entertainment industry and online platforms like YouTube rely heavily on written content, from blogs to scripts and memes. AI tools like ChatGPT and Copy.ai are highly efficient at these tasks and could potentially take over more than 50Regarding software development, the introduction of AI tools like Devin "The Software Engineer" has sparked concerns about job security for developers. However, large companies have extensive development setups and pre-written code that AI cannot yet fully comprehend or modify independently. Additionally, no company would want to feed its confidential code and problem solution into a self-learning AI bot, necessitating in-house AI solutions, which are not financially viable for more than 75% of the companies. Moreover, development teams include various roles such as UI/UX designers, testers, database designers, managers, and client interaction specialists. While some jobs may be reduced, new roles related to AI regulation and maintenance will emerge.

Jobs like stock market advisors and insurance underwriters are also at high risk because AI can analyze vast amounts of data and make accurate predictions. Jobs like psychologists, physiotherapists, teachers and other jobs dealing with human emotions are not likely to be replaced by AI.

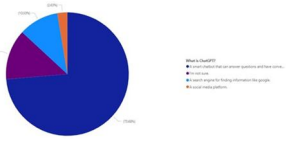


Fig. 1. Understanding of AI

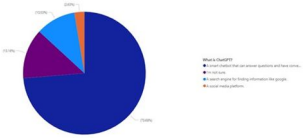


Fig. 2. Awareness of AI Tools

V. SURVEY

We did a survey on AI awareness focusing on people belonging to non-IT backgrounds. The survey reveals several key insights:

1) *Understanding of AI*: Approximately 18-20% of respon- dents do not have a clear understanding of what AI is.
2) *Awareness of AI Tools*: Among those who are familiar with AI, 27% are unaware of the widely known AI tool, ChatGPT.
3) *Proficiency in Using AI Tools*: Of the respondents who are aware of ChatGPT, 66% are not able to use it effectively.
4) These findings highlight a significant gap in AI literacy among the population. As AI continues to integrate into various aspects of our daily lives, it is crucial to bridge this knowledge gap. The first step towards a well- informed and managed society is to educate people about AI, including its uses, applications, and potential risks. By doing so, we can ensure that individuals are equipped to utilize AI tools safely and effectively.

VI. KEY RECOMMENDATIONS FOR SAFE AND RESPONSIBLE AI INTEGRATION

To ensure the safe and responsible integration of AI into our daily lives, a comprehensive set of rules and regulations must be established to mitigate potential risks. Here are key recommendations:

A. Transparency And Ownership Of Training Data

1) Strict regulations should be implemented to ensure trans- parency and ownership of training data.

2) Thorough analyses should be conducted to prevent the use of illegally obtained or plagiarized information across all data forms, not just textual.
3) Applications should be developed to facilitate this anal- ysis.
4) Data transparency should be ensured so individuals can claim copyright if their data is used without proper consent.

B. *ENVIRONMENTAL SUSTAINABILITY*

1) There should be a balance between AI development and environmental sustainability.
2) There is a need for developing tools to calculate both the accuracy of AI models and their carbon emissions.
3) Low-emission models can be implemented in high-query environments such as search engines, smart speakers, and mobile phones.
4) High-accuracy models can be used only in critical areas to maintain a balance between advancement and sustainability.

C. *COMBATTING DEEP-FAKES*

1) Establishment of stringent rules and penalties against the creation and distribution of deep-fakes is required.
2) Software detectors should be developed to differentiate between real content and deep-fakes.
3) Access to these detectors should be restricted only to journalists, government agencies, and detective agencies because what is available openly is easy to bypass for criminals.

D. *TESTING AND ACCOUNTABILITY*

1) It should be mandatory to do a thorough testing of AI systems before deployment in uncontrolled environments.
2) There should be clear rules regarding accountability and penalties in case of malfunctions.
3) Deployment and commercialization of humanoid robots in uncontrolled environments should be prohibited.

E. *AI AWARENESS AND EDUCATION*

1) We should prioritize public awareness about AI, including its applications, uses, threats, and responsible usage.
2) The educational curriculum should be enhanced to include basic AI knowledge in early grades and in-depth AI concepts in advanced courses to foster the cultivation of more AI scientists.

F. *HUMAN-AI COLLABORATION*

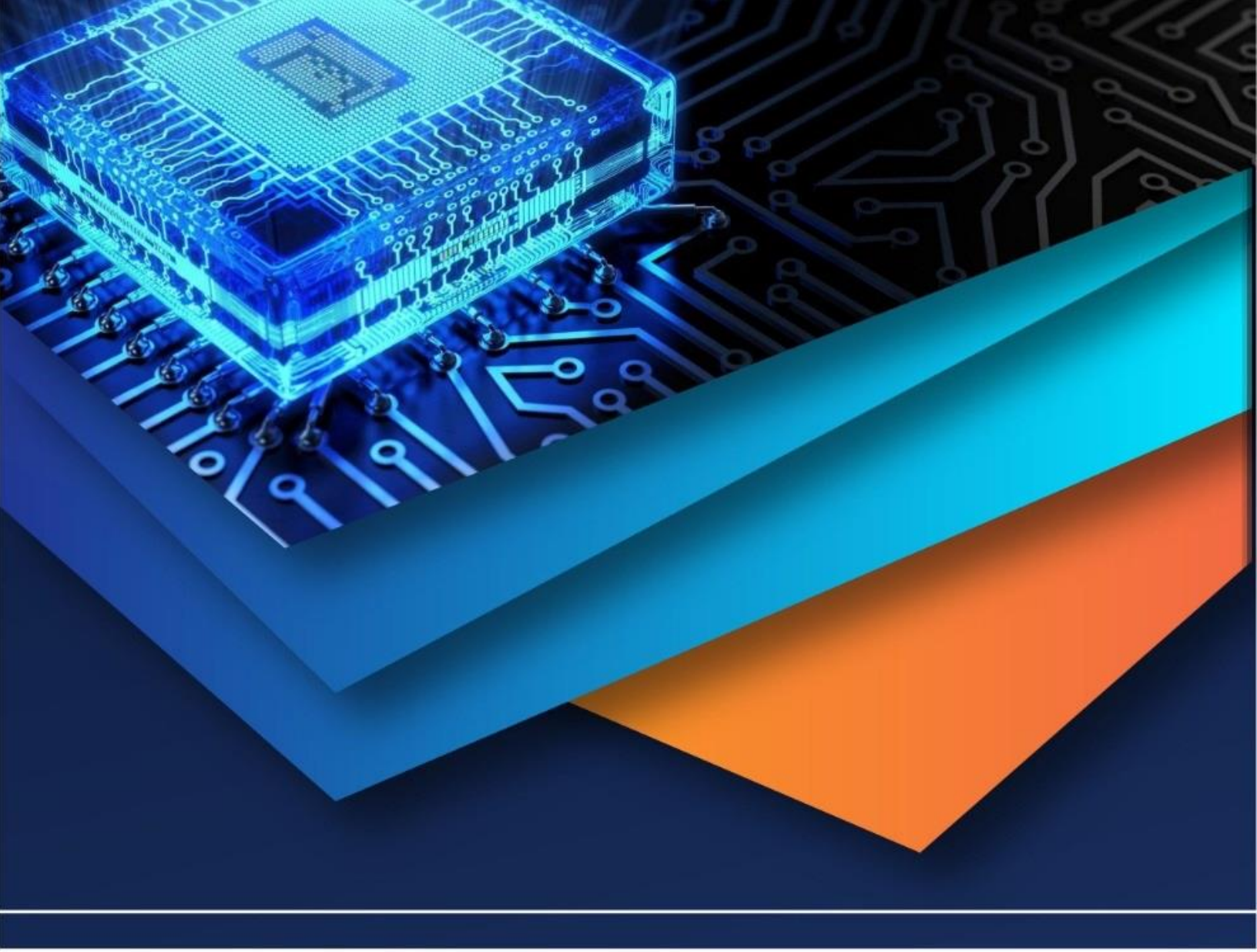
1) AI should be designed to complement human abilities rather than replace humans.
2) Focus should be on creating systems that enhance human efficiency through collaboration.

VII. CONCLUSION

This paper concludes that despite the enormous advantages of AI, it can be dangerous for human life. The key to success in the race of AI is to use it in a manner that is secure and responsible.

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