

Examining the Prospects and Challenges of Artificial Intelligence in African Democracy

Toba Paul Ayeni ^{a*}, Opani M. Aweh ^b, Adedayo Opeyemi Aina ^c and Emmanuel Oluwafemi Ola ^d

^a*Department of Computing, Afe Babalola University, Ado Ekiti, Nigeria and Independent National Electoral Commission, Nigeria*

^b*Department of Computing, Afe Babalola University, Ado Ekiti, Nigeria*

^c*Independent National Electoral Commission, Nigeria*

^d*Independent National Electoral Commission, Nigeria*

Abstract

Artificial intelligence's (AI) influence on democracy is evident in its impacts on civic engagement, decision-making, and political processes. The majority of African countries are still acclimating to the integration of technology in electoral processes despite the discernible positive impact it is having on the electoral system. As policymakers and academics engage in deliberations regarding the implementation of AI in elections, there remains an uncertain correlation between technology and democracy that defies clarity. The effective implementation of AI in Africa elections could be facilitated through the establishment of a policy instrument that mirrors the approach taken in Europe, overseeing the development, structure, and deployment of AI systems, adhering to ethical AI principles that prioritise inclusivity, fairness, accountability, transparency, integrity, and engaging citizens, civil society organisations, and other relevant stakeholders in the decision-making and design phases. This article therefore examines the impacts of AI in the African electoral processes, discussing its potentials, challenges, and possible recommendations for its proper application. AI is regarded as having the potential to significantly aid in the advancement of democracy in Africa, notwithstanding the challenges it may present.

Keywords: Artificial Intelligence, Africa, Democracy, Technology, AI, Elections

1 Introduction

Artificial intelligence (AI) is an expansive domain within computer science that focuses on creating machines capable of performing tasks typically requiring human intelligence [1]. AI has become popular in society through its application in various fields such as biometric and facial identification, object detection, risk prediction, and algorithmic decision-making [2]. Drawing from multiple disciplines, AI utilizes a variety of approaches, with recent advancements in machine learning and deep learning driving transformative changes across nearly every industry. These systems function by processing data through algorithms. Initially, large amounts of data are gathered to develop mathematical models or algorithms that process this information, recognize patterns, and make predictions—a process known as training [3], [4].

Within a month of being launched, ChatGPT, the AI chatbot that generates responses, reached a milestone of 100 million users

per month, establishing itself as the most rapidly expanding program ever. To provide context, it took the popular video-streaming platform Netflix, which is now well recognised, a period of three-and-a-half years to achieve a monthly user base of one million. However, in contrast to Netflix, the rapid and impressive growth of ChatGPT and its capacity to bring either positive or negative outcomes has generated much discussion. This underscores the popularity and acceptance of AI [5]. Machine learning, a rapidly growing field at the intersection of computer science and statistics, seeks to create computers that improve automatically through experience [6]. Over time, AI systems become more adept at specific tasks, allowing them to adapt to new information and make decisions without explicit programming. In essence, AI is about training machines to think and learn like humans, with the goal of automating tasks and solving problems more efficiently [7].

The deployment of AI technologies is expanding across the African continent, although policy responses remain in their infancy. As AI development continues to grow globally, an AI ecosystem is also emerging in Africa. Leila Janah, the founder and CEO of Samasource, notes that "if you use a mobile phone or laptop's facial recognition features, drive a car, or shop online, there's a good chance that a person in East Africa helped train the algorithm that makes your technology work" [8]. This highlights the significant role that individuals play in the development of modern technologies. It suggests that many of the algorithms behind common technologies, such as facial recognition on phones, automated systems in cars, and online shopping platforms, have been trained using data processed by people all over the world.

1.1 Artificial Intelligence Domain

AI encompasses several key domains, each focusing on different aspects of intelligence and problem-solving. [9], [10], [11], [12], [13] and [14] among many other authors listed and explained the domain of AI which include the following:

1.1.1 Machine Learning (ML):

- **Supervised Learning:** Involves training a model on labeled data, where the input-output pairs are known. The model learns to predict the output based on new inputs. This is commonly used in tasks like spam detection in emails and image classification.
- **Unsupervised Learning:** Deals with unlabeled data. The model tries to find patterns and relationships within the data, such as grouping similar items together (clustering). It's used in applications like market segmentation and anomaly detection.
- **Reinforcement Learning:** Focuses on decision-making by rewarding desired behaviors and penalizing undesired ones. This approach is used in areas like robotics, game AI, and self-driving cars, where the system learns by interacting with its environment.

1.1.2 Natural Language Processing (NLP):

- **Text Analysis:** Involves extracting meaningful information from text data, such as sentiment analysis, topic modeling, and text summarization.
- **Machine Translation:** Automatically translating text or speech from one language to another. Google Translate is a popular example of this.
- **Speech Recognition:** Converts spoken language into text, enabling voice-activated systems like virtual assistants (e.g., Siri, Alexa).
- **Chatbots and Conversational AI:** These systems can understand and respond to human language in a conversational manner, used in customer service and virtual assistants.

1.1.3 Computer Vision:

- **Image Classification:** Categorizing images into predefined classes. For example, determining whether an image contains a cat or a dog.
- **Object Detection:** Identifying and locating objects within an image or video. This is crucial for applications like autonomous vehicles and surveillance systems.
- **Facial Recognition:** Identifying or verifying a person's identity based on their facial features, commonly used in security systems and social media tagging.
- **Image Segmentation:** Dividing an image into segments to simplify analysis or highlight areas of interest, used in medical imaging and autonomous vehicles.

1.1.4 Robotics:

- **Autonomous Robots:** Robots that can perform tasks without human intervention, such as drones, robotic vacuum cleaners, and autonomous vehicles.
- **Human-Robot Interaction:** Focuses on how robots can interact with humans in a way that feels natural and intuitive, important in settings like healthcare and customer service.
- **Robotic Process Automation (RPA):** The use of software robots to automate repetitive tasks in business processes, enhancing efficiency and reducing human error.

1.1.5 Expert Systems:

- **Rule-Based Systems:** Systems that apply predefined rules to data to make decisions or solve problems. These are often used in areas where the decision-making process can be explicitly defined, such as diagnosing medical conditions or troubleshooting technical issues.
- **Knowledge Representation:** Involves structuring and storing knowledge in a way that a computer system can utilize it to solve complex problems.

1.1.6 Neural Networks:

- **Artificial Neural Networks (ANNs):** Modeled after the human brain, these networks consist of layers of nodes (neurons) that process data. They are particularly powerful in recognizing patterns and are used in deep learning.
- **Convolutional Neural Networks (CNNs):** A type of neural network particularly effective in processing and analyzing visual data, widely used in image and video recognition.
- **Recurrent Neural Networks (RNNs):** Designed to handle sequential data, such as time series or natural language, and are used in tasks like speech recognition and text generation.

1.1.7 Fuzzy Logic:

- **Decision-Making with Uncertainty:** Unlike traditional binary logic, fuzzy logic deals with degrees of truth, making it useful in situations where information is imprecise or uncertain. It's often used in control systems, such as air conditioning and washing machines, where decisions need to be made based on incomplete or ambiguous data.

1.1.8 Speech Recognition:

- **Voice-Activated Systems:** Systems that can interpret and respond to spoken commands, used in virtual assistants, smart home devices, and accessibility tools.
- **Speech-to-Text:** Converting spoken language into written text, which is used in transcription services, voice typing, and real-time subtitles.

2. Literature Review

The study by [15] discovered that AI has the ability to directly promote the clustering of productive services or enhance productivity. The study conducted by [16] reveals that the use of AI capabilities helps companies shift to environmentally friendly operations by actively participating in green and clean innovation. Additionally, the study revealed a positive correlation between the capabilities of AI and reduced levels of greenhouse gas emissions. The article [17] elucidates that AI enhances preoperative planning and aids in performing surgeries through the use of augmented reality and robotic systems, resulting in increased safety and precision during operations. AI can monitor a patient's recovery, adjust treatment plans, and manage long-term ailments throughout postoperative care, allowing for personalised patient care. The study [18]

demonstrates how the use of generative AI may effectively engage young people in enjoyable digital writing and encourage them to explore and reflect upon the dynamics and structures of various platforms that influence their own and others' literacy activities. Educators should view young people's innovative use of these advancing technologies as possible chances to cultivate a discerning understanding of how commercial platforms want to profit from their users.

Nevertheless, According to a study conducted by [19], revealing the presence of artificial intelligence in pleasurable services reduces customers' trust in their thinking and emotions, their perception of quality, and their inclination to use the services. Furthermore, research indicates that the disclosure of AI in pleasurable situations increases the dread of negative consequences caused by AI. This fear is mostly driven by threats to one's existence and identity, with risks to existence having a greater influence. Nevertheless, this revelation does not impact utilitarian services. Revealing the use of AI in the hotel industry greatly impedes clients' willingness to embrace these technologies. [20] contended that the implementation of AI can be hindered by current procedures that are intended to handle ambiguity. Specifically, numerous procedures are developed to facilitate synchronised decision-making among various organisational participants. Artificial intelligence can exacerbate the difficulty of coordination. Nevertheless, as the expenses associated with altering these procedures decrease, the benefits derived from implementing AI technologies rise.

The project conducted by [21] investigates the utilisation of AI in predicting and effectively handling disturbances in the global value chain, with the aim of addressing the issue of food insecurity. The interdependence and integration of global markets have resulted in intricate disruptions in worldwide value chains, triggered by many variables including natural calamities, climate occurrences, geopolitical disputes, and economic downturns. Advancements in AI machine learning, blockchain technology, and big data analytics have opened up new opportunities for accurately predicting and efficiently managing these disruptions. In conclusion, [22] explains that democracy is being transformed by digital technologies and that direction and guidance in this process need to be sought to understand the connection between technology and democracy as it appears to be uncertain and in a state of flux.

3 Methodology

This study investigates the influence of AI on African democracy using a qualitative methodology. The study performs a thorough examination of the current academic literature, covering articles, reports, and case studies, in order to evaluate the impact of AI on democratic processes throughout the continent. Common sources of secondary information consist of databases like Google Scholar, IEEE Xplore, and ScienceDirect. These databases offer access to significant academic articles and industry reports. The research explores several aspects of AI's influence on election systems, governance, political communication, and public participation by utilising these sources. The analysis utilises political science and international relations theories to provide a balanced examination of AI's role as a tool for enhancing democracy and its potential to pose a danger to democratic integrity.

The paper emphasises the potential of AI in election monitoring, countering misinformation, and promoting political engagement, while also acknowledging the difficulties around AI-driven polarisation, privacy, and ethical considerations. This paper employs a thorough examination of literature and theoretical analysis to clarify the dual function of AI in the transformation of democracy in Africa. It highlights the benefits as well as the possible disadvantages of AI in this context.

3.1 Application of AI in African Elections

Artificial intelligence has the potential to enhance democracy. It can help individuals in understanding politics and engaging in discussions that can enhance democracies. Politicians have the ability to develop stronger connections with citizens and also to advocate for their interests. Cooperation between citizens and politicians has the potential to change electoral campaigns and improve the effectiveness of policymaking. AI has the potential to support democracy by increasing citizen participation and improving political representation. The purpose of this is to facilitate citizens' understanding of politics and engaging in democratic discussions, while also enabling politicians to engage with their constituents. This alignment has the potential to enhance electoral campaigns and policies [23]. AI has the potential to reduce financial barriers in African democracies, where political campaigns tend to be costly. Underfunded candidates can effectively compete in the absence of advisers by implementing automated systems for generating news releases and targeting specific audiences. Artificial intelligence may customise campaign messaging based on voter demographics utilising microdata, hence enhancing public engagement. Additionally, it has the ability to disseminate false information, distort the perspectives of voters, and intensify political polarisation by taking advantage of societal divisions. Other application of AI includes the following:

3.1.1 Efficiency in Election Administration:

AI significantly enhances the efficiency, reliability, and security of election processes. AI-powered tabulators can quickly scan paper ballots, reducing the time needed for result reporting and recounts. This streamlining of electoral processes ensures more timely and accurate outcomes.

3.1.2 Information Accessibility:

AI-powered solutions can improve information accessibility and voter education, especially in resource-constrained places. Chatbots and voice-enabled programs can update citizens on government policy, elections, and civic rights. This increases transparency and public knowledge. AI tools solve numerous needs, making citizen information more accessible. AI applications that improve information access:

- AI-powered chatbots and virtual assistants may deliver information and support in natural language.
- Speech Recognition: Technology converts speech into text for auditory learners. Transcribed government announcements, public service information, and official files are accessible to varied communication preferences.
- AI-driven multilingual translation tools simplify communication. Usage: Translating government websites, public notices, and official papers helps multilingual residents access information.
- AI-powered auto-complete and predictive text enhance input speed and accuracy. Usage: Online forms and search bars on government websites enable citizens find and apply for information quickly.
- AI analytics can tailor information delivery based on user

behaviour and preferences. Usage: These tools can tailor government site material to citizens' needs.

- TTS technology reads text aloud for visually challenged or audio-only users. Usage: Audio versions of government documents, announcements, and websites improve accessibility.
- Use AI-driven summarisation to condense large texts while retaining key information. Usage: Summarising official documents, reports, and rules helps citizens absorb important information quickly.
- AR glasses and smartphones overlay digital information on the actual world. Use: Government-provided AR apps can provide context by overlaying real-time information on landmarks, public spaces, and documents. Use: Integrating AI into communication strategies and digital platforms can improve information accessibility and citizen engagement for governments. Making these technologies accessible promotes inclusivity for people of all abilities and interests.

3.1.3 Election Integrity:

AI has the ability to improve the integrity of elections in the following ways:

- By tackling electoral difficulties, AI can improve election integrity. Here are various ways AI might help ensure fair and transparent elections:
- Voter Registration/Authentication: in identity verification, AI algorithms can improve voter identity verification during registration, minimising fraud.
- Voting Security: The use of blockchain technology and AI can enable secure and transparent voting systems. Blockchain records are immutable, making election tampering harder.
- Prevention and detection of fraud: AI can be used for anomaly detection. AI systems can identify vote data anomalies like multiple votes or strange voting trends that may imply fraud.
- Deepfake detection: AI has the capability to do media authentication. AI can recognise deepfake films and audios used to propagate misinformation or influence political campaigns.
- Predictive Security Analytics: AI can be helpful in threat analysis. AI-driven predictive analytics may analyse historical data, social media patterns, and other factors to determine election security concerns. This proactive strategy helps authorities anticipate and mitigate dangers.
- Monitoring Social Media: It has the capability to carry out sentiment analysis. AI systems can analyse social media sentiment to assess public opinion and discover coordinated disinformation activities that may affect the election.
- Accessibility and inclusivity: AI-Assisted Voting in the form of voice recognition and assistive technologies can make voting more inclusive for those with disabilities.
- Real-time Data Analysis: AI can carry out live monitoring. It can detect long lines, technological concerns, and other interruptions in electoral procedures in real time, allowing officials to act quickly.
- Audits after elections: data forensics is possible through AI. AI systems can analyse massive datasets to find contradictions and abnormalities in reported results, ensuring election accuracy.
- Public Awareness Campaigns: AI can help public awareness campaigns provide targeted and personalised content to teach voters about election integrity and how to report violations.

- Security Measures: AI can improve cybersecurity to protect electoral systems from hacking and ransomware attacks.

Election authorities can improve voting integrity, protect against threats, and build voter trust in democracy by using AI technologies. These technologies must be implemented with transparency, privacy, and ethics in mind to ensure electoral credibility.

3.1.4 Data Analysis

AI can facilitate data analysis to detect patterns, monitor public opinion, and comprehend social requirements, hence enabling data-driven governance. Utilising data in decision-making can result in more adaptable governance, as policymakers can customise their programmes to effectively tackle the distinct difficulties encountered by various communities

3.1.5 Counterterrorism:

AI plays a crucial role in combating extremist activities online, helping to mitigate the spread of radicalism, political violence, and polarization. Through surveillance and intervention strategies, AI helps maintain the security of the electoral process.

3.1.6 Anomaly Detection:

AI is capable of identifying anomalies in voter lists and voting machines, which helps prevent electoral fraud and voter disenfranchisement. This ability to detect irregularities ensures the integrity of the electoral process.

3.1.7 Intelligent Public Services:

The adoption of AI in public administration is increasing, driven by the promise of customized, streamlined, and effective public services. This could significantly enhance service delivery, contributing to more efficient and responsive electoral management.

3.1.8 Democratization of Campaigns:

AI tools can lower financial barriers for first-time and underfunded candidates by improving voter education through targeted advertisements and tracking harmful hate speech. This levels the campaign playing field, promoting a more democratic electoral process. The exact targeting of certain voter demographics through microdata by AI can assist campaigns in delivering customised messages, perhaps swaying undecided voters and enhancing citizen engagement in democracy. Nevertheless, AI also presents potential hazards, such as the dissemination of false information and the utilisation of bots to sway voter perspectives, as exemplified in Kenya's 2017 election. Moreover, AI has the potential to worsen polarisation by offering tools that might exploit pre-existing divisions, such as those based on religion and ethnicity, in countries like Nigeria [24].

3.1.9 Enhanced Security:

AI-powered systems enhance the security of electoral processes by detecting and preventing cybersecurity threats, such as hacking attempts on electoral systems and databases. This contributes to the overall security and integrity of the electoral process.

3.1.10 Real-Time Monitoring:

AI technologies enable real-time monitoring and observation of elections by analyzing social media, news reports, and other online sources for indicators of electoral malpractice. This

increases transparency and accountability in the electoral process.

3.1.11 Promoting Equity

AI has the capacity to fundamentally transform political campaigns by equalising opportunities, especially in African democracies where campaign expenses are increasing significantly. In nations such as Ghana, Uganda, Kenya, and Nigeria, the financial onus of participating in political campaigns is substantial, rendering it arduous for candidates with limited funding to effectively contend. AI has the potential to decrease these obstacles by automating operations like creating press releases and targeting specific audiences. This would enable smaller campaigns to function more efficiently and effectively, eliminating the need for costly consultants.

AI can be advantageous for civil groups and citizens in their endeavours to enhance transparency and accountability throughout the voting process. AI has the potential to enhance the capabilities of civil society organisations (CSOs) in monitoring elections and facilitating individuals' access to reliable political information. Nevertheless, the digital divide could impede smaller or rural CSOs from effectively utilising AI tools, while citizens remain susceptible to AI-generated misinformation, such as deepfake videos[24].

3.2 Weaknesses of AI in African Elections

While AI technologies and applications have the potential to solve many of humanity's biggest problems—such as making the world less sick, hungry, productive, educated, and climate-ready—they also risk entrenching and amplifying social inequality [23], [25]. AI trained on non-representative or biased data might perpetuate social and economic inequalities by perpetuating representation gaps and biases [26]. AI can be deployed by dominant technology companies to increase their economic and social power or by governments to violate citizens' privacy and other human rights. As AI systems scale up, a lack of transparency and accountability can worsen their effects [27]. The following are seen as probable fears in applying AI in African elections.

3.2.1 Polarization and Political Violence:

While AI can help combat extremism, it can also contribute to political polarization, radicalism, and violence. AI's use in these contexts may exacerbate societal divisions, potentially fueling extremism and undermining the democratic process.

3.2.2 Ethical Tensions:

The integration of AI in public administration is fraught with ethical challenges related to equity, openness, confidentiality, and fundamental human rights. These ethical tensions must be carefully managed to avoid undermining the integrity of the electoral process.

3.2.3 Misinformation and Disinformation:

The rise of AI in recent years has intensified concerns about its impact on democracies, especially regarding the election process. AI, while offering benefits, poses significant risks, particularly as a tool for disinformation and misinformation, which can incite conflict and even violence during elections. For instance, AI can generate false information or propagate biased views that do not reflect public opinion, potentially undermining the democratic process.

3.2.4 Data Privacy Concerns:

AI's handling of sensitive data raises significant concerns about data security and the potential compromise of confidentiality.

Incidents like the ChatGPT issue highlight the risks associated with AI in managing electoral data.

3.2.5 Bias and Errors:

AI models could introduce biases, particularly in how voter rolls are "cleaned up," disproportionately targeting minority voters. AI-based authentication systems may also produce errors in recognizing voters' facial or fingerprint features, which could lead to voter disenfranchisement.

3.2.6 Limited Adoption:

Many African electoral commissions face financial constraints and other challenges that prevent them from adopting AI technologies. This limited adoption could exacerbate inequalities in electoral processes, as only some regions benefit from AI's advantages.

3.3 Recommendations for the Use of AI in African Elections

3.3.1 Establishing Robust Regulatory Frameworks:

The Council of Europe, the foremost human rights group in Europe, is presently engaged in developing a legally binding instrument that will regulate the establishment, organisation, and execution of artificial intelligence systems. The main aim of the "Convention on Artificial Intelligence, Human Rights, Democracy, and the Rule of Law" (AI Convention) is to protect human rights against the adverse effects of AI technology. The AI Convention has the potential to become the first globally acknowledged agreement that imposes legal responsibilities for AI [28].

Nations in the Global South, specifically in Africa, must confront governance obstacles and enhance institutional capability in order to establish the groundwork for the flourishing of artificial intelligence [29]. Additionally, it is imperative to contemplate how the global community might assist in bridging the technological disparities in Africa through the implementation of a solution-oriented strategy. This entails customising AI laws to suit specific local requirements and obstacles, instead of merely replicating policies from other regions, a practice that has frequently impeded progress in Africa. Adopting a problem-oriented methodology would empower African nations to formulate AI policies that are more tailored to their unique circumstances.

African countries should develop comprehensive regulatory frameworks to govern the use of AI in elections. These frameworks should address data privacy, ethical considerations, and the prevention of misuse, ensuring that AI technologies enhance rather than undermine electoral integrity.

3.3.2 Enhance Data Security and Privacy Protections:

Implement stringent data security measures to protect sensitive voter information. Ensuring that AI systems handle data with the highest standards of privacy and security will help maintain voter trust and prevent breaches.

3.3.3 Promote Transparency and Accountability:

AI systems should be designed with transparency in mind, allowing stakeholders to understand and verify the processes and decisions made by AI technologies. This includes clear documentation of AI algorithms and decision-making processes to ensure accountability.

3.3.4 **Invest in AI Literacy and Capacity Building:**

Provide training and resources to electoral commissions, government officials, and other stakeholders on the use of AI in elections. Increasing AI literacy will help mitigate risks associated with the technology and ensure its effective and ethical use.

3.3.5 **Monitor and Evaluate AI Impact:**

Continuously monitor and evaluate the impact of AI on electoral processes. This includes assessing the effectiveness of AI tools in detecting anomalies, preventing fraud, and enhancing voter engagement. Regular evaluations will help identify and address any issues that arise.

3.3.6 **Address Ethical and Bias Concerns:**

Develop and implement guidelines to address ethical issues and biases in AI systems. Ensure that AI models are tested for fairness and accuracy, and establish mechanisms for addressing any biases or errors that could affect voter disenfranchisement or electoral integrity.

3.3.7 **Facilitate International Cooperation:**

Foster collaboration between African countries and international organizations to share best practices and experiences related to AI in elections. International cooperation can help address common challenges and promote the effective use of AI technologies.

3.3.8 **Promote Inclusivity and Accessibility:**

Ensure that AI technologies are accessible to all regions and communities, including those with limited resources. Efforts should be made to prevent disparities in the adoption and benefits of AI across different areas, ensuring a level playing field for all voters.

3.3.9 **Encourage Public Engagement and Dialogue:**

Engage the public in discussions about the use of AI in elections to build trust and address concerns. Transparent communication about how AI technologies are used and their benefits and limitations will help gain public support and understanding.

3.3.10 **Leverage AI for Conflict Prevention:**

Utilize AI-driven early warning systems to detect and address potential conflicts and electoral violence proactively. These systems should be integrated into broader conflict prevention and response strategies to enhance governance and electoral stability.

4 **Future scope and conclusion**

Future studies on the use of artificial intelligence in African elections should concentrate on several important areas to improve efficiency and handle current issues. First, artificial intelligence algorithms must be developed specifically for the particular election environments seen throughout African nations. Improving the accuracy and dependability of AI systems in identifying electoral fraud and handling voter data depends on customising machine learning models to manage different data quality and regional complexity. Furthermore, crucial is the building and preservation of robust technological infrastructure. Improving local knowledge, computer resources, and internet connectivity would help AI systems to be deployed effectively. Ensuring that data scientists and election officials can properly manage and apply AI tools depends on local capacity building training programs.

Future studies should concentrate on encouraging openness and interacting with stakeholders if we are to build public confidence in AI-driven election processes. Gaining acceptance and confidence in these technologies will depend on an awareness of public worries about artificial intelligence and addressing of them. Longitudinal researches are required to evaluate how artificial intelligence might affect democratic government and electoral integrity over time. Analysing how artificial intelligence shapes voter behaviour and election results can help to improve applications and guarantee that they support democratic processes rather negatively. And lastly, investigating fresh ideas and combining artificial intelligence with developing technologies like blockchain will present chances to improve voting methods. By testing innovative ideas in actual environments, pilot programs offer useful information about their possible advantages and efficacy.

The increasing prevalence of AI in recent years has raised concerns about its impact on democratic systems, specifically in relation to the voting process. AI undoubtedly offers tremendous advantages to African democracies when embraced. The benefits encompass information accessibility, election integrity, anomaly detection, and real-time monitoring, among other advantages. There are concerns regarding the potential problems that can arise from the use of AI in African elections. These issues encompass the usage of AI as a tool for disseminating incorrect and deceptive information, which has the potential to incite conflict and physical harm during electoral proceedings. However, AI may be a valuable asset for democracies if used properly, along with measures like including tools to detect AI-generated content and employing watermarking techniques to clearly designate stuff created by AI. Undoubtedly, the use of AI in the electoral process by African nations would significantly improve the process and foster the long-term existence of democracy in the region.

5 **References**

- [1] Y. Xu, X. Liu, X. Cao, C. Huang, E. Liu, S. Qian, and J. Zhang, "Artificial intelligence: A powerful paradigm for scientific research," **The Innovation**, vol. 2, no. 4, 2021.
- [2] C. Muller, "The Impact of Artificial Intelligence on Human Rights, Democracy and the Rule of Law," 2020. [Online]. Available: <https://allai.nl/wp-content/uploads/2020/06/The-Impact-of-AI-on-Human-Rights-Democracy-and-the-Rule-of-Law-draft.pdf>
- [3] "Artificial Intelligence," **Builtin**. [Online]. Available: <https://builtin.com/artificial-intelligence>
- [4] M. I. Jordan and T. M. Mitchell, "Machine learning: Trends, perspectives, and prospects," **Science**, vol. 349, no. 6245, pp. 255-260, 2015.
- [5] S. Kreps and D. Kriner, "How AI Threatens Democracy," **Journal of Democracy**, vol. 34, no. 4, pp. 122-131, Oct. 2023.
- [6] M. I. Jordan and T. M. Mitchell, "Machine learning: Trends, perspectives, and prospects," **Science**, vol. 349, pp. 255-260, 2015. DOI: 10.1126/science.aaa8415.
- [7] N. Berente, B. Gu, J. Recker, and R. Santhanam, "Managing artificial intelligence," **MIS Quarterly**, vol. 45, no. 3, 2021.
- [8] L. Janah, "How East Africa Trains AI," **LinkedIn**, Dec. 05, 2018. [Online]. Available: <https://www.linkedin.com/pulse/how-east-africa-trains-ai-leila-janah/>

- [9] A. O. Abiola, A. O. Adetunmbi, and A. Oguntimilehin, "A review of the various approaches for text to text machine translations," **International Journal of Computer Applications**, vol. 120, no. 18, pp. 7-12, Jun. 2015. DOI: 10.5120/21325-4278.
- [10] A. Oguntimilehin, A. O. Abiola, and K. A. Olatunji, "Computer aided diagnostic systems for managing typhoid fever: A review of diagnosis techniques," **International Journal of Computer Applications**, vol. 126, no. 6, pp. 24-29, Sep. 2015. DOI: 10.5120/ijca2015906071.
- [11] R. Kala, "Chapter 1 - An introduction to robotics," in **Emerging Methodologies and Applications in Modelling, Autonomous Mobile Robots**. Academic Press, 2024, pp. 1-48, ISBN 9780443189081. [Online]. Available: <https://doi.org/10.1016/B978-0-443-18908-1.00010-8>.
- [12] S. Xiao, J. Li, S. P. A. Bordas, and T.-Y. Kim, "Chapter One - Artificial neural networks and their applications in computational materials science: A review and a case study," in **Advances in Applied Mechanics**, vol. 57, Elsevier, 2023, pp. 1-33, ISBN 9780443137051. [Online]. Available: <https://doi.org/10.1016/bs.aams.2023.09.001>.
- [13] T. Zwingmann, "AI in a Nutshell: A Practical Guide to Key Terminology," 2023. [Online]. Available: <https://blog.tobiaszwingmann.com/p/demystifying-ai-practical-guide-key-terminology?ref=gptechblog.com>
- [14] M. Newhauser, "Five Diagrams to Understand AI," 2023. [Online]. Available: <https://www.gptechblog.com/5-diagrams-to-help-you-understand-generative-ai/>
- [15] X. Xie and J. Yan, "How does artificial intelligence affect productivity and agglomeration? Evidence from China's listed enterprise data," **International Review of Economics & Finance**, vol. 94, pp. 103408, 2024. [Online]. Available: <https://doi.org/10.1016/j.iref.2024.103408>.
- [16] A. Jiao, J. Lu, H. Ren, and J. Wei, "The role of AI capabilities in environmental management: Evidence from USA firms," **Energy Economics**, vol. 134, 2024, Art. no. 107653. [Online]. Available: <https://doi.org/10.1016/j.eneco.2024.107653>.
- [17] M. H. Al-Rumaih, M. S. Al-Ahmari, and W. Kishta, "The role of artificial intelligence (AI) in paediatric orthopaedic surgery," **Journal of Orthopaedic Reports**, 2024, Art. no. 100416. [Online]. Available: <https://doi.org/10.1016/j.jorep.2024.100416>.
- [18] A. Stornaiuolo, J. Higgs, O. Jawale, and R. M. Martin, "Digital writing with AI platforms: The role of fun with/in generative AI," **English Teaching: Practice & Critique**, vol. 23, no. 1, pp. 83-103, 2024. [Online]. Available: <https://doi.org/10.1108/ETPC-08-2023-0103>.
- [19] Y. Xu, G. Zhou, R. Cai, and D. Gursoy, "When disclosing the artificial intelligence (AI) technology integration into service delivery backfires: Roles of fear of AI, identity threat and existential threat," **International Journal of Hospitality Management**, vol. 122, 2024, Art. no. 103829. [Online]. Available: <https://doi.org/10.1016/j.ijhm.2024.103829>.
- [20] A. Agrawal, J. S. Gans, and A. Goldfarb, "Prediction machines, insurance, and protection: An alternative perspective on AI's role in production," **Journal of the Japanese and International Economies**, vol. 72, 2024, Art. no. 101307. [Online]. Available: <https://doi.org/10.1016/j.jjie.2024.101307>.
- [21] P. Tamasiga, E. H. Ouassou, H. Onyeaka, M. Bakwena, A. Happonen, and M. Molala, "Forecasting disruptions in global food value chains to tackle food insecurity: The role of AI and big data analytics – A bibliometric and scientometric analysis," **Journal of Agriculture and Food Research**, vol. 14, 2023, Art. no. 100819. [Online]. Available: <https://doi.org/10.1016/j.jafr.2023.100819>.
- [22] C. Djeflal, "AI, Democracy and the Law," pp. 255-283. [Online]. Available: https://library.oapen.org/bitstream/handle/20.500.12657/43874/1/external_content.pdf?page=256
- [23] A. Hagerty and I. Rubinov, "Global AI ethics: A review of the social impacts and ethical implications of artificial intelligence," Cornell University, 2019. [Online]. Available: <https://arxiv.org/abs/1907.07892>.
- [24] D. Amata, "Exploring the Opportunities and Risks of AI in African Democracy," 2024. [Online]. Available: <https://www.dataphyte.com/latest-reports/exploring-the-opportunities-and-risks-of-ai-in-african-democracy/>
- [25] A. Gwagwa, E. Kraemer-Mbula, N. Rizk, I. Rutenberg, and J. de Beer, "Artificial Intelligence (AI) Deployments in Africa: Benefits, Challenges and Policy Dimensions," **The African Journal of Information and Communication**, vol. 26, pp. 1-28, 2020. [Online]. Available: <https://dx.doi.org/10.23962/10539/30361>.
- [26] J. Powles and H. Nissenbaum, "The seductive diversion of 'solving' bias in artificial intelligence," **Medium**, Dec. 7, 2018. [Online]. Available: <https://onezero.medium.com/the-seductive-diversion-of-solving-bias-in-artificial-intelligence-890df5e5ef53>.
- [27] A. Koene, C. Clifton, Y. Hatada, H. Webb, M. Patel, C. Machado, and D. Reisman, "A governance framework for algorithmic accountability and transparency," European Parliament, 2019. [Online]. Available: [https://www.europarl.europa.eu/RegData/etudes/STUD/2019/624262/EPRS_STU\(2019\)624262_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2019/624262/EPRS_STU(2019)624262_EN.pdf).
- [28] H. van Kolschooten and C. Shachar, "The Council of Europe's AI Convention (2023–2024): Promises and pitfalls for health protection," **Health Policy**, vol. 138, 2023, Art. no. 104935. [Online]. Available: <https://doi.org/10.1016/j.healthpol.2023.104935>.
- [29] E. O. Arakpogun, Z. Elsahn, F. Olan, and F. Elsahn, "Artificial Intelligence in Africa: Challenges and Opportunities," in **The Fourth Industrial Revolution: Implementation of Artificial Intelligence for Growing Business Success**, A. Hamdan, A. E. Hassanien, A. Razzaque, and B. Alareeni, Eds., vol. 935, Studies in Computational Intelligence, Springer, Cham, 2021, pp. 337-360. [Online]. Available: https://doi.org/10.1007/978-3-030-62796-6_22.