

The Promise and Perils of Generative AI: Case Studies in an African Context

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ABSTRACT

As generative AI applications such as ChatGPT, Midjourney, DALL-E, Bard, and others increase in ubiquity, concerns about the negative implications of these technologies are becoming more present in public discourse. However, little research has examined the impact that generative AI stands to have on African consumers and users who may be affected by its application in various fields such as education, healthcare, and social media. This work presents an early look into the implications of using generative AI within African contexts, exploring case studies of current generative AI use within Africa. These case studies examine the use of generative AI in marketing and for image and text generation. While the potential for generative AI in Africa is growing, this preliminary work aims to set a foundation for highlighting risks associated with generative AI while exploring how generative AI can be responsibly developed and used within African contexts.

CCS CONCEPTS

• **Computing methodologies** → **Artificial intelligence**; • **Social and professional topics** → **Computing / technology policy**; • **Human-centered computing** → **Human computer interaction (HCI)**.

KEYWORDS

generative AI, large language models, responsible AI, Africa, algorithmic bias

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1 INTRODUCTION

Over the past year, the use of generative artificial intelligence (AI) has spread across the world. However, the use of generative AI raises concerns about dis/misinformation, intellectual property

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rights, and gender, cultural, and socioeconomic bias. Given the development of these technologies in primarily Western contexts, many of the conversations regarding the misuse and implications of generative AI have been focused on this region. Despite this, there are even stronger concerns about the negative impacts of generative AI on African populations given the lower levels of traditional and digital literacy [27] and a higher susceptibility for misinformation to spread through social media and messaging channels [15]. With this in mind, it is imperative that research be done to understand the implications of using generative AI in African settings and outline ways to develop, deploy, and use these technologies in responsible ways. This poster presents case studies examining real-world issues with generative AI tools, highlighting the use of these tools in spreading disinformation and creating negative perceptions of African populations. Given that the use of generative AI is still growing within the continent, there exist limited examples of misuse, but this research aims to set the foundation for further work in this area as new harms emerge.

2 BACKGROUND

2.1 Generative AI

Generative AI is an emerging field within AI that is used to create new content such as images, music, or text. Generative AI is able to create this content by learning patterns and structures from being trained on large amounts of data scraped from the internet and collected from existing resources like archives [23]. Large language models (LLMs), which are often used to produce generative text content, aim to develop an understanding of language and shared knowledge [22]. LLMs are often trained on vast datasets from sources like books, articles, blogs, and websites. LLMs have various functionalities and can be used to answer questions, engage in conversations, and provide explanations of real-world concepts. Examples of generative AI tools that are based on LLMs include ChatGPT¹ (developed by OpenAI), Bard² (developed by Google), Claude³ (developed by Anthropic), and Poe⁴ (developed by Quora). Generative AI can also produce visual media such as images and videos. Examples of generative AI tools that are used to create realistic images and art include DALL-E⁵ (developed by OpenAI), Midjourney⁶ (developed by the independent research lab, Midjourney).

¹<https://openai.com/blog/chatgpt>

²<https://blog.google/technology/ai/bard-google-ai-search-updates/>

³<https://www.anthropic.com/index/introducing-claude>

⁴<https://quorablog.quora.com/Poe-1>

⁵<https://openai.com/dall-e-2>

⁶<https://www.midjourney.com/home/>

2.2 AI in Africa

Over the past decade, the use of AI worldwide has grown considerably with applications in domains such as agriculture, education, healthcare, and policy. Within Africa, there has been considerable interest in using AI to address problems in these domains with projects addressing topics such as identifying plant diseases [12, 13, 17, 35], aiding healthcare workers in diagnosing diseases and caring for patients [1, 6, 29], improving AI education for students [11, 28, 34], human resource management [5], marketing [3, 7, 24], trade & commerce [44], and translating low-resource African languages [18, 30, 32, 38].

While there is strong potential for AI and machine learning (ML) to help address pressing social issues within the African continent, there exist quite a few barriers that impede AI research and development within the continent. Such problems range from a lack of computing infrastructure needed to train large AI/ML models to a lack of AI practitioners that can develop these solutions [27]. To address these issues, African telecommunications have partnered with large companies to improve data and cloud infrastructure [39], and initiatives such as the African Institute for Mathematical Sciences⁷ have been established to increase the number of African students earning advanced degrees in artificial intelligence and other STEM fields. More promisingly, there has been a significant growth of grassroots African AI initiatives such as Deep Learning Indaba⁸, Masakhane [30], Ghana NLP⁹, AI Saturdays Lagos¹⁰, and Data Science Nigeria¹¹ that have expanded the inclusion of local researchers and developers into Africa-focused AI initiatives. Additionally, multinational tech companies such as Google, Microsoft, and IBM have established research labs and development centers in countries such as Ghana, Nigeria, Kenya, and South Africa. As the interest in using AI to address critical problems increases, AI advances within Africa will only continue to grow.

2.3 Responsible (Generative) AI in Africa

Given the challenges experienced with AI in applications of facial recognition [4], medical bias [26], and internet searches [21], researchers have begun to focus on ways to build AI more responsibly. However, challenges with AI systems are not only limited to Western contexts. Over the past few years, research examining the prospects of responsible AI in Africa has increased [10, 27], demonstrating the progress made in advancing AI solutions within the continent and the respective challenges associated with deploying and governing the use of these technologies. As generative AI and LLMs have come to the forefront over the past year, researchers have also begun to examine the challenges posed by these technologies [2, 8, 43]. However, very little of this work focuses on African contexts. This is troubling, given that generative AI use is expanding rapidly within the continent, and there have already been incidents of misuse, primarily in political use cases. As generative AI tools become more readily accessible to African consumers,

⁷<https://nexteinstein.org/about-us/>

⁸<https://deeplearningindaba.com/2023/>

⁹<https://ghananlp.org/>

¹⁰<https://aisaturdayslagos.github.io/>

¹¹<https://www.datasciencenigeria.org/>

it is imperative that efforts be taken by governments and the companies behind these technologies to understand the potential for abuse and mitigate harmful uses of these technologies.

3 CASE STUDIES

This section presents two case studies examining the use of generative AI in African contexts. The first case study examines bias when prompting text-to-image generative AI applications, and the second case study examines the use of generative AI in marketing financial services in Ghana.

3.1 Prompting Text-to-Image Bias

Recent work has shown the proliferation of age, class, gender, and ethnic bias in generative AI systems [19, 20, 41]. For example, generative AI tools used to produce hyper(realistic) images are often biased against certain gender groups, returning images of Asian women when prompted with the phrase “housekeeper” or returning images of men when prompted with the word “CEO” [19]. Other work has demonstrated how generative AI content is biased against the African context, showing that images produced from prompts such as “African workers” or “buildings in Dakar” perpetuate Western stereotypes about Africa and fail to accurately represent people and architecture within the continent [16, 36]. In a recreation of the text prompt “African workers” from the Business Insider Africa article [16], we find that little has changed despite a new release of the underlying Stable Diffusion model in June 2023 [37]. Figure 1 compares images generated in [16] versus those generated by the author. We also acknowledge that the prompts used in our experimentation may have impacted the output. Since there exist African workers who resemble the workers depicted in our output, further experimentation is needed to understand how these representations differ with modified prompts and if other text-to-image systems replicate such bias.



Figure 1: Images produced by Business Insider Africa (left) and images produced by the author (right)

3.2 Generative AI in Marketing for African Consumers

With the ability to generate novel images and text, Generative AI has become commonly used in marketing to produce marketing copy and aid with advertisements. In late July of 2023, the primary author was browsing through Twitter and came across a post entitled “A generative AI ad targeting potential customers in Africa.” The post depicted an advertisement for a partnership between Access Bank (Ghana) and Uber and pointed out a discrepancy in

the image used within the advertisement. Upon further examination of Access Bank's website and social media feeds, we found many more examples of generated AI images used in advertising across LinkedIn, Facebook, Twitter, and the Access Bank website. In Figures 2, 3, and 4, we list examples of generated images used in marketing materials for this initiative by Access Bank. While this use case may be relatively harmless, there remain broader concerns about the potential for misuse when marketing services that could be fraudulent.

4 IMPLICATIONS OF GENERATIVE AI FOR AFRICAN CONSUMERS

Research has shown many types of bias (gender, age, class, etc.) in generative AI [2, 9]. Still, within Africa, there exist other aspects of identity like tribe and religion that also have significant impacts on daily life. If these nuances are not understood, generative AI will continue to harm marginalized populations within the continent. Additionally, little research has focused on African contexts to examine the implications of generative AI within technologies targeting African consumers. As generative AI becomes a common method for news and media outlets to create content, these institutions must use generative AI in ways that do not mislead consumers. While African companies should be encouraged to adopt emerging technologies in their business processes, the use of generative AI comes with concerns due to people's limited ability to discern between human and AI-generated content [14, 31]. Given the prevalence of misinformation in Africa [15, 25, 42], companies should employ generative AI in responsible ways and inform consumers of its use in their content.

Overall, generative AI presents many opportunities to African populations but also presents new challenges. The preliminary findings of this work show that much more effort is needed by governments, researchers, and the private sector to evaluate the implications of generative AI in Africa. Additionally, African institutions should work toward the responsible development, deployment, and use of these technologies.

5 FUTURE RESEARCH

While the research presented within this abstract is preliminary, it indicates that generative AI usage within the African continent is still in its very early stages. Thus, many opportunities exist to shape future deployments of generative AI to ensure that African consumers are aware of their use and not harmed by any negative impacts of these technologies. To continue this work, the research team plans to find more generative AI use cases within Africa by leveraging social media platforms, journal articles, conference papers, and online resources (news outlets, blogs, etc.). The research team is also interested in examining use cases of generative AI in creating audio content due to an April 2023 incident where claims of a manipulated audio conversation occurred between a Nigerian politician and a Bishop [33]. Similar to work done by Thomas and Thomson [40], we are also interested in conducting longitudinal studies of outputs from generative AI systems to understand how their biases evolve over time. To understand the impact of generative AI on African consumers, the research team is also interested

in conducting user studies with users from multiple African countries to gain their perspectives on the use of generative AI and how they perceive the respective implications of these technologies. Such work would involve various methods, including focus groups, interviews, and surveys.

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Figure 2: An advertisement for Access Bank in Ghana detailing their Uber Discount Partnership. The image depicts a Black couple (woman and man) who are smiling and presumably seated in the back of an Uber. In the generated image, the visible earlobe of the woman depicted in the image is distorted, and earphones are protruding from where an earring normally would.

Figure 3: An 2nd Access Bank advertisement. It depicts a young Black man smiling downwards at a mobile phone. The man is wearing a dark gray button-up shirt with a lighter gray shirt underneath. The first button on the dark gray shirt is distorted and appears significantly different from the button below it.

Figure 4: A 3rd Access Bank advertisement. It depicts a young Black woman smiling slightly away from her tablet. Unlike other representations, the earring in the visible earlobe of the woman is placed correctly. However, there is still a similar unnatural sheen on the face and a similar smile with exposed teeth.

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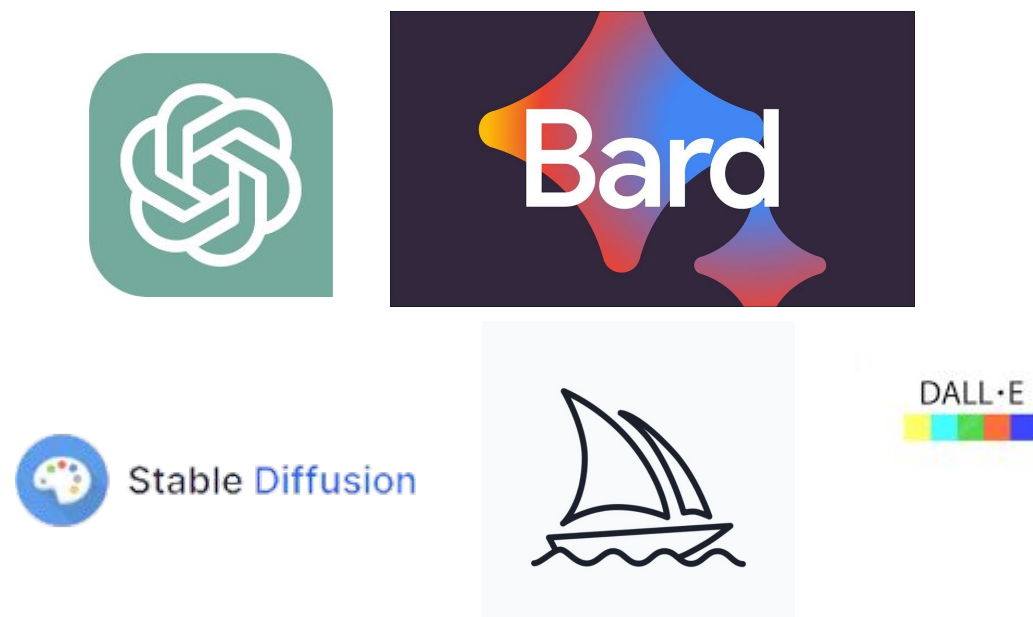
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Motivation As generative AI applications such as ChatGPT, Midjourney, DALL-E, Bard, and others increase in ubiquity, concerns about the negative implications of these technologies are becoming more present in public discourse. However, little research has examined the impact that generative AI stands to have on African consumers. This work presents an early look into the implications of using generative AI within African contexts, exploring case studies of current generative AI use within Africa. These case studies examine the use of generative AI in marketing and for image and text generation. While the potential for generative AI in Africa is growing, this preliminary work aims to set a foundation for highlighting risks associated with generative AI while exploring how generative AI can be responsibly developed and used within African contexts.

Generative AI

Generative AI is an emerging field within AI that is used to create new content such as images, music, or text.



Responsible (Generative) AI in Africa

Researchers have begun to examine the challenges posed by generative AI technologies, however, very little of this work focuses on African contexts. This is troubling, given that generative AI use is expanding rapidly within the continent, and there have already been incidents of misuse.

Case Studies

Prompting Text-to-Image Bias



Images produced by Business Insider Africa



Images produced by the author

Recreating Image Bias

In a recreation of the text prompt "African workers" from a Business Insider Africa article we find that little has changed despite a new release of the underlying Stable Diffusion model in June 2023.

Marketing for African Consumers

Advertisements for Access Bank (Ghana)



- The visible earlobe of the woman depicted in the image is distorted, and earphones are protruding from where an earring normally would



- A young Black man smiling downwards at a mobile phone. The first button on the dark gray shirt is distorted and appears significantly different from the button below it.



- A young Black woman smiling slightly away from her tablet. Unlike other representations, the earring in the visible earlobe of the woman is placed correctly. However, there is still a similar unnatural sheen on the face and a similar smile with exposed teeth.