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Elucidating Common Fallacies and Misconceptions Around LLMs

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Article

Attracting Investment and Reducing Poverty in Africa through AI Technologies

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Abstract: Africa's greatest assets are its young and dynamic population, and abundant natural resources. However, the continent faces numerous socioeconomic challenges that have hindered its ability to fully embrace technological advancements, particularly in artificial intelligence (AI). This paper proposes an ontological framework-based approach to address these challenges and unlock Africa's AI-driven growth and development potential. The proposed strategies aim to attract investment, foster collaboration, and secure financing for AI initiatives across the continent. Additionally, the paper explores how AI can be leveraged to alleviate poverty and improve the socioeconomic conditions of African citizens.

Keywords: artificial intelligence; poverty reduction; AI adoption

1. Introduction

The advent of Artificial Intelligence (AI) has marked a pivotal moment in human history, reshaping the landscape of industry, innovation, and socio-economic development. With remarkable achievements ranging from self-driving cars [1] to Natural Language Processing (NLP) [2] and medical diagnoses [3], AI has transcended its initial perception as a futuristic concept to become an integral force in the Fourth Industrial Revolution (4IR). This paper explores the creation of an AI framework for attracting investment on the African continent, and reducing – and potentially ameliorating – historically high poverty rates across the continent. This is accomplished by providing step-by-step analyses of how various stakeholders and counterparties in Africa can come together to achieve the goal of establishing AI as a vehicle to achieve the aforementioned in the 4IR.

In recent years, AI has shown remarkable strides in pushing the boundaries of human understanding and technological capabilities. From DeepMind's AlphaGo system, which achieved unprecedented victories in the ancient Chinese game of Go [4–7], to AI-powered language translation that bridges linguistic divides [8], through to generative AI (GenAI) tools that can write entire essays, pass SAT math exams, pass the LSAT exam [9], draw images that rival the greatest visual artists in history [10], and compose music that is on par with the most illustrious in history [11], AI has swiftly evolved from being a novel tool to a transformative force that permeates almost all sectors in modern society. AI is categorised by its ability to analyse vast datasets, recognise patterns, and execute complex tasks, it has imbued industries with newfound efficiency, precision, and innovations. 4IR, characterised by the convergence of digital technologies and the physical world, has AI as its vanguard. AI-driven automation is revolutionising manufacturing, while IoT (Internet of Things) and smart cities are shaping urban landscapes. Augmented Reality (AR) and Virtual Reality (VR) technologies are

redefining how we interact with our environment, and AI is the glue that binds these technologies together, enabling seamless and intelligent operations across domains.

Quintessentially, AI is not only a solution but also an investment magnet. Recognising AI's far-reaching capabilities, governments, businesses, and international organisations are channelling resources into AI research and development. This influx of investment serves to fuel AI innovation, fostering economic growth, job creation, and technological advancements.

While North American, European, and Asian governments have been championing the AI-course, Africa has been on the backseat, and has been taking instructions as opposed to dictating their own instructions in this race for technological advancement and superiority. Owing to this deficiency, it is vital that key stakeholders come to the fore, and discuss and design strategies to make Africa a leader in this regard. Notwithstanding, there have been several attempts to ramp up Africa's progress: The Deep Learning Indaba, and various AI initiatives directed at climate change, equity and inclusion, agriculture and food systems, health, and responsible AI, and many more. While these initiatives have made progress, the African continent is plagued with poverty, lack of education, droughts and food shortages, rife corruption, poor service delivery, homelessness and joblessness, tribalism, gender-based violence, and inferior literacy and numeracy rates. Thus, we propose the use of AI technologies as an enabler to improve this dire situation to create a better life for all on the continent through the allure of investment, and the promise of diminishing impoverishment.

2. Literature Review

We do not claim to be the first research team to try to address the issue of poverty reduction in Africa; we have significantly benefited from the excellent research pieces which have contributed to this paper. These are discussed below.

In [12], Mhlanga critically investigates the impact that AI has on globally reducing poverty, with specific emphasis on Sub-Saharan Africa. It was found that AI has a strong influence on poverty reduction in areas of relevant data collection through the construction of poverty maps. Further, AI has the ability to revolutionise agriculture, education, and the financial sector through the process of digital financial inclusion. The study proposes that governments and development institutions should invest more in AI to fight poverty.

In [13], Mhlanga investigates the influence of AI on the attainment of Sustainable Development Goals (SDGs) with a direct focus on poverty reduction, industry, innovation, and infrastructure development in emerging economies. The study found that AI has the potential to contribute to the attainment of SDGs in emerging economies like Africa, but more research is needed to investigate the differences between the influence of AI on SDGs in advanced economies and emerging economies in the 4IR debate.

In [14], Raghavendra *et al* provide bibliometric and content analysis to give a review of the relationship between AI and the assuagement of poverty. In particular, they provide a systematic characterisation of progress, trends, obstacles, and future prospects of how AI as a champion can alleviate poverty. The key findings of the paper include: A 19.84% year-on-year growth rate of interest in the number of publications on AI for poverty alleviation, the identification of four themes in AI for poverty alleviation, namely:

1. Poverty and sustainable development.
2. Agriculture.
3. The usage of optimisation techniques.
4. The usage of statistical analyses for the identification of population pools affected by poverty.

Additionally, it was found that AI has a direct and indirect impact on poverty alleviation. Directly, it is used for poverty mapping, financial inclusion, and healthcare. Indirectly, it is used for the improvement of governance, environmental sustainability, and education. Importantly, the paper identified the various challenges and limitations in the applications of AI to poverty alleviation. These include, and

are not limited to, data quality issues, data privacy issues, AI ethics, and collaborative efforts between the various stakeholders to build capacity.

Additional reference materials are contained therein, and it is beyond the scope of this paper to be entirely exhaustive in this regard. In keeping with the core findings of the aforementioned research, we have used these *faux pas* as benchmarks to design the proposed frameworks for attracting investment and reducing poverty.

3. Proposed Frameworks

Two frameworks are proposed, one for attracting investment through AI, and the other for reducing poverty.

3.1. Investment Gravitas – An AI Framework

The attraction of investment at a country-level is a multiplex problem that involves several moving parts and requires buy-in, tax benefits, regional economic stability, favourable regulations, etc. However, in 4IR, a much more nuanced approach needs to be adopted. We propose the following processes, which are somewhat sequential in nature, as well as those that can happen in parallel.

1. **Promoting Stakeholder Engagement through Bi- and Multilateral Treaties:** Forming a collaborative ecosystem that spans local and foreign governments, captains of industry in AI, academia, and international organisations for the exchange of information, symbiotic relationships that cultivate talent, and creates an industry to work in. Constantly promote dialogues, operational committees, and partnerships to identify common goals and opportunities between these stakeholders.
2. **Policy and Regulation Development through Sector-specific Incentives:** Develop AI-specific policies and regulations that are specific to the industry in which AI will be impacting. For example, while there might be overlaps in AI policies for big pharma and banking, there should be nuanced policies that speak to these industries and their regulators. This has the effect of ensuring ethical AI development, and warranting data privacy laws. In addition, offers incentives, tax breaks, and investment-friendly policies for AI-related businesses and startups. For example, suppose that a government decides that the taxation rates on drugs developed through the adequate use of AI technology would be reduced by 2%. This would encourage big pharma and startups to look seriously into drug development with AI as the technology of choice.
3. **Development of AI Infrastructure and AI Ecosystems:** Governments need to invest in high-speed internet, and make it accessible to all. This creates inclusivity, and grants access to freely available resources on the internet to teach oneself AI and related 4IR subjects, and promotes digital awareness and literacy. In addition, partnerships with big tech need to be forged in order to set up the relevant data centres and cloud platforms in the respective countries.
4. **Development of Skills for a Future-proof Workforce:** Create budgets in education departments to offer coupons and free access to high quality online AI courses in which students can get certified, and thereafter these programmes can act as incubators to feed talented individuals to industries that require their skillsets.
5. **Strategic Partnerships through Big Tech:** Governments must engage big tech and perform an analytics report of how the big tech partner can help to improve the quality of life for citizens in a particular African country, for example, through disease diagnosis and treatment, fraud detection, traffic optimization using advanced algorithms, and skills development among educators and learners.
6. **Investment in Research and Development:** Governments should look into the allocation of resources to AI research and development hubs and institutions such as public universities, startups, and labs. Additionally, to incentivise and encourage collaborations between universities and the private sector.

7. **Development of AI Ethics Frameworks:** While research into the development of AI technologies is important, an equally salient feature is a robust AI ethics framework that governs the fair usage of these technologies on the continent. These include the design of algorithms which do not discriminate against people based on their gender, race group and ethnicity, religious affiliation, sexual orientation, and political stance.
8. **Protection of African AI Intellectual Property:** All sectors of society need to look into establishing a body of legislation that jurisprudentially protects African researchers and company's intellectual property and AI patents from being copied by the rest of the world without due reference, acknowledgement, and the payment of royalties.
9. **Celebrating Quick Wins and Youth Encouragement through the Showcasing of Success Stories:** African governments should invest in giving press coverage and "air time" to AI researchers, companies, AI startups, and AI entrepreneurs by making them "African heroes", and allow them to do roadshows and workshops amongst the youth to encourage youngsters to pursue careers in AI.

Through this nine-point strategy, we envision a continent that is thriving with AI technologies as being co-creators with Africans, i.e. Africans providing that human-in-the-loop element to create AI for Africans, by Africans.

The adoption of analogous strategies has seen countries like the United Arab Emirates be the first country in the world to establish a Department of AI in its government by adopting a strategically crafted framework for its 2030 vision. In similitude, if Africa had to have such a well-crafted strategic vision, which we believe that the above framework provides – subject to additions, Africa could become a global AI superpower.

3.2. Reducing Poverty Through AI – A Framework

While we believe that AI is not the valiant "knight in shining armour" to solve all problems on the African continent, we strongly advocate that it has some bearing on reducing the poverty rates through strategic adoption, implementation, accountability from leaders, and assessments at each phase. Accordingly, we propose the following framework for narrowing the poverty gap:

1. **Analysis of Demographic Data to Scientifically Establish the Extent of the Problems:** Perform analytics to identify poverty trends, factors and social conditions, and economic indicators.
2. **Creating Financial Inclusivity through AI:** Usage of AI technologies to create transaction platforms for Africans without bank accounts. In addition, collect data and build AI models to assign credit scores to those citizens who do not have bank accounts so that they can have loan products (home, personal, study, agricultural, vehicle and asset finance, and so on).
3. **Food Security through AI:** Implement AI-powered precision agriculture techniques to enhance crop yield, reduce waste, and improve food distribution. Use AI for early warning systems to mitigate the impact of droughts, pests, and other agricultural challenges.
4. **Diagnostic Medicine Through AI:** Develop AI-driven through mobile health applications to provide access to healthcare services in remote areas in Africa. Use AI for predictive healthcare analytics to identify disease outbreaks and improve healthcare resource allocation.
5. **High Quality Education anywhere on the Continent:** Create AI-driven e-learning platforms – like Khan Academy, Coursera, Udemy, edX, Pluralsight, Codecademy, and so on – that cater to the specific needs of African learners, and adaptive educational tools to provide quality education in underserved regions. Develop chatbots and virtual tutors to assist students and teachers in areas with limited educational resources.
6. **Skills Development Hubs:** Establish AI-driven job matching platforms that connect job seekers with employment opportunities. Offer AI-powered skills development programs and vocational training to enhance employability.
7. **AI Entrepreneurship and Startup Incubators:** Encourage AI-driven business incubators and accelerators to support local entrepreneurs. Facilitate access to AI technologies and mentorship to foster innovation in local startups.

4. Conclusion

Addressing the dual challenges of attracting investment and alleviating poverty in Africa demands a concerted effort from all sectors of society. While the task is undoubtedly complex, a strategic and well-coordinated approach, guided by the frameworks presented in this paper, can pave the way towards achieving these objectives. The proposed ontological framework-based strategies provide a structured approach to identifying and addressing the key factors that hinder AI adoption and investment in Africa. These strategies emphasise fostering stakeholder collaboration, building robust AI ecosystems, and leveraging AI's transformative power to address socioeconomic challenges. Moreover, the paper highlights the critical role of AI literacy in empowering African citizens to participate actively in the AI revolution. Africa can cultivate a digitally savvy workforce capable of driving innovation and economic growth by equipping individuals with the skills and knowledge to harness AI's potential. As Africa embraces the opportunities presented by AI, it is crucial to ensure that the benefits of this technology are shared equitably across all segments of society. AI-powered solutions can play a pivotal role in addressing poverty, improving access to essential services, and empowering marginalised communities.

5. Conflicts of Interest and Contributions

The authors would like to declare that all authors contributed equally, and there are no conflicts of interest.

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