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AI4D: Mapping the benefits and risks of AI driven Development in the Global South

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Today's world is on the brink of a new dawn, a technological boom that will change the landscape of the world as we know it. The possibilities of Alan Turing and early computer scientists are becoming true in the 21st century. Now, more than ever, is the digital impossible a reality. Machines run our lives: they drive our cars, trade stocks, power security systems and teach children. The sophistication of frontier technologies continues to be mainstreamed through products like Amazon's Alexa and Google's Siri. At the forefront of the fourth industrial revolution is Artificial intelligence, better known as "AI." As a frontier technology, AI is implementing deep and far-reaching changes into the way we work, play and live. It is powered through the availability of enormous data which allows it to conduct complicated data analysis. These tools present numerous opportunities in solving issues of international development. Emerging AI/ML applications can reshape healthcare, agriculture, and access to democracy in the Global South. Nearly all of the literature surrounding frontier technologies like AI, Machine Learning, automation and the Internet of Things has been focused on the Global North. Given the opportunities and potential consequences of new automation and mechanization techniques and advanced analysis through machine learning and neural networks, it is imperative to consider possible risks and outcomes of AI driven solutions to developmental goals. Organizations like ICT4D have taken a vested interest in AI on the political stage. ¹ It has applied research across the globe to advance awareness of using artificial intelligence for development. In the realm of international relations, attention has been brought to AI with a call for a "data revolution" at the United Nations' High-Level Panel on the Post-2015 Development Agenda, the creation of the World Economic Forum's Centre for the Fourth Industrial Revolution in 2016, and the inaugural 'AI for Good' Global Summit in 2017. ²

Yet despite its infallible potential, the negative repercussions of AI driven change have become abundantly clear. These consequences will only be exacerbated in the Global South where there is a greater tendency for weak institutional capacity and governance. AI has the potential to threaten employment, human rights, democratic process and worsen economic dependency. The very nature of these tools--the ability to codify and reproduce patterns--must be met with responsible, ethical actors who ensure developmental goals will be met. Is AI4D the answer? This paper will illustrate the opportunities and risks of AI-driven development. I argue that technology can no longer be considered an inherent equalizer, and that the responsibility for fairness in the digital world must be championed by the international community. Finally, I will present possible steps policymakers can take to ensure true development in our data-driven future.

What is AI and Opportunities of AI4D

¹ S. Mann and M. Hilbert, "AI4D: Artificial Intelligence for Development," (2018), 83.

² Ibid.

The definition of AI varies depending on the source. For brevity, it is easily understood as the use of “computers for automated decision-making that is meant to mimic human-like intelligence.”³ In short, it is the process of smart automation. AI often incorporates machine learning into its automation process, which are the methods used to allow computers to recognize patterns in data then use these patterns to make predictions. Beyond its definitions, AI is a diverse moniker for the array of capabilities possible with AI from data processing to decision making. These functions range from simple systems that aid human behaviour, to hyper-advanced systems that simulate human cognition. ⁴

AI demonstrates great potential to achieve positive development outcomes and overcome important issues facing the developing world, through the process of automating human input to make processes more effective, efficient and far-reaching. AI’s capacity to collect and use vast amounts of data and generate informed decisions is already having a transformative effect in the area of international development. Recent research has highlighted several sectors that are implementing AI currently with the aim of achieving development goals: healthcare, the agricultural sector, education, the public sector and the informal sector. ⁵ In healthcare, AI is being deployed to generate predictions based on public citizen health data, provide expertise to health workers to diagnose and treat illnesses as well as predict potential disease outbreaks such as Zika. The Brazilian NGO Viva Rio, in alliance with the Artificial Intelligence in Medical Epidemiology organization AIME, analyses existing local datasets, combines it with satellite image recognitions systems and predicts disease epidemics for the future. Nigerian startup Aajoh developed an AI system which provides remote medical diagnosis in rural areas of the country. Healthcare AI has also been implemented on a global scale. Currently, UNICEF is developing a facial recognition system to detect malnutrition in children in impoverished nations.

AI is playing an essential role in the education sector in three keyways. First, it is ushering adaptive education through learner facing technologies such as learning platforms. In addition, the use of teacher focused technologies such as automated assessment tools like Moodle allow significant structural improvements. AI is also used at the sector level, like the collection of data across all schools in a country to predict student performance.⁶ An example of education focused AI is the startup Geekie in Brazil, it is using AI to provide tailored virtual tutoring to students across the country. In agriculture, AI is identifying crop diseases and

³ Mann and Hilbert, "AI4D: Artificial Intelligence for Development."

⁴ Ibid.

⁵ W. D. Eggers, W. D. Schatsky and P. Viechnicki, "AI augmented government: using cognitive technologies to redesign public sector work," (2017).

⁶ Ibid.

helping farmers better understand issues like crop health and soil quality to minimize harvest risk and increase productivity.⁷ Aerobotics, a South African start-up, uses satellite image technology and drones to optimize crop time in Zimbabwe and Mozambique. Ugandan diagnostic tool Mcrops analyze crop disease data in cassava plants, makes predictions and allows farmers to take action and stop the spread in real time. In Nigeria, a bot platform allows farmers to sell their produce and purchase services.⁸

Despite the government falling behind the private sector in terms of integrating frontier technologies, there are significant opportunities for AI to deliver public goods and services more effectively and efficiently. For instance, through automating complex structural procedures, analyzing datasets in record time and streamlining citizen engagement initiatives, the public sector can be emboldened by AI. Japan is currently developing an “AI for Parliament” program that will be fed five years’ worth of parliament agenda summaries. The Japanese government has announced future plans for AI initiatives. Coined “Society 5.0”, the government envisions AI and other frontier technologies to be implemented across public services and tackling challenges like ageing, productivity growth and population well-being.⁹

AI automated translation can also serve to benefit culturally diverse nations who face disproportionate illiteracy rates. Natural language processing can be applied where language barriers are a roadblock to development. Some aspects of this, such as language translation and language understanding, can be applied to a wide range of domains.¹⁰ For example, natural language processing can be used in translating information stored in unconventional textual formats like health records, social media posts and legal documents. In countries like India, Nigeria and countless others this technology could allow people to engage with the government and public sector more efficiently. An example of automated translation systems would be “Conversations as a Platform.” This collaboration between Microsoft and the Government of Singapore allows chatbots to facilitate increase accessibility, engagement and inclusion of marginalised populations in the public sector.¹¹ Lastly, it would be remiss to ignore that many

⁷ Li A. H. Khamis, E. Prestes and T. Haidegger. "AI: A Key Enabler of Sustainable Development Goals, Part 1 [Industry Activities]," IEEE Robotics & Automation Magazine 26 (2019), 95-102.

⁸ Eggers et al., "AI augmented government: using cognitive technologies to redesign public sector work."

⁹ Khamis et al., "AI: A Key Enabler of Sustainable Development Goals, Part 1 [Industry Activities]."

¹⁰ Ibid.

¹¹ Eggers et al., "AI augmented government: using cognitive technologies to redesign public sector work."

Southern states are reliant on the informal sector. Given its expanding opportunities, low barriers to entry in terms of capital and education and potential for success the informal sector is a significant drive for inclusive economic growth. Digital platforms like Kudi.ai, a Nigerian chatbot system, that allow people to make payments and send money on their phones as well as e-commerce like Jumia.ng have a great capacity to boost demand and productivity in informal markets.

The McKinsey Global Institute's 2018 research paper 'Applying AI for Social Good' outlined the potential of AI programs against the UN's sustainable development goals.¹² The findings indicated that goals such as Good health and well-being; Peace, justice and strong institutions, Industry innovation and infrastructure and Quality education could be achieved by AI led initiatives. The continued development and improvement of new and existing AI can lead to a greater role in predicting disease, economic development and increasing access to public goods. AI can be used to address pressing issues that occur from urbanization such as transportation congestion and housing crises. It could help governments optimize their budgets through smart resource allocation and management, making good governance a feasible reality. Continued research and innovation will foster spaces for experts to design geographic and context specific AI solutions across a broad range of sectors in the Global South. In addition, the successful dissemination of AI will strengthen ethical and fair public systems and foster AI infrastructure and skills in the Global South. Application of AI, in short, can play a vital role in accelerating the achievement of SDGs.

Risks of AI4D

AI systems are powerful analytical tools, and without proper consideration of its negative possibilities, they can harm the very communities they have been assigned to aid. As AI sweeps the globe, there is a justifiable concern that foreign-developed AI will only serve to exacerbate and deepen existing inequality. While the application of AI is gathering pace in the developing world, the field is still dominated by a distinct number of companies from the Global North.

A helpful way to contextualize inequality is through imagery. Imagine a fresh pie, perfectly sectioned into eight neat pieces. These eight pieces are meant to be shared between eight people whereas one person receives one piece. If one person was to collect two pieces, another person invariably has to go without a slice of pie. This is known as a zero-sum game. Overarchingly, the total aim of frontier technologies is to create systems and institutions that make more pies, so that everyone gets a piece. Yet, AI appears to be a zero-sum game where only a few, wealthy nations get pie. According to a 2017 PwC analysis, China and North America will benefit from 70% of the global economic gains from AI by 2030.¹³ Developing

¹² Mann and Hilbert. "AI4D: Artificial Intelligence for Development."

¹³ "Sizing the prize: What's the real value of AI for your business and how can you capitalise?" PwC Publication, n.d..

nations are wary of implementing systems that have been designed with data and contexts different from their own. Although the consequences of AI depends on the variety of systems employed, the key ethical concerns include data bias and limitations, gray accountability, unemployment as well as weakening democracy and increase corruption.

Unequal results in AI often spring from biased AI. Bias can exist at various levels: system level development, selection bias, limited data bias and incorrect information facing bias. Bias can occur at both system level input and data collection input, resulting in biased outputs. The biased outputs create negative feedback, where the system continuously produces biased results. Biased outputs are especially worrisome when their results impact and reinforce existing social marginalization. At the system level, bias involves developers creating AI systems that intentionally or unintentionally run on their human biases. In the NBER paper “AI and the modern productivity paradox,” the example of system level bias is outlined with the example of a microfinance NGO in Brazil.¹⁴ This NGO has a credit score algorithm that relies on alternative data sources, as the population in question has low credit usage. System bias also occurs when developers overlook known bias. The developers may seek to avoid bias by avoiding race, the final product will still produce biased results if it includes commonalities of racial hierarchy in Brazil such as postal code and employment status. Another example is if mapping systems like Google Maps only used input data from Apple users to estimate where it was safe to travel, it would only be accurate in wealthier areas in a population where smartphones would be more common. The mapping systems example also related to limited data incurred bias. This is when developers determine some data to be less relevant than others. Finally, false or outdated data inevitably leads to inaccurate results.

The effects of incomplete data will be magnified in the Global South, given the lack of data collection and stores available. Successful AI requires comprehensive data. A significant challenge in AI4D is the sectors that benefit the most from AI solutions like healthcare do not have sufficient data. Existing local data is typically closed to the public, may be incomplete or inaccurately generated for political means. This data gap exacerbates bias, reduces the capacity of civil actors to aid in AI4D and reduces accountability.¹⁵ Furthermore, data gaps may lead developers to rely on foreign data sources to build systems. When comprehensive data exists, it is typically sourced from wealthier areas with higher access to the internet. The data inherently excludes several facets of society such as rural areas, the elderly, the poor and other disenfranchised classes with less access to technology. In a 2018 study, the GSMA found that women in developing nations were 10% less likely to own a mobile phone meaning that 184 million women did not own phones in these markets.¹⁶ Mobile phones are arguably the widest

¹⁴ E. Brynjolfsson, D. Rock and C. Syverson, "Artificial intelligence and the modern productivity paradox: A clash of expectations and statistics," (2017).

¹⁵ C. Arun, "AI and the Global South: Designing for Other Worlds," (2019).

¹⁶ G. C. Women, "The Mobile Gender Gap Report 2018," (2018).

available data source in developing countries. Any AI system that uses data like this produces outputs with data based mostly on men, thus creating biased outcomes.

Accountability and AI

Another key issue surrounding AI is accountability. Who is accountable for AI systems? Machine learning systems rely on maths and are an alternative to biased human decisions. As a result, they are often considered wholly objective. The perceived objectivity of AI, coupled with overconfidence in data output, can dispel direct responsibility as the outputs they produce are rarely questioned. As mentioned in *Weapons of Math Destruction*, the reality is: all AI/ML systems have error rates. No matter how low the error rates are, in a pool with millions, thousands could be affected by systemic oversights.¹⁷ In the case of international development, systems are typically built by foreign, private entities. This narrow group is unlikely to expand considering the limited array of AI talent as well as limited capacity of ICT4D and A14D focused organisations to develop their own systems. The layers between state recipient, state and foreign implementers and software producers become complex, with the target population entangled in its web. When there is no accountability due to reliance on machine learning, the layers become even harder to navigate. This eventually leads to a failed international development initiative.

With regard to work, AI can automate labour previously employed by human capital. AI can also create new tasks and industries in which humans can be employed. AI research has skewed more towards automation rather than labour creation. The consequences of this have been slow but stagnating labour demand, lower productivity growth and rising unemployment.¹⁸ By hyper focusing on further automation, AI can exacerbate economic and social inequality. Robots begin to replace workers, even those classified as skilled professionals, thus reducing employment and financial opportunities. In a research paper published by NBER, authors found that “rapid advances in machine capabilities may curtail aggregate labour demands as technology increasingly encroaches on human job tasks, ultimately immiserating labour.” Autor and Solomons refer to this immiseration as the “robocalypse”, finding that labour forces in technologically progressive sectors tend to shrink.¹⁹

AI can also be a highly corruptible entity. AI systems can be weaponized in authoritarian governments and institutions such as the military and national intelligence. The Global South has many authoritarian states, and the risks of corruption are strong. AI systems have limitless

¹⁷ C. O’Neil, *Weapons of math destruction: How big data increases inequality and threatens democracy*. Broadway Books, (2016).

¹⁸ W. Naudé, “The race against the robots and the fallacy of the giant cheesecake: Immediate and imagined impacts of artificial intelligence,” (2019).

¹⁹ A. Agrawal, “The economics of artificial intelligence,” (2018).

capabilities---even context specific systems like satellite imagery machinery for crops could be used to subvert good governance i.e conducting mass surveillance. The data collecting properties of AI systems could allow governments to better sort and categorise its population into groups. This information could be used to enforce unequal redistribution of services amongst certain groups. China has exported AI surveillance technology to security forces in some African countries who have a history of authoritarian governance and oppressing minorities. ²⁰

Potential Policy Implementation of AI4D

In 1993, computer scientist Vernor Vinge stated, “Within thirty years, we will have the technological means to create superhuman intelligence. Shortly after, the human era will end.” ²¹ As AI solutions further develop, understanding their impact within development will similarly require further methods of monitoring the impact of output. It is crucial for the output to be analyzed on the basis of who benefits, who doesn't, the effects of AI solutions on employment, human rights, democratic institutions and other sectors. Majority of the world's population resides in the Global South. We cannot have a situation where Southern populations are simply passive consumers of artificial intelligence. AI developers and implementers like local government must be cognizant of the AI divide and take suitable measures in ensuring a responsible development process.

The Principles for Digital Development are a set of guidelines that help address the risks associated with AI in international development. These nine guidelines were established to promote responsible, ethical and effective technology led initiatives for international development. The ICT4D rubric asks the developer to involve design with the user, understand the ecosystem, designing for scale, build for sustainability, being data driven, use open data and always improve. The risks of an AI system vary depending on sector and context so there is no universal solution to potential consequences. Nonetheless, the Principles for Digital Development provide a useful map for implementing ethical AI in international development for both vendors and implementers. ²²

Considering possible alternatives, ensuring realistic implementation and undertaking risk assessment are practical methods policymakers can undertake to align with the Principles of Digital Development. First, it is imperative to consider whether an AI solution is the best possible solution. The opportunities of technology are exciting and there is a strong temptation to apply new solutions to every possible problem. Yet, considering the potential consequences, AI

²⁰ R. Gallagher, "Export laws: China is selling on surveillance technology to the rest of the world," Index on Censorship 48, (2019), 35-37.

²¹ O'Neil, *Weapons of math destruction*, (2016).

²² A. Waugaman, "From principle to practice: implementing the principles for digital development." Proceedings of the Principles for Digital Development Working Group, (2016).

implementers must look at all possible solutions. To see whether an AI intervention applies to an issue appropriately, it must be determined the problem cannot be solved with simpler methods. Doing so avoids the accountability challenges incurred with AI systems. If applicable, the implementation must also be realistic. Is there enough data present? Is the data relevant and widely accessible? If not, efficient AI output becomes impossible. The onus is on AI4D implementers to apply systems free from systemic data biases. Potential consequences, and how they can be mitigated, must also be considered. To ensure that output does not enforce existing socio-economic marginalization, implementers could run a risk assessment. ²³

AI must be a non-zero sum game. Instead of one actor hoarding all the pie, AI should present opportunities for each actor to have a pie. The development process must be a multi-stakeholder one, with all actors involved working together to realize the full potential of these digital technologies. Implementers of AI4D must go beyond typical design processes found in corporate settings. ²⁴ When AI systems are designed to affect human lives, the developers and the investors cannot presume a producer/consumer relationship. The stakeholder countries, as well as the members of the community the program impacts, must be involved in every step of the design process to ensure the principles of digital development are reached. Regular corrections and context provided by the community in question can help flag potential consequences, bias and fallacies earlier than later. In addition, it can foster trust in the community which is imperative for successful and sustainable development. Implementers should aim to incorporate local, skilled tech talent into developing AI systems. This ensures equitable stakeholder representation, inclusion of more Global South perspectives in the homogeneous field of AI and makes for a more accurate output. Locals will have a more succinct understanding of target ecosystem, culture and can help spot potential risks that may have been overlooked by foreign AI developers. In cases where local talent may be underdeveloped, AI4D practitioners have a duty to foster AI talent to the best of their ability. This helps avoid “development dependency” of Global South states on foreign entities. ²⁵

Concerning the workforce, AI can be misappropriately used as a replacement for human labour. As I mentioned earlier, frontier technologies can empower the worker force in the same way it can dismantle the job industry. The effect of frontier technologies on worker inequality and labour demand depends on who owns them. . In the NBER published research paper titled “Artificial Intelligence, Worker-Replacing Technological Change And Income Distribution”, it was found that coupled with appropriate policies, increased technological presence in the

²³ Waugaman, "From principle to practice: implementing the principles for digital development."

²⁴ Brynjolfsson et al., "Artificial intelligence and the modern productivity paradox: A clash of expectations and statistics."

²⁵ Waugaman, "From principle to practice: implementing the principles for digital development."

workforce can lead to higher incomes and greater leisure for workers. To achieve this Pareto , implementers must ensure that industries in which human capacity i.e emotion is vital (an area where “narrow AI” cannot be applied) are ripe with employment opportunities. So if robots and other forms of AI dominate some sectors, there will still be work in industries where the advantage of AI systems are not feasible. ²⁶Finally, implementers must clearly establish a hierarchy of responsibility to ensure total transparency. A risk assessment can be used to create roles, categorize what stakeholders are responsible for each fact of an AI project and develop plans in preparation for unlimited risk scenarios. Implementers must also avoid potential misuse by withholding full control of said systems to another stakeholder without complete confidence.

Conclusion

Is AI a great equalizer? AI presents magnanimous benefits and consequences. Aside from its opportunities and risks, the sheer transformative nature of AI is magnified in the Global South, where development can either be achieved or existing social stratifications could be exacerbated. Artificial Intelligence is on the cusp of rapid growth with regard to international development. Implementers of A14D must ensure this implementation is responsible, effective and ethical. Questions of fairness, accountability, social change and data limitations must be addressed within A14D. Failure to do so leaves a dangerous vacuum in the application of AI driven development and serves only to entrench an already existing development hierarchy.

The purpose of A14D is global inclusion. It must consider its target communities as active stakeholders in the development process. Stakeholders in the field of AI as well as international development must make way for interdisciplinary collaboration. This combination will allow for greater understanding of artificial intelligence means in the context of a Global South ecosystem and further establish a role for AI in international development. Responsive institutions and good governance have a crucial role to play in mitigating the potential harms of AI, like diminishing jobs, while ensuring that AI systems deliver innovative solutions. Whoever owns the robots, owns their destiny. Responsibility is on international development implementers to ensure AI facilitated growth becomes a resource to be harnessed by all.

²⁶ Stiglitz, J E. and A Korinek. "Artificial Intelligence, Worker-Replacing Technological Change, and Income Distribution." (2017).

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