Artificial Intelligence: Economic, Social, and Political Impacts in Low/Middle Income Countries
Notes of Roundtable Discussion

Introduction

- This event, co-hosted by Future Advocacy (FA), the Web Foundation (WF) and the Centre for Global Development (CGD), came about after research and scoping work undertaken by FA for WF, focused on maximising the opportunities and minimising the risks of AI in low and middle income countries. The research involved over 40 interviews in 15 countries with those researching and working with AI.
- An edited version of this work was published in July, as part of a White Paper series entitled 'Opportunities and risks in emerging technologies'. It can be found here.
- FA, WF and CGD felt this was quite uncharted territory. We organised this roundtable discussion to get expert feedback on the research and to brainstorm fruitful areas for future work with attendees.
- The format of the roundtable was chosen to mirror the major themes of the White Paper, namely **ensuring that we listen to those on the ground in low/middle income countries**, and that we should look at the **economic, social and political impacts** of AI.

What is AI?
- It is difficult enough trying to define 'intelligence', let alone 'artificial intelligence'.
- At Future Advocacy we use an inclusive definition of intelligence as 'problem solving'
- It's a mistake to think of intelligence on a single dimension (ant, chimp, human, superintelligence). Intelligence is multidimensional. Many animals are more intelligent than humans in one or more dimension.
- Discussion of AI often differentiates between narrow AI and broad/general AI.
  - Narrow AI is AI that is great at specific tasks, such as DeepMind's AlphaGo beating Lee Sedol at Go, and IBM's DeepBlue beating Garry Kasparov at chess. AlphaGo and DeepBlue are undoubtedly intelligent, and in AlphaGo's case, are learning how to get better at what they do, but they'll **never** learn how to make a cup of tea.
  - Broad/General AI has the human-like flexibility to learn different tasks, and apply the learning from one domain to another.
- AI researchers complain that every time they work out how to do something, like playing chess, it stops being AI. "What was once magical becomes mere computation", as Australian roboticist Rodney Brooks put it.

- A lot of the recent excitement about AI is a result of advances in machine learning and the subfields of deep learning and neural networks.
- Application of machine learning has made Google Translate go from comically crap to seriously useful, it's why driverless cars are very nearly a solved problem (technically at least).
- Every day an amazing new application of AI is springing up.
- But what does it mean for low and middle-income countries? That's the question set for the meeting today.

Session 1: AI - the East African Experience

- There are some exciting and innovative ideas and applications of Data Science and Artificial Intelligence
- More satisfying than just reading about them is meeting and interacting with people who are using AI to locally solve problems in Kenya specifically and the wider African continent in general.
- Examples of the use of data science and AI are found in various sectors:
- Financial services:
  - A Pew Research Centre survey done in 2015 showed "the percentage of people living on less than $1.25 a day in sub-Saharan Africa is more than twice as high as any other region in the world." With so many people living on so little, most of the population in sub-Saharan Africa is excluded when it comes to traditional financial services.
  - In 2007, the leading mobile network operator in Kenya, Safaricom, introduced mobile money – a product known as M-pesa – and disrupted financial services in Kenya. Safaricom has since introduced other products over time such as M-shwari, which is a banking product for M-pesa users that allows you to save and borrow money through your phone while earning interest on money saved. Using information such as saving and spending patterns, they determine how much of a loan you are entitled to thus providing credit to a whole spectrum of the population who would otherwise not have access to it.
  - Other players in the space include Tala, a company that provides microloans in several countries worldwide, including Kenya and Tanzania. They offer a smartphone application that collects data ranging from biographical information, the number of people the loan applicant contacts daily, the size of the applicants' network and support system, their movements, routine habits like whether they call their mother everyday or pay their bills on time, and use these to determine a credit score that is not available in a traditional way.
- Agriculture:
  - A report released by One Acre Fund on scaling up agricultural credit in Africa stated, "Of the more than 1 billion people in the world who survive on less than $1.25 per day, 75 percent depend on agriculture for their livelihood."

- ○ Small-scale farmers, contributing a large percentage to those living below the poverty line, do not have access to traditional banking services. There are institutions specialized in providing these to them.
- ○ Using machine learning to process alternative data, not necessarily pertaining to the actual crop output, such as the farmer's individual and social data, environmental and satellite data these companies can determine how much to lend farmers based on their expected agricultural output. Examples of companies doing this are FarmDrive and Juhudi Kilimo.
- ○ Additionally, there is research using data collected using Internet of Things (IoT) devices. One project in Tanzania uses sensors to predict when cows are on heat for optimum insemination timing, because semen is expensive.
- ○ An issue with the use of IoT devices is data storage. This data could be easily streamed to the cloud but Internet connectivity is not always reliable in most places in Sub-Saharan Africa, especially in rural areas. An alternative is to cache the data locally, on the IoT device itself, but the downside of that is the requirement for the manual retrieval of the data. In cases where the data is time sensitive and a decision needs to be made as soon as possible, the delay may hurt the decision making.
- ○ KUDU – a mobile-based agricultural market in Uganda – started out as research looking into how mobile phones could make agricultural markets more effective. They found that farmers had trouble finding buyers for their produce and were facing the threat of spoilage of their goods while on the flip-side traders faced uncertainty when it came to locating produce. To solve this problem, they developed a double auction system where buyers and sellers submit their information separately and the best matches are found computationally. Another project from Uganda uses smartphones to capture images of crops and diagnose disease with computer vision techniques. These two projects are under the AI Research Lab in Makerere.
- Urban planning:
  - ○ Nairobi ranks among the most congested cities in the world. It is said to lose US$357m annually in fuel consumption, pollution and lost productivity due to its notoriously endless traffic jams. How to beat its traffic problems is an ongoing, heated debate.
  - ○ Towards this end, Ma3Route built a community on its platform where traffic data is crowd sourced and the information shared is trusted. Using simple text and photographs, mainly posted on Twitter as well as their mobile application, users share their experience of road conditions, thus helping others decide whether or not to use a certain route.
  - ○ Due to the large amount of information collected on where people go at what time of day as well as how they get there, they have several data-backed projects such as an accident mapping project that collects accident reports from users and plans to release a comprehensive report. Such reports could then be used to shape policy decisions around road safety.

- ○ In Uganda, a company called Thin Void started out trying to solve the problem of bodaboda theft. Bodaboda are bicycle and motorcycle taxis commonly found in East Africa. Thin Void attach GPS sensors on the bikes, which collect data on where the bodaboda are as well as how fast they are moving. This data is transmitted every 30 seconds. Over time, they came to realise how valuable the data they collect is and started exploring it for other uses such as traffic congestion monitoring.
- Energy access and reliability:
  - ○ IBM Research in Kenya is undertaking a project that attempts to predict electricity demand for new customers, helping providers know how much to generate and improves reliability by reducing the chances of outages due to overloading of power systems.
- Education:
  - ○ Eneza Education in Kenya use low cost mobile technology to give users educational lessons and assessments through SMS, web and Android platforms. As of 2016, Eneza has over 55,000 monthly active subscribers, over 1 million lessons viewed and over 10 millions question answered. All this translates into a lot of data which they are starting to explore and disseminate with the aim of giving parents and schools insights on how to best help their students.
  - ○ Still in the research phase, there is some work at a local university in Nairobi going into predictive modeling of academic performance whose aim is to identify factors that contribute to poor performance in school with the objective of placing preventive measures to reduce failure rates.
- Healthcare:
  - ○ Savannah Informatics in Kenya tries to solve the problem of care fragmentation by working with partners to deliver an integrated health information system. As things stand, most health records are paper-based, and thus confined to the health centre/hospital where they are collected. Savannah Informatics is working on a centralized and integrated system. Using this data and in collaboration with their stakeholders, they also help in reviewing, developing and implementing medical curricula for training.
- In conclusion, Artificial Intelligence despite still being very 'young' in East Africa, is very vibrant. Not many people have specialized training in the field but there are communities that bring together individuals who are self teaching, be they academics, industry professionals, students, basically people from all walks of life. This is creating room for collaboration and further exploration of solutions to the problems we face.

Session 1 Q&A:

- "Why do such solutions appear so unique to East Africa or similar nations?"
  - ○ Frequently the technology used is widespread in the African context, but not used in developed economies. Examples of such technologies include SMS and USSD

- these have been superseded in advanced economies, but given that many in rural areas do not have smartphones, are still valuable technologies here.
- "What barriers exist to the application of these technologies at scale?"
  - One barrier is funding, with a lot of start-ups struggling to get funding.
  - Another is the relative inexperience of the African AI scene - many practitioners are self-taught and have no experience of starting up or scaling up.
  - On the governmental level, generally speaking adoption of new policies and technologies is very difficult. Many systems have been set up to protect and reinforce corrupt practices, so trying to change them is met with a lot of resistance.

Session 2: The Economic Impact of AI

- Growth and labour:

  - The world economy is growing by 3.5%, but growth of underlying productivity has dropped to 1% since 2005. We may be moving to a less desirable new normal.
  - Spending on research and development and patenting rates have both risen, yet there is no corresponding rise in productivity.
  - Value chains are more consolidated. There are changes in the structure of the Chinese economy. It is less dependent on imports.
  - Emerging economies cannot depend now on manufacturing which has been the engine of growth.
  - Income inequality is rising, as a result of weaker unions and the growing dominance of superstar firms.
  - Globally, the share of GDP constituted by labour is declining. Good public sector jobs are decreasing and the platform economy is growing.
  - This is especially worrying in light of automation. In Saudi Arabia 70% of labour growth is in the public sector. If e-government consolidation occurred there could be mass unemployment.
  - In African countries we are not seeing the emergence of large scale firms.

- Policy:
  - Create a resilient and mobile workforce that is tech savvy and good at working.
  - Build a social safety net to absorb the shocks. Whether UBI is going to work will depend on its political feasibility. For this reason the financing mechanism will be decisive.
  - Governments must find ways to tax people fairly.
  - Automation and AI must be disruptive in a positive way.
  - AI must remain within our control.
  - Improve our diagnostic and forecasting tools. We must work out the ethics of using particular types of data.

- Leapfrogging
  - It's striking that many of the problems for developing countries are similar to the problems of the developed world. The Far East seems to be in a strong position to overtake us.
  - The reason behind the rise of many economically developed countries in Asia is manufacturing. For many countries infrastructure is still lacking to enable them to truly overtake Western economies. However, China is certainly in a good position to capitalise on artificial intelligence.

- Automation:
  - We now have robots that can do needlework. There are 5 million women in the textile industry in Bangladesh which is a significant proportion of their exports (80%) and constitutes much of their growth.
  - There is a risk that we get caught up in the exciting tech start ups in Nairobi and neglect planning for cases like these 5 million women who could lose their jobs and plunge the country into economic decline. It is an economic issue and a gender issue.

- Youth:
  - AI may severely limit the potential of youth. There is the need for economic growth, a youth bulge, and an environment which is increasingly hostile to control.
  - More than half the workforce in Egypt is under the age of 30. People are not marrying. Skills are deteriorating.

- Job creation
  - It is important to point out that the 'AI revolution' is different from the industrial revolution. Coders may be less in demand, as advanced machines become more capable.
  - There is also the risk that job creation will be concentrated in high skill professions.

Session 3: The Social Impact of AI

- We need Digital Equality, meaning that everyone has equal rights and responsibilities online.
- AI is disrupting the Web and digital technologies more widely, so it's no surprise that we need to take it into consideration when making the case for Digital Equality.
- Compared to the Industrial Revolution, the pace of change now has been estimated by McKinsey as "happening ten times faster and at 300 times the scale, or roughly 3,000 times the impact."

- Besides the writing of this report on 'Artificial Intelligence: The Road Ahead in Low/Middle Income Countries', The Web Foundation has undertaken a separate study mapping out artificial intelligence in Africa.
- Various opportunities for the use of AI were identified, including:
  - Data analysis of satellite imagery to aid agricultural planning
  - The use of chatbots to tackle taboo healthcare subjects. For example, SophieBOT provides answers to questions sexual and reproductive health.
- However, new risks and considerations were uncovered, particularly around the use of data. Questions that need to be addressed include:
  - Who owns the data that are being used to train these AI models?
  - Who owns the databases where these data are stored?
  - Who has access to these databases?

  In many of these countries, the regulatory mechanisms and governance around these issues are non-existent or unclear.
- Data has biases even when it is 'good' and 'clean'. There is also the concerning issue of people deliberately introducing bias into datasets.
- Furthermore, high barriers to the collection of data in terms of the ethical requirements may be exclusionary in themselves, as only rich institutions (universities, companies) can afford to undertake a laborious process of consent gathering and documentation.
- An interesting point that was raised was the importance of context in the use of algorithms. As Cathy O'Neil put it in her book 'Weapons of Math Destruction', "algorithms are opinions embedded in code".
- Thus although AI algorithms are excellent, and getting better, at finding patterns in huge datasets, they do so without any contextual awareness. Add to this the 'black box' problem, namely that it is very hard if not impossible to interrogate an algorithm to understand how it made a particular decision tree, and it becomes clear that algorithms developed in one social context may not necessarily apply to another.
- This is an issue if AI algorithms are developed in high-income countries and then 'parachuted into' low/middle income countries.
- With respect to the 'black box' issue, a counter-argument was proposed - will algorithms not give us a greater ability to understand bias in decision-making? In a sense, the human brain is a black box too, and the instances of bias in judicial and other public service decision-making are well-documented. Could the greater use of auditable algorithms provide an opportunity in this regard?

- The role of Governments in the development and deployment of AI was also discussed. When governments move into the AI space, what does this mean for the power dynamics in countries where there is already much centralisation of power?
- The example was given of Ethiopia, where the state-owned EthioTelecom controls all internet traffic in the country, and has in the past shut down access to the internet in times of political unrest. What happens when a Government with so much capacity to control has access to or indeed drives the development of powerful AI tools?

- Governments everywhere are grappling with these issues, and no-one really has the complete answer.

- The recommendations made in the social domain include:
    - We should advocate for the transparent and accountable use of data by design
    - We should enable developers in low/middle income countries to have access to open, curated datasets to be able to train AI algorithms.
    - Governments should support technology/AI ecosystems, but allow them to operate and grow independently.

Session 4: The Political Impact of AI

- Where possible, events such as these should be held in low/middle income countries, in keeping with the WF's and FA's recommendations.
- Cross-sectoral collaboration is crucial. There needs to be greater interdisciplinarity, both in ethical debates and in creating the technology too. We must bring the humanities and the sciences into the debate which is even more difficult to do in Asia, where the onus is on careers that make lots of money.

- The AI debate:
    - AI is always framed as being positive (as well as negative) to our detriment
    - The pressure to talk about the 'opportunities' of AI as well as the risks is not the case for other technologies.
    - Funders will only fund things that have a positive slant which is holding back work on the urgent risks.
    - Governments champion innovation and they don't want to look retrograde. They have to talk about the positives of AI.
    - We need other archetypes, beyond driverless cars which doesn't have many negative associations; more examples of AI that could go wrong, more harm stories.

- Data protection rights:
    - It's hard to advocate for data protection rights in low and middle income countries for several reasons.
    - They are the objects of development in countries where they don't just lack data protection rights, but also many civil rights. It's presented as binary: a choice between privacy and transparency.
    - You can be seen as elitist because issues like privacy are low on people's priorities and hierarchy of needs - 'don't talk to me about privacy, I don't have basic food and water'.
    - China (which has ambitions to be a world leader in AI by 2030 and will likely surpass the US in the number of AI patents this year) there is a notion of

collective good rather than individual rights. This can make advocating against individual discrimination as a result of AI even more difficult.

- Leapfrogging:
  - Leapfrogging could be very dangerous. In Asia, there is quite often a desire to leapfrog, and there are perceived benefits of being an early adopter, rather than a late arrival. However, the institutions aren't robust enough to keep up. There may be a lack of governance framework when things go wrong.

- Labour market disruption:
  - Labour market disruption is a growing problem and it is often perceived positively. AI is seen as providing a service that no-one wants to do anymore (people think call centre work is beneath them).
  - It is also viewed as being able to replace older people who are not having children
  - Potential solutions to the problem are flawed. We talk about training people for the 'jobs of the future' but we don't know what these jobs are. We talk about 'retraining' but those doing menial jobs aren't going to become quantum physicists. We talk about 'UBI' but basic welfare safety nets don't exist.

- Political risks:
  - Whoever controls AI controls the future. There could be a 'golden age of surveillance' in the same way that there is a 'golden age of AI'. Academics are currently shining a light on it, but there is a worry that this won't be the case in future. (There is the Fairness and Transparency in Machine Learning Conference - FAT ML).
  - We could see wealthy individuals using AI to microtarget voters, although there are some opportunities for political enfranchisement (through chatbots and natural language processing). In Myanmar, a group of students created a search engine to prioritise results in their language. This could preserve linguistic diversity while facilitating inclusion.
  - The push to develop AI is from government institutions at the moment. Tech is being developed almost in house, and commercial companies are the ones training them.
  - We can't underestimate the impact that China will have. Some companies are starting to store data just outside China so that other companies will trust them.

- End-users:
  - End-users need to have a voice. They are not being incorporated in the design process. There needs to be interaction with those who are using and building the technology - and we need to bake in ethics and privacy by design.
  - Japan are making headway with soft law and guidelines for AI but the consultation process only takes into account the views of corporations.

Academics often have half their salary sponsored by business or the state, so if they do contribute they are forced to have vested interests. This is a huge issue in terms of regulatory capture.

- ○ We are pushing decision making to those who are weakest in the chain - those who don't have access to smartphones and have a lack of understanding of how systems work.
- ○ Perhaps there should be labelling requirements for AI to empower end-users and increase trust.

Session 5: Potential Avenues for Future Work

Participants were asked to think of proposals for how to take this work forward. Three streams of work were suggested: advocacy, research and programmatic work. We have synthesised the contributions made by delegates below, and loosely grouped them into three categories along the lines of the meeting: social, economic and political interventions.

Themes	Advocacy	Research	Programmatic
Economic	Advocate that governments in developing countries need to prepare for huge changes in labour markets and global supply chains	Research into better understanding of what the private sector are doing and why	Develop business models for AI for social good
		Research how AI affects financial markets	Training and retraining programmes for the workforce of the future
		Research into which countries/sectors/groups/demographics are going to be most impacted by automation	Facilitate learning between emerging economies and those that are at the frontier of AI development
		Better understanding of likely future timeframes. What will be automated when? What will be the pace of change?	
		Research case studies of labour conflicts involving AI and how legislation worked in those cases	
		Research into strategies that developing countries can deploy to navigate changes in global labour markets/supply chains etc.	

Social	Advocate for the empowerment of marginalised communities, and for their voices to be genuinely heard in debates around AI. This includes women and children	Research what civil society strategies can lead to governments directing AI towards citizens' empowerment	Develop a programme to train activism start-ups in AI issues
	Advocate for investment in increased data/digital literacy	Research specific challenges in repurposing Western developed AI tech for low/middle income countries	Capacity-building programmes for civil society organisations to consider AI-related issues in their area of work
	Public awareness campaigns on the material risks and challenges presented by AI, how it will affect day-to-day life	Research algorithmic design ownership, and how algorithmic models affect products when based on algorithms built in another country/continent	Develop a 'CERN for AI' - a major global collaboration to drive AI projects that solve big social challenges around the world
	Advocate for AI to be 'labelled' and announce itself as AI	Research on how to mitigate bias in algorithmic decision-making and comparative bias in human decision-making, especially in justice contexts	
	Advocate for private sector bodies like the 'Partnership on AI' to include members from developing countries	Research on more use cases for specific instances and types of bias (not just generic notion of algorithmic bias)	
Political	Advocate for global standards of regulation to protect human rights and ensure ethical use of AI	Research on what sort of regulatory agencies need creating and how to avoid capture	
		Research the influence of AI on elections	
Miscellaneous		A better understanding of which AI applications are a) already ubiquitous b) at pilot stage c) a twinkle in a developer's eye	Develop standards, possibly as design patterns, for "good" AI, in terms of auditability, interoperability, and for governments and companies using AI

			Develop alternative sources of funding, including supporting existing independent organisations, to focus on AI-related issues.

Closing Comments

- We need to remember that ultimately, this is about the interaction of people with technology - that is, the technology is secondary.
- It is clear that there's a lot to discuss and we need to keep the conversation going.
- Furthermore, there are similar discussions that are ongoing about similarly disruptive technologies, such as blockchain. It is important to ensure that we engage with these wider conversations too.