Towards a Realistic AI Policy for Sri Lanka

Discussion Paper

Ramathi Bandaranayake, Viren Dias
LIRNEasia, 12 Balcombe Place, Colombo, Sri Lanka
(ramathi, viren)@lirneasia.net

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Contact: 12 Balcombe Place, Colombo 00800, Sri Lanka. +94 11 267 1160.
info@lirneasia.net www.lirneasia.net

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Introduction

John McCarthy, one of the founding fathers of the field of artificial intelligence (AI), coined the term in 1955 (McCarthy et al., 1955), and defined it as "the science and engineering of making intelligent machines, especially intelligent computer programs" (McCarthy, 2007). In the last two decades, the field of AI has seen an exponential growth with over 120,000 peer-reviewed publications in 2019, accounting for 3.8% of all peer-reviewed publications for that year (Zhang et al., 2021). This growth has resulted in the development of a substantial number of advantageous applications, such as disaster warnings, disease mapping, crop detection, natural language processing, etc. Over the past few years, there have been a proliferation of national AI policies, as governments have sought to harness the potential of AI to achieve various national goals.

Dutton (2018), defines "AI policy" as follows:

> *"AI policy is defined as public policies that maximize the benefits of AI, while minimizing its potential costs and risks."*

What is the purpose of a National AI Policy?

Dutton (2018) categorizes the main themes of national AI policies as follows:

1. Basic and Applied Research
2. Talent Attraction, Development, and Retainment
3. Future of Work and Skills
4. Industrialization of AI Technologies
5. AI in the Government
6. Data and Digital Infrastructure
7. Ethics
8. Regulations
9. Inclusion
10. Foreign Policy

National AI strategies that have already been released are likely to cover a selection of the above-mentioned themes.

How should Sri Lanka approach a National AI Policy?

Sri Lanka has not yet adopted a national AI policy, and tends to lag behind globally. In terms of the 2020 Government AI Readiness Index, released by Oxford Insights, Sri Lanka ranked 90 out of 172 countries. (Oxford Insights, 2020) The index aims to rank countries based on:

"How ready is a given government to implement AI in the delivery of public services to their citizens?"

The benefits of designing and adopting an AI policy could be twofold:

1. **A plan to harness the economic benefits of AI**. Planned investments in and encouragement of AI can help the country's ICT sector advance and become more internationally competitive.
2. **Harnessing socially beneficial AI applications**. As mentioned previously, AI has many beneficial applications in fields such as disaster warnings, disease mapping, crop detection, and others. Encouraging the use of AI in these sectors can help Sri Lanka achieve other national priorities and advance towards the Sustainable Development Goals (SDGs).

However, it is important to note that Sri Lanka, as an LMIC (Lower Middle Income Country), is resource constrained. This means that the country has limited capital to spend on investments in AI technologies, as well as limitations in building up local AI capacity through training and investments in the necessary infrastructure.

This discussion paper considers how Sri Lanka, given its resource constraints, could work towards creating a realistic AI policy that would help the country to start harnessing some of the benefits of AI without committing it to unrealistic goals. We hope as well that, while the situation of every country is unique and requires its own approach, the discussions laid out in this paper may be of some use to other LMICs as well.

Infrastructure

This section is divided into two parts: Access to digital technologies, and data

Access to Digital Technologies

In the context of AI applications, there are two salient levels of access to digital technologies that should be considered: a lower level of access required to utilize AI applications, and a higher level of access required to develop AI applications.

Utilizing AI Applications

In order to utilize AI applications, one typically requires access to the internet, which in turn requires access to either a smartphone, laptop, or desktop computer.

According to the 2018 nationally representative After Access surveys, in Sri Lanka 37% of the population aged 15-65 had used the internet. However, there is a gender gap in internet use as well, where 34% fewer women had used the internet than men in 2018, and an urban / rural gap, where 23% fewer members of the rural population had used the internet than the urban population. 29% of the population reported having no limitations on internet use. The most prominent main limitations reported were cost of data and lack of time (25% of the population each). Just 5% stated that speed of the internet was a main limitation for them. Mobile phone ownership was at 78% of the population and SIM card ownership at 83% of the population. Computer ownership was very low, however, at just 12% of the population.

There are gaps in access along the lines of gender, and urban / rural divides. This will affect access to using AI technologies, as well as developing skills and competencies in AI development / engineering. Hence, there is a risk of some segments of the population being left behind / not harnessing the full benefits of AI.

Developing AI Applications

The infrastructure required to develop AI applications is highly variable, and is dependent on the computational complexity of the machine learning algorithm and the type and quantity of input data. The required infrastructure can be obtained by one of two means:

- **Renting the required infrastructure.** More specifically, this refers to cloud computing services such as Amazon Web Services and Google Cloud. Renting infrastructure yields a plethora of benefits: no upfront costs; little to no lead time in acquiring, upgrading, and downgrading infrastructure; and redundancy handled by the service provider. However, cloud computing is not without its issues: for large volumes of input data, upload bandwidth may be a bottleneck; and in the case of sensitive data, data privacy may be a concern.

- **Purchasing the required infrastructure.** The primary benefit of purchasing infrastructure is lower long-term costs. Additionally, upload bandwidth and data

privacy will not be as much of a concern. However, purchasing infrastructure has several disadvantages: significant upfront costs; equipment installation and maintenance costs; non-zero lead times in acquiring, upgrading, and downgrading infrastructure; and redundancy costs.

Data

Producing AI applications requires vast amounts of up-to-date, accurate, and complete data. However, collecting data of such quality requires a lot of resources; resources that not everyone has access to. The following two subsections on data sharing and open data discuss this issue.

Open data—defined as data that "can be freely used, modified, and shared by anyone for any purpose" (Open Knowledge Foundation, 2015)—enables resource-poor individuals and organizations to access high-quality data.

Data Sharing

Data sharing is a key way of giving developers and computer scientists access to the data necessary to create machine learning applications. Sri Lanka does not yet have a Personal Data Protection Act in force, although a draft Bill has been created and gazetted in November 2021. The gazetted Bill contains provisions for the designation of a "Data Protection Authority." One of the roles of this authority is stated to be:

31 (n): *"make rules governing the sharing of personal data between controllers which are public authorities, in accordance with the provisions of this Act, where such data can be shared between the controllers via a secure interoperability platform, including setting in place criteria mandating the sharing of personal data between controllers thereby restricting the duplication of collection and storage of data already available with another controller."*

Sri Lanka currently has a draft National Data Sharing Policy. The draft covers data handled by the government, and proposes frameworks for classifying data by sensitivity and determining what can be shared and what cannot be shared. The following data sharing principles are proposed: transparency, protection of intellectual property, protection of data privacy, interoperability and linking to LIFe (Lankan Interoperability Framework), legal support and mandates, formal responsibility to enable and promote data sharing, accountability and completeness and correctness of data, technical and operational efficiency, machine readable formats, pricing, and maintenance of data quality.

Open Data Portal

The Open Knowledge Foundation (2015) defines open data as data that "can be freely used, modified, and shared by anyone for any purpose." It enables access to high-quality data by resource-poor individuals and organizations. The need for open data in Sri Lanka had been identified in 2012 (Department of Economic and Social Affairs, 2012), resulting in the Open Data Portal of Sri Lanka (http://www.data.gov.lk/).

The Open Data Portal has adequate functionality; not unlike that of other national open data portals. However, as elaborated by Dias and Bandaranayake (2021), the portal has several shortcomings:

- **The quantity of datasets available is very limited.** As of the writing of this document, the portal has just 136 datasets available.
- **The quality of the available datasets is unacceptable.** A significant portion are not available in machine-readable format, and many lack sufficient documentation of collection methodologies and variable descriptions.
- **The social features of the portal are unused.** There is no interaction between users with the forums void of any posts.
- **Some datasets contain personal information.** This includes information that can directly identify an individual, such as: full names, complete addresses, and telephone numbers.

Dias and Bandaranayake (2021) also discuss several potential solutions that involve: a stricter submission and review process for datasets, and incentives for contributing toward the open data portal. Regardless of the method, it is imperative that we address these identified issues and foster a culture of open data in Sri Lanka.

It is important to also consider policy initiatives to involve the private sector in data sharing, as the private sector contains a great deal of valuable data. This could include collaborations between the private sector and government and civil society for data for development applications, or collaborations with universities for research purposes.

Skills / Human Resources

At a high level, the skills required to develop AI applications are:

- Data science and engineering,
- Computer science and engineering,
- Mathematics, and
- Statistics.

Furthermore, subject-matter experts specific to the application should be consulted to shed light on intricacies that would otherwise be missed by a layperson. For example, when developing an AI application to predict paddy yield from satellite imagery of Sri Lanka, an agriculturalist might take into consideration the rice subspecies, the nuances of crop cycles, and the cultivation practices to determine that satellite imagery from India would be unsuitable as training data.

Owing to their relative youth as academic fields, data science and engineering, and computer science and engineering represent the primary skills bottleneck for developing AI applications. Training for such skills is available in Sri Lanka; provided by both government universities and private institutions. According to statistics published by the University

Grants Commission (2020), 11 recognised universities and institutions have produced 1,210 graduates in these fields in the 2018/2019 academic year, with the University of Moratuwa being the largest contributor.

However, Sri Lanka has a severe shortage of such skills. An ICT workforce survey conducted by the Information and Communication Technology Agency (ICTA, 2019) depicted a growing demand-supply gap for ICT-related skills: from 458 in 2013 to 12,140 in 2019.

However, Sri Lankan universities are beginning to implement programs to address this issue. Vishaka Nanayakkara, Senior Lecturer, University of Moratuwa, observes that universities have begun to respond to the increasing demand for AI-related skills. For example, Moratuwa has introduced a new undergraduate level stream on data science, which would lead to a BSc. in Engineering with a specialization in Computer Science and Engineering with a stream in data science. A new MSc. in data science and artificial intelligence has been proposed. Ruvan Weerasinghe, Researcher in Natural Language Processing at the University of Colombo School of Computing, observed that one ongoing issue is that academic work in the Sri Lankan university system still tends to be quite siloed. This makes it difficult to do interdisciplinary research and teaching on AI and its impacts through combining multiple fields such as data science, sociology, law, etc.

Ethics and Governance

To ensure that the benefits of AI are maximized and the harms minimized, it is necessary to consider how AI may be developed and used ethically. Ethical considerations fall into two types:

1. How can AI be developed in an ethical manner?
2. How can AI be put to use for good and ethical ends?

Several principles and frameworks on AI ethics have been developed worldwide. A 2019 review by Jobin et al. noted that AI ethics principles commonly tend to coalesce around the five principles of transparency, justice and fairness, non-maleficence, responsibility, and privacy, although there are differences in how they are interpreted. Here we have chosen to focus on the issues of bias, accountability, explainability, and privacy.

Bias

AI is not without its issues. Recent history is littered with examples of bias in AI applications: from Amazon's AI hiring system being biased against women for technical positions (Dastin, 2018), to Google Photos misidentifying a black couple as gorillas (Alciné, 2015). Arguably the most well-known example is that of COMPAS—an AI for predicting recidivism that was used to assist in making judicial decisions—which was found to be biased against black defendants following two years of ground-truth data (Angwin et al., 2016).

Bias in AI applications has long been determined to be broadly caused by: (a) using an ill-suited model for the task, (b) bias in the training data, and (c) overfitting to the test environment (Dias et al., 2020). Whilst (a) and (c) can be fairly easily identified and solved, or entirely avoided, by a team of experienced computer scientists, (b) is far more difficult to tackle. This is due to the following:

- **Bias in the training data can often be subtle, and in some cases, entirely invisible to those ignorant of the local context.** For example, consider sentiment analysis of a social media post containing the Tamil word "thambi": Tamil is natively spoken in five different countries, and "thambi" directly translates to "little brother" with no negative connotation. However, specifically in a Sri Lankan context, it translates to a slur informed by decades of ethno-nationalism casting the Tamil-speaking ethnicities as the racial "little brothers" to the ethnic majority. Such a relationship would only be visible to a Sri Lankan; even a Tamil speaker from India would not be able to identify it.
- **An unbiased training dataset may be unattainable.** For example, consider using de-identified call detail records data as a proxy for human mobility in Sri Lanka: 86% of males aged 15–65 owned a mobile phone, whilst only 72% of females aged 15–65 owned a mobile phone (LIRNEasia, 2019). Even though it is known that the dataset is

clearly biased against females, it is not clear how a computer scientist would account for this bias especially considering that the data has been de-identified.

Having observed the phenomenon of bias in AI and its root causes from the plethora of AI applications in the developed world, it is clear that AI applications for use in Sri Lanka must be developed by Sri Lankans using Sri Lankan data.

Both Vishaka Nanayakkara and Ruvan Weerasinghe observe that the lack of Sri Lankan data makes it difficult to do research on Sri Lankan problems. Even students, when searching for research topics, often have to resort to publicly available datasets created in other countries because of a lack of data from Sri Lanka. Hence, the research they are doing is not necessarily applicable to a Sri Lankan context.

Yasith Fernando, of the Artificial Intelligence Centre of Excellence (AICx), SLASSCOM, also points to the necessity of increasing awareness about data governance in the private sector, as biased and poor quality data may lead to serious errors in the development of AI applications.

Explainability and Accountability

Explainability (XAI) is often proposed as a way of ensuring that the reasons a decision is made through AI or algorithmic decision making are made clear, and establishing accountability for decisions. However, much of the technical work on XAI is still at a relatively early stage. While explainability is important, it is also vital to encourage the use of other ways to evaluate AI devices in the short term. It may not be prudent to disallow the implementation of AI technologies until explainability can be established, as many of the economic and social benefits of AI technologies would not be realized in the meantime. Other methods of evaluation could include looking to see whether the decision-making process results in biased or unfair outcomes. Impact assessments could be done in the design stage with relevant stakeholders who are likely to be affected by the deployment of the AI system (this is elaborated on later in the discussion paper).

Privacy

In the bill gazetted in November 2021, some allowances regarding the processing and storing of personal data are made with regard to research:

Section 6 (2): *"Subject to the provisions of section 10 of this Act, further processing of such personal data by a controller for archiving purposes in the public interest, scientific research, historical research or statistical purposes shall not be considered to be incompatible with the initial purposes referred to in paragraphs (a), (b) and (c) of subsection (1)."*

Section 9: *"Provided however, subject to the provisions of section 10 of this Act, a controller may store personal data for longer periods in so far as the personal data shall be processed further for archiving purposes in the public interest, scientific research, historical research or statistical purposes."*

Section 10 relates to maintaining the confidentiality and integrity of data.

With regard to algorithmic decision making, under Section 18 (1):
"Subject to section 19, every data subject shall have the right to request a controller to review a decision of such controller based solely on automated processing, which has created or which is likely to create an irreversible and continuous impact on the rights and freedoms of the data subject under any written law."

AI developers in Sri Lanka would need to keep the above in mind when developing AI applications, which will inevitably entail automated decision making.

There have also been debates regarding the economic implications of data protection, especially in resource poor settings. While data protection legislation is important to protect the privacy of individuals, it is feared that some businesses, especially smaller businesses and SMEs will not have the resource capacity to follow best practices in data protection. These limitations also affect the ability of businesses to do business abroad. For example, in the European Union businesses would be subject to the General Data Protection Regulation (GDPR). Hence, AI policy in resource constrained settings must bear these limitations in mind.

Surveillance is also an important aspect to keep in mind with regard to privacy. Sanjana Hattotuwa, Research Fellow, Te Pūnaha Matatini, University of Auckland, points to the use of AI in facial recognition technologies and warns against the normalization of surveillance. He points out that in such systems, people do not necessarily consent to using AI and have AI used on them instead, even without their knowledge. He also emphasized the need to keep in mind the implications of AI for human rights such as the freedom of expression and the freedom of belief.

Impact Assessments and Post-Deployment Testing

Before deployment, it is important to assess the impact of the algorithm / AI tool on the population in which deployment will take place and have the tools audited, to ensure that the community is not negatively affected. The idea of algorithmic impact assessments has been gaining traction. For example, the government of Canada has launched an online Algorithmic Impact Assessment tool (Government of Canada, n.d.). Furthermore, the impact assessment should not be a one-off process. It should take place pre-deployment and at several stages post-deployment. Issues identified during the testing and evaluation should be addressed iteratively.

The government should also aim to develop guidelines for the public sector's use of AI and algorithms. One example is "A guide to using artificial intelligence in the public sector" (Office for Artificial Intelligence, UK, n.d).

Ashwini Natesan, a Legal Consultant/ Researcher/ Lecturer specialising in Technology, Media and Telecommunications Law, notes that it is important to pay attention to the needs of specific sectors and applications in an AI policy. Different sectors and applications will have different needs in terms of data, regulations, and ethical guidelines, so a policy should also be sensitive to these needs.

Selecting Priority AI Applications

Acknowledging the resource constraints of Sri Lanka, it is imperative that we prioritize AI applications that yield the most benefits at the lowest costs. This can be a daunting task—considering the plethora of AI applications proven across the world. This section offers guidelines on what to consider when prioritizing AI applications:

- **Positive impacts.** The sum of all benefits yielded by the AI application in the short- and long-term. For example, developing optical character recognition software would help digitize old medical records to enable easy access and sharing in the short-term. Additionally, these now digitized medical records could be a source of training data for future AI applications.

- **Negative impacts.** The unintended consequences of the AI application. For example, developing chatbots for customer service enables mundane issues—not requiring human intervention—to be resolved quickly and effortlessly, but also results in less customer service executives being required, thus leading to unemployment.

- **Infrastructure for development.** The availability of sufficient training data, skills, and digital technologies to successfully develop the AI application with accurate results.

- **Infrastructure for deployment.** Access to the relevant digital technologies to realize the full benefits of the AI application. For example, developing a smartphone application that enables farmers to assess soil health via the smartphone's camera would not be of much use if only a small proportion of farmers owned smartphones.

- **Probability of success.** Evidence of success: either in the form of successful implementations of similar AI applications elsewhere, or data gathered from preliminary experiments. With the limited resources available and abundance of options, selecting an AI application with low probability of success is unacceptable.

- **Time and effort.** The quantity of resources required to successfully implement the AI application. In every field, there typically exists some AI applications that yield substantial benefits and require minimal resources—so called "low-hanging fruit." These should be identified.

- **Ethical standards.** Compliance of the AI application with established ethical standards, which are concerned with issues including algorithmic bias, accountability, and privacy violations.

Key Takeaways

Recognizing that Sri Lanka faces resource constraints, we recommend the following courses of action.

- **Expand access to digital technologies.** Collaborate with universities and the private sector to ascertain the current status of AI relevant infrastructure, and devise feasible solutions to plug existing gaps.

- **Foster a culture of open data.** Encourage government departments to release more datasets on the open data portal. It is suggested that ICTA and other digital ministries work together with other government departments who may need assistance in technical competencies in generating datasets.

- **Narrow the demand-supply gap for human resources.** Make courses in data science, computer science and machine learning more widely available through universities and schools, including online courses. It is necessary that there are courses offered in Sinhala and Tamil as well as English. Opportunities for collaboration should be sought where possible in gaining access to and translating courses.

- **Address issues of bias, explainability and accountability, and privacy.** A draft personal data protection bill is available; a personal data protection act should be enacted as soon as it is feasible. Ethics also need to be incorporated at every step, including being taught as part of courses, and considered in the process of developing and deploying the application. It should also be considered whether the task at hand should be automated in the first place. Impact assessments could be a useful means of getting input from the communities in which the AI solution is going to be deployed. The government should also develop guidelines on the use of AI and algorithms in the public sector.

- **Prioritize certain AI applications.** As suggested in the previous section, select a few priority applications and focus sectors that Sri Lanka can focus on to help build capacity in AI, reap economic benefits, and achieve social good.

Experts Consulted

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- Yasith Fernando - Artificial Intelligence Centre of Excellence (AICx), SLASSCOM
- Sanjana Hattotuwa - Research Fellow, Te Pūnaha Matatini, University of Auckland
- Ashwini Natesan - Legal Consultant/ Researcher/ Lecturer specialising in Technology, Media, and Telecommunications Law
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- Nalin Manchanayaka - Director– Regional Cluster Development, Information and Communication Technology Agency of Sri Lanka

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