Applications of AI at National Level

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Preamble

Artificial Intelligence (AI) is often referred to as a single technology, when in fact it actually refers to a combination of a wide range of technologies. These include those such as intelligent search, knowledge representation, reasoning, speech and language processing, computer vision, machine learning and optimization. Over the past 50 years or so, some of these technologies have matured to states where they are now being widely deployed in solving human problems, instead of being limited to university laboratories.

Language foundation

A pre-requisite for leveraging AI at National level in Sri Lanka, is localization and language processing in and for the national languages of Sinhala and Tamil. This involves developing both linguistic resources and key technologies required for processing these local languages. Once this 'infrastructure' is set in place, AI applications can be deployed at national level to solve problems based on development priorities.

Some of the key local language technology applications include optical character recognition (OCR) by which printed material in hard copy can be digitized to editable form, text-to-speech (TTS) by which digitized text can be spoken out aloud by the computer automatically, speech recognition (ASR) by which human speech can be directly digitized and machine translated by which text or speech in one language can be translated to another. These technologies in combination could for instance allow a blind person to scan a document using their smart phone which performs OCR followed by TTS, to enable the written work to be read out loud, so that the blind could (metaphorically) 'see'.

Machine learning

What drives AI at present is machine learning. While classical information technology used algorithms to manipulate data in order to arrive at results, machine learning is about using the data and results in order to obtain the 'algorithm'. In particular, in supervised machine learning, the system 'learns' from past examples which have been solved by humans, and generalizes this knowledge in order to build predictive systems for deployment.

While a majority of such machine learning tasks utilize structured data from data sources such as organizational databases, unstructured data such as image/vision, speech and language can also be used for learning tasks automatically using machine learning.

AI applications

A common example of the above kind of supervised learning is the prediction of credit worthiness of customers to a business. While the banking, finance and insurance industries are the most obvious beneficiaries of such a system, any business having to make decisions about the level of credit that can be extended to its customers can use such a system. This could also be employed by various state, Non Government Organization (NGO) and private sector micro-credit operations to lend to the most trustworthy parties, so that the funds remain in circulation for the benefit of a maximum number of potential beneficiaries.

Another common business related AI application is for churn prediction – i.e. predicting the customers or employees who are most likely to leave one's business or brand. With appropriate data, even state organizations can 'train' supervised learning algorithms to help identify employees who are most likely to be disgruntled and so likely to leave the organization, so that some intervention can be made to avoid it, if the organization is going to be negatively affected by it. For businesses, apart from losing employees, losing customers to competitors is a serious problem. Being able to predict customer churn, a business would be able to target deals and discounts needed to mitigate such 'migration'.
Sri Lanka can also use data collected by the police, currently in written, and therefore hard-to-use form, to discover unforeseen associations between criminals, in order to detect and track down their networks. Association rule mining and network analysis are two machine learning techniques that could be used in this kind of task. While predictive policing has been criticized for being intrusive, more conciliatory approaches to deal with information extracted from criminal data to predict which members of society could potential fall prey to such networks, would be beneficial especially for probation services.

Biometric analysis is a related application for assisting law enforcement agencies. Already finger print identification systems are able to uncover many a crime that previously went undetected. Other forms of biometric identification including iris scanning, blood flow and DNA finger printing will allow ever increasing accuracy in ascertaining the truth in cases of prosecution. These systems can also of course be used in non-criminal settings such as for access control to premises.

One of the most topical issues facing Sri Lanka in the recent past has been the fake news phenomenon. It has become increasingly difficult to identify fake news owing to the sheer proliferation of news and gossip. Modeling the credibility of news sources using network analysis is becoming an essential task, in order to make our population more discerning. The related social media phenomenon of hate speech on the other hand can be more directly dealt with using a supervised learning approach, based on data collection and annotation. Credibility networks can also be effectively employed on journalists, politicians, academics, lawyers and doctors in order to weigh multiple competing 'truths'.

A very useful service that currently provides access to government information is the 1919 call center. Unfortunately, the call center only operates during daytime for practical reasons. Replacing its core activities using a conversational agent (chatbot) would not only allow 24-hour service, it would also free up human resources during the daytime, since only matters beyond the scope of the chatbot would ever be referred to a human operator. Chatbots could also assist all kinds of citizen service providers, including state organizations.

Sports analytics is a new area which is becoming popular in many countries and could potentially help Sri Lanka identify sports and athletic talent at school level by matching body types with appropriate types of sports, in order to better streamline our talent pool. In addition to this, analytics could also professionalize many of our sports by gamifying athletic performance. It could also provide the platform for unbiased selection for district, provincial and national level teams in a transparent way, based purely on pre-defined objective metrics.
The common thread running through all the above applications is that all decision making in these scenarios is evidence-based. This kind of decision making will free Sri Lanka from the clutches of favouritism and bias, thus allowing a level playing field for a maximum number of participants to compete with each other in order to realize the best benefits for the country as a whole.

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