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Headline: Deepening national AI capabilities - What is AI Singapore and what does it do

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AI Singapore logo (The AI Singapore logo consists of a tree/circuit board that is designed in the shape of Singapore. The tree symbolises the aim of AI Singapore: Grow our own timber, Groom local AI talent. The radiant and bright orange and red gradients show AI Singapore's thirst for Passion, Change and Growth. The neurons symbolise Artificial Intelligence; three roots spreading from the tree represent the three key pillars: AI Research, AI Technology, AI Innovation.)/ Credit: AI Singapore

The programme has three pillars: AI research, AI technology and AI innovation. The first is about fundamental research, the second seeks to identify and address grand challenges and the third is about industry innovations across sectors and building a talent pipeline.

Last year, the Singapore Government launched a national programme, called AI Singapore to deepen Singapore's artificial intelligence (AI) capabilities. But what exactly does that mean and how is AI Singapore working towards achieving that objective?

OpenGov attended a presentation at the ongoing Supercomputing Asia Conference by Mr Adhiraj Saxena, Manager, Industry Innovations, AI Singapore who provided a brief introduction to the programme and talked in detail about one of the three pillars of the programme. Based on the presentation and other available information, we take a look at developments in the programme till date.

Deepening or strengthening capabilities means generating a pipeline of AI engineers and creative AI entrepreneurs. It implies enabling Singapore-based companies, whether they are big or small, foreign or local, to create more value through the use of AI. Value creation could be through revenue growth, higher bottomline through efficiency improvement or even competing better with competitors from overseas.

STAKEHOLDERS

AI Singapore is driven by a government-wide partnership involving the National Research Foundation (NRF), the Smart Nation and Digital Government Office (SNDGO), the Ministry of Health's Integrated Health Information Systems (IHIS), the Economic Development Board (EDB), the Infocomm Media Development Authority (IMDA) and SGInnovate. The NRF set aside S\$150 million to be invested in the programme over five years.

It also brings together four universities, National University of Singapore (NUS), Nanyang Technological University (NTU), Singapore University of Technology and Design (SUTD), and Singapore Management University (SMU), as well as the publicly funded research organisation, Agency for Science, Technology and Research (A*STAR).

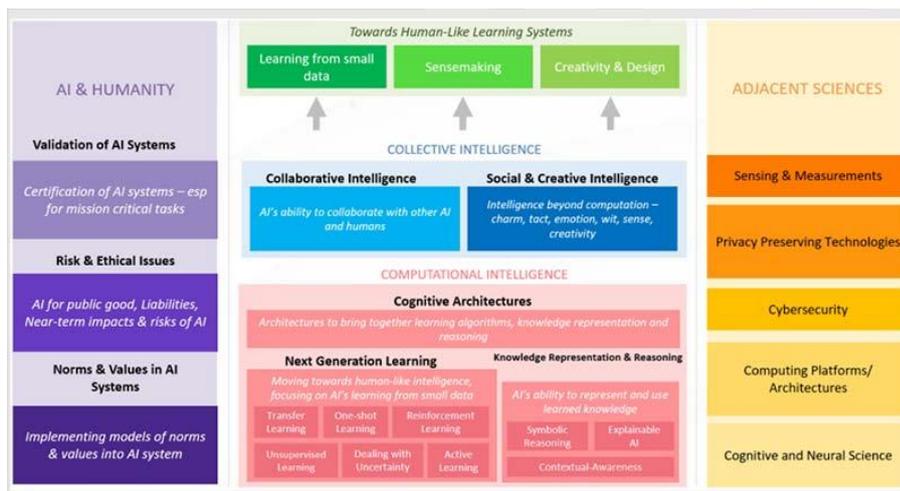
A range of industry and other partners are being brought on board to further various objectives of the programme. For instance, recently AI Singapore signed three Memorandum of Understanding (MOUs) with the National Trades Union Congress (NTUC), Intel Corporation and PwC Singapore. It also entered into an agreement with Transwarp Technology, a Big Data and AI Software provider from China, for joint research, resource sharing and training on AI-related projects and signed a letter of intent to collaborate (LIC) with the HK Smart City Consortium.

The programme has three pillars: AI research, AI technology and AI innovation. Several initiatives have been launched under the pillar of AI innovation.

FUNDAMENTAL AI RESEARCH

This area seeks to address fundamental problems in AI. For instance, current image recognition algorithms require thousands of images to recognise a cat. A 3-year-old child needs maybe three or four instances to know what a cat looks like. Can that gap be bridged?

In addition to the gaps in current AI technology, the area would look at questions like: What are the new AI advances with positive economic and societal impacts?; How can we use AI safely and securely?; How do we design AI to align with ethical, legal and societal principles?



Currently, AI Singapore is inviting applications in the field of advanced research in machine learning, computer vision and natural language processing, and how AI interacts and collaborates with humans. Researchers from Singapore-based Institutes of Higher Learning (IHLs), Research Institutions (RIs), and publicly-funded Medical Institutions can apply. Researchers from AI Start-ups in Singapore, private sector and other entities are eligible to apply as collaborators.

Topics of interest also include, but are not limited to, techniques to enhance robustness and explainability of AI, learning from small data, learning from multimodal data, abstraction and generalisation, and AI with sense-making, hypothesis generation, design and creative capabilities. Proposals should emphasise on methodology and algorithms, rather than domain-specific solutions.

(These are important challenges that AI researchers in Singapore and worldwide are seeking to address. For instance, explainability of AI would be crucial when algorithms are being used to drive decisions with significant, life-altering impact on people, such as hiring of job applicants, or policing and imprisonment. With deep learning which is responsible for much of the current excitement over AI, it is difficult to understand why and how decisions were made. This can hamper trust among users, whether organisations or individuals and also pose ethical dilemmas and legal issues.)

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Desired technical outcomes include AI systems that learn effectively from small datasets, with fewer training iterations, which are able to demonstrate sense-making abilities, and that exhibit creativity and design abilities.

Applications for this inaugural call are open till 9 April. The Programme will support each project for a duration of up to 3 years, providing funding in two tiers: up to S\$ 500,000 (Level 1) and up to S\$1 million (Level 2). Inter-institutional collaborations are encouraged and it is a mandatory requirement for Level 2 project proposals.

AI TECHNOLOGY - GRAND CHALLENGES

The AI technology pillar is about co-ordinating grand challenges that are important issues and problems faced by Singapore and beyond, and which can be effectively addressed by AI technologies and innovations.. The three identified priority areas here are healthcare, urban solutions and fintech.

According to the AI Singapore website a Grand Challenge idea should be:

- Inspiring (for the researchers, users and the general public)
 - Measurable (with respect to some well-recognised criteria for success)
 - Impactful (the solutions will benefit many people, socially and/or economically)
- Examples of Grand Challenge ideas include an intelligent personal health assistant for both in- and out-patients, smart traffic light control system for the whole city, or say a personal digital financial advisor for the ageing population.

AI INNOVATION

This third pillar focuses on industry innovations. In this pillar, AI Singapore is speaking to three sets of people. The first group is young local programmers (not necessarily computer science graduates; they could be graduates from biology, economics or any other field but should have competency in coding).

The second is forward looking enterprises, regardless of sector, who have realised that if they don't adopt AI, then a competitor who does will take away their customers and business, either today or tomorrow.

The third group is industry-savvy researchers in Singapore who have deep expertise in AI and want to see their technology deployed in the industry to create value.

Three suites of programmes have been created to address the needs of these three groups.

100 Experiments

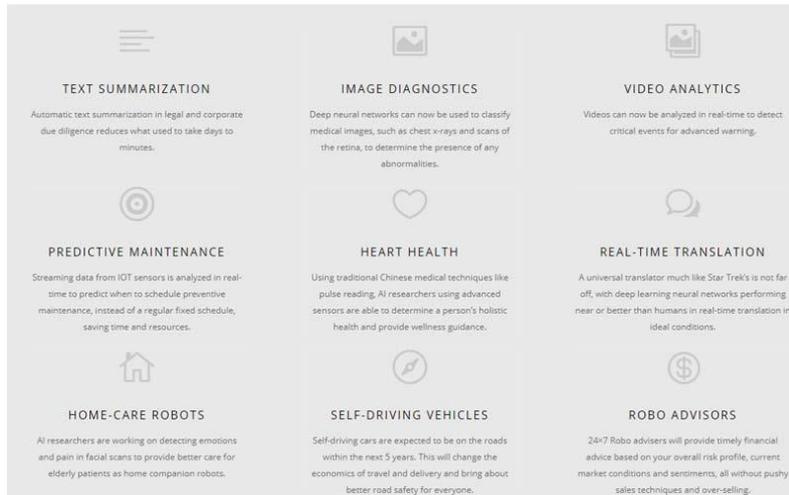
To connect industry seeking to solve problems with deep AI expertise, AI Singapore has launched the 100E or 100 Experiments Programme. If any enterprise has a problem statement which they are unable to solve with commodity-off-the-shelf solutions, but for which existing AI technologies can be quickly built with limited research, then AI Singapore will facilitate matching the statement to the work areas of researchers from NUS, NTU, SUTD, SMU and A*STAR.

For the matched problem statements, AI Singapore co-funds the project with the enterprise on a 1:1 basis, up to S\$250,000. The contribution from AI Singapore goes to the principal investigator from the IHL or the research institute. The expected end-result here is not a paper, but a minimum viable product (MVP) within 9-18 months.

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Possibilities for 100E projects/ Credit: AI Singapore

AI Apprenticeship programme

To develop a talent pipeline, AI Singapore has launched the AI Apprenticeship programme (AIAP), in collaboration with the Infocomm Media Development Authority (IMDA). It is the first TechSkills Accelerator (TeSA) company-led training programme in AI. The programme is intended for recent graduates (currently defined as someone who has not graduated more than 3 years ago).

Apprentices will be awarded a stipend of between SGD\$2,000 – \$3,500/month for the duration of the program.

It is a 9-month full-time structured training programme comprising 3 months of AI coursework consisting of classrooms, online, mini-projects, and 6 months of on-the-job training on a real-world AI problem. The focus is on live projects and candidates are expected to come with intermediate level programming skills. They should also be familiar with cloud computing and existing cloud providers, as well as big data technologies such as Hadoop and Spark.

The AIAP programme is designed by industry practitioners with a focus on certain key aspects of an AI/machine learning systems: 1) Data collection, cleansing and feature engineering; 2) Selection, training and tuning of machine learning and deep learning algorithms; and 3) Designing, implementing and managing a High Performance Computing (HPC) infrastructure to build Reproducible AI workflows.

In his presentation, Mr Saxena said that the ideal combination would be when a company has a 100E project and is also seeking to develop a talent pipeline. In that case, they would not only get a MVP, but also develop a pipeline of AI engineers who can take the MVP to full production.

The first AIAP application closed on 31 December, 2017, with a total of 144 applications received.

Marketplace

The final programme under AI innovations is a marketplace, kelaberativ.aisingapore.org. It intends to meet the needs of enterprises looking for collaborators, such as system integrators or HPC service providers for an AI project it wants to deploy in Singapore. AI companies can also search for collaborators and business opportunities.

The ultimate aim is to bring together the AI community in Singapore – companies, startups, researchers, students, professionals – to collaborate, find research and business opportunities and talent. It consists of an online news magazine where the community is encouraged to share their stories, and a forum for discussion.

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Applications being explored

Mr Saxena talked about some of the sectors which have expressed interested in adopting AI. The companies range from the medical industry (medtech, hospitals, diagnosticians and even a Traditional Chinese Medicine company) to matchmaking services to manufacturing (for example for predictive maintenance) and logistics (for route optimisation).

There's also been interest in using AI for detecting fake news and predicting if there will be fake news after a certain event so that there is no unnecessary social unrest.

Among the many applications, AI Singapore is viewing Robotic Process Automation (RPA) as the lowest hanging fruit. It helps automate tedious business tasks through software robots that mimic the activities of the human beings. Companies in sectors, such as accounting and legal, with well-structured backend processes, can reap significant benefits from RPA. In fact, AI Singapore is now maintaining and developing a RPA tool - TagUI – which can be used for automating user interactions with web browsers or other applications. The intention is to add AI capabilities to TagUI while keeping it open-source.

Key features of the tool include cross-platform implementation (macOS, Linux, Windows), integration with R & Python for big data and AI use cases, execution of automation flows in 20+ human languages or JavaScript. AI Singapore is looking for developers and users who are keen to use and extend the tool, in particular, for the SME ecosystem, where commercial RPA tools are often too costly for them to acquire.

The above initiatives are the first steps in AI Singapore's journey as it sets out to bring together all the different players in the ecosystem and catalyse, synergise and boost Singapore's AI capabilities.