

Publication: Tech Node Online

Date: 10 July 2020

Headline: WAIC 2020 | Here's how Singapore turns AI research into real-world 'smart city' tech

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Experts explained how Singapore is using AI to make the nation smarter at today's World Artificial Intelligence Conference (WAIC). It was the first time the annual event focused on the city-state, with a special WAIC Singapore stage.

Here's what happened in the six sessions:

1. Singapore's national AI strategy

Singapore's big push into AI is driven in large part by the government, which has made developing and using AI technology a core part of its strategy for the years ahead.

Chng Zhenzhi, director of the National AI Office within Singapore's Smart Nation and Digital Government bureau, said the goal is for AI to "solve real-world problems."

She added, "Our goal is to harness the potential of AI to create social and economic value," which means focusing on what's needed, what's practical, what's ethical, and avoiding technology for its own sake.



There are three pillars to this very practical strategy: digital economy, digital government, and digital society.

Singapore has outlined five projects where AI-related technology will be put to use, Chng explained:

1. Logistics: e.g. intelligent freight planning
2. Municipal services: e.g. a chatbot for reporting local issues
3. Healthcare: applications include personalized risk scores to help with early detection
4. Education: e.g. creating personal syllabi personalized to each child's strengths
5. Border clearance: e.g. supporting completely automated immigration points

So far, Singapore has committed around \$360 million to AI-related research. The next steps will include forming public-private partnerships so that the new, people-oriented AI technologies can be commercialized, Chng said.

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2. AI research meets reality

Next up was Li Xiaoli, principal scientist and head of machine intelligence at Singapore's government-funded Agency for Science, Technology and Research (A*STAR). The organization was formed to figure out how exactly all those concepts and real-life needs can be transformed into working tech.

Of A*STAR's 4,000 engineers and support staff, Li's team of 120 are dedicated AI and data scientists. They have already set up 10 joint labs in partnership with other government agencies as well as major corporations such as KPMG, DBS, and Singapore Airlines.

Li gave the example of procurement fraud, a major issue for the tax department. With AI, his lab has been able to build what he calls an anomaly detection engine that can assemble a "suspicion ranking" on procurement deals so that auditors can prioritize which ones to check.

It saves time, reduces costs, and increases auditor productivity, he added.



His second example is one that might save lives. In collaboration with Singapore Airlines, the A*STAR scientists have used AI to build a system, using tons of sensors, to predict when aircraft components will have problems.

It shows maintenance crews the probability of failure for specific parts of a plane, avoiding lengthy and expensive downtime for the airline company by preemptively identifying parts that will need to be replaced or repaired.

3. Accelerating AI adoption in Singapore

Continuing with the theme of collaboration and implementation, Laurence Liew, director of AI innovation at AI Singapore said that his organization is what he calls a "tripartite partnership." That means it's a government-backed entity—funded by the National Research Foundation—that connects industry with expertise in academia and research institutes.

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Liew said AI Singapore does three main things:

- AI research
- AI prizes and challenges
- Catalyzes the application of AI into industries

Because industries need to move fast, the joint AI development projects produce a working product in just nine to 18 months, he said.



Liew gave the example of a public housing group in Singapore that wanted to use AI to predict when its elevators would require maintenance. Since it runs 10,000 buildings with around 25,000 elevators, and many of the buildings are decades old, it was far from a simple project.

AI Singapore got the project rolling by signing up a professor at Singapore Management University (SMU) to develop algorithms that can predict up to a week in advance when an elevator will malfunction.

That's just one example of AI Singapore's 20 real-world, AI-driven projects that have been deployed since its inception three years ago.

When the organization works with private enterprises, it contributes up to \$180,000, which the company matches. Then the cash is pooled and AI Singapore engages a research institute or university to start developing the tech.

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4. Data sharing as a virtue

"AI is fueled by data. Without data, there is no AI," said Ng See-Kiong, a professor at the National University of Singapore's (NUS) Institute of Data Science and Department of Computer Science.

Ng posed the question during his presentation: how can governments make their cities smarter when data tends to be trapped in silos?

While there is no clear solution yet, Ng outlined how his research is geared toward getting data to intermingle between the three main data holders: individuals, governments, and companies. The issue is complex because there are often barriers to sharing data within corporations or governments, even between departments.



Right now, Ng is looking into six aspects of this quandary:

1. "Federated learning": where owners still hold the data but make it available
2. "Machine unlearning": which is like Europe's "right to be forgotten" data privacy laws
3. AI ethics
4. Fair data valuation
5. Safety, security, privacy
6. Model-centric sharing

5. AI that is accessible as well as smart

Renee Lo, general manager for data and AI at Microsoft, emphasized AI accessibility in her presentation. The tech giant's Azure cloud engine is central to this goal, where, in Lo's words, all developers can access AI services whether they have formal AI training or not.

Examples include Microsoft-developed AI for transcribing audio, detecting or redacting faces, and moderating content for children.

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Giving real-world examples of Azure helping developers and cities get smarter, she pointed to Jerusalem, where analysis of public transit ridership led to changes that reduced travel time by 47%. And as commuting became more pleasant, the city's transit usage went up four-fold.

Another example was in Miami, where sensors monitor the flows in the city's 10,000-plus kilometers of water pipes to quickly identify leaks and spills. Repair crews are sent out proactively, rather than waiting for leaks to cause visible damage which residents then report.

6. AI in the years ahead

Where do Singapore's AI experts see the technology headed in the next few years?

The WAIC Singapore stage ended the day with a panel discussion, where a couple of our experts returned—Li and Ng—and were joined by Alibaba Cloud's Yang Kan. The moderator was Zhu Feida, associate professor of information systems from SMU.

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The discussion started with new priorities for AI. Li said that AI learning with less data is the key “fundamental challenge to be tackled.” Fraud detection, he said, is a prime example of the many areas where there’s a strong need for AI-powered tech, yet there is little real-world data from which to build models.

Ng agreed that there is a need to adapt to less data. He added that other forms of AI beyond data and models are needed, such as logical reasoning or creativity, to more closely mimic the function of the human brain.

In the near future, Yang views the improvement of AI tech platforms as crucial to the technology’s accessibility, particularly for platforms geared toward non-AI specialist users, who can then train their own models.

Zhu anticipates that researchers and companies need to better contend with the issue that data is often not free and therefore need to do a better job of pricing and auditing data.

Editor’s note: This article is first published on TechNode Global by Steven Millward, in partnership with WAIC 2020.