

# Singapore eyes a slice of the AI pie

Latest projects that are up and running include NTU's robot receptionist and NUS' driverless cart

Lester Hio

Nadine, a robot receptionist at the Nanyang Technological University (NTU), is staring at the visitor in front of her. "I remember you," she says. "You were here last Saturday."

The long-haired, uncannily human-looking robot pauses as her software runs through past interactions to figure out the most appropriate thing to say. Finally, she settles on: "We talked about your job."

At the National University of Singapore campus, a driverless cart attempts to navigate along a crowded walkway. When it senses a person in front of it, it stops; and as the crowd disperses, it inches forward, having learnt when to stop when an obstacle impedes its progress and when it is safe to move again.

These are two of the latest artificial intelligence (AI) projects that local researchers are working on as Singapore positions itself to grab a piece of the global market tipped to reach US\$5.05 billion (S\$6.8 billion) by 2020.

The revenue prediction by India-based research and consulting firm MarketsandMarkets was based on an expected rise in the adoption of AI in media and advertising, retail, finance and healthcare, growing from a market size of US\$419.7 million in 2014.

The new wave of AI machines like Nadine has moved beyond traditional AI design, in which machines are given specific instructions to follow with no room for improvisation.

Rather, they tap into a subfield of AI, called machine learning, in which machines generate new outcomes for themselves after learning from previous outcomes.

"Nadine could eventually act as a robotic caretaker for the sick or elderly," said NTU's Professor Nadia Thalmann, Nadine's creator.

Machine learning was thrust into the spotlight last month when a computer program, AlphaGo, beat one of the highest-ranking players in the world 4-1 in the ancient, complex board game of Go.

Such a feat was thought to be at least five years away, and would not have been possible without machine learning. It would have been impossible to code all the optimal moves into the software as the number of moves on the evolving board state can exceed the number of atoms in the universe.

However, AlphaGo's developer company, DeepMind, fed the software millions of Go games and had it play against itself, where it eventually learnt and developed a play style of its own. AlphaGo's success brought renewed interest in the capabilities of machine learning.

While both AI and machine learning are not new, they have become

more accessible to software developers due to two recent factors: the rapid increase in computational power and the proliferation of big data.

"These two advances in computing technology made it possible for computers to efficiently crunch large amounts of data to look for patterns, and to have a wide dataset to learn from," said Associate Professor Steven Hoi, an expert in machine learning from the Singapore Management University.

Consumers are seeing the applications of machine learning in their hands. Speech-recognition software like Apple's Siri and Microsoft's Cortana, for instance, make use of machine learning to comprehend a user's voice and the spoken instructions to the phone via a process called natural language processing.

Machine learning also underlies many of Google's services found in Android devices. Google Photos, for instance, uses machine learning to learn and tag objects in its gallery.

When a user searches for "cats", for example, the app is able to pick out photos with cats in them, having learnt how to identify such felines through millions of examples.

According to Professor Alfred Huan, executive director of the Agency for Science, Technology and Research's (A\*Star) Institute of High Performance Computing, current capabilities of AI have reached near human-level performance in areas such as machine vision and speech recognition.

But while machine learning has enabled AI to leap ever closer to the ambitious goal of simulating human consciousness, experts say there is still a long way to go before the days of robotic superiority.

"As impressive as these feats have been, machines are still nowhere near the intelligence of even a two-year-old child," said Prof Huan. "We are still far away from any truly intelligent machine capable of replacing humans."

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**PROFESSOR ALFRED HUAN**, executive director of A\*Star's Institute of High Performance Computing, on robots replacing humans

