ADVERTISEMENT FEATURE

Raising a global centre for deep learning

A university lab is transforming Hongo, Tokyo, into A HUB FOR INNOVATION IN ARTIFICIAL INTELLIGENCE

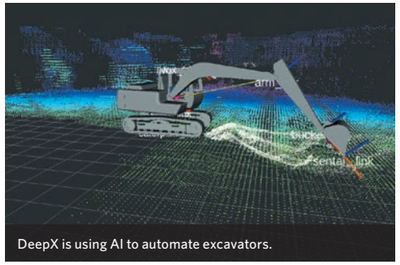

Yutaka Matsuo is excited about combining Japan's strength in manufacturing with AI.

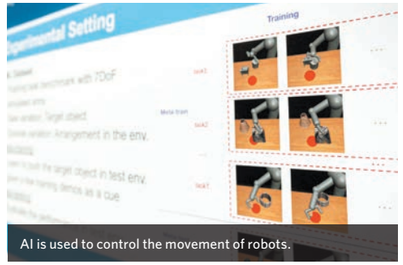

Matsuo and his lab members.


Matsuo's lab at the University of Tokyo.


Robotics is an area where AI can play a critical role.


KOSEN-DCON is a contest where teams apply deep learning to hardware.


DeepX is using AI to automate excavators.


AI is used to control the movement of robots.

Hongo, a neighbourhood in the centre of Tokyo and home to the University of Tokyo, is rapidly transforming into a global technology hub with strengths in artificial intelligence (AI) and deep learning. "This is Japan's answer to Silicon Valley and Shenzhen," says Yutaka Matsuo, a professor at the School of Engineering at the University of Tokyo, who heads the laboratory spearheading this initiative.

"THE LAB'S SUCCESS ULTIMATELY STEMS FROM OUR STRENGTH IN BASIC RESEARCH"

Japan's aspiring young AI entrepreneurs view Matsuo's lab as a gateway to success. This is due in part to its remarkable track record in incubating startups. It has fostered ten successful AI startups, two of which are listed on the Tokyo Stock Exchange. When all these startups are included, the lab's market value exceeds US$2 billion. The lab also advises more than 30 companies.

Competing with the world through hardware

Matsuo — a leading figure in Japanese AI research — is clear that the new hub, dubbed Hongo Valley, is not aiming to outsmart Silicon Valley tech giants on web-based initiatives. "It's unrealistic to compete head-to-head with the rule makers of the web on their playing field," says Matsuo. Instead, he points to collaboration with large manufacturers as the way forward, especially in robotics. "If Japan has any chance of competing, it's in combining deep learning with the hardware produced by manufacturing giants like Toyota and Panasonic," explains Matsuo.

Japan has historically been strong in hardware manufacturing, and Japanese corporations hold top international shares for industrial robots. "It will be a game changer if startups in Hongo Valley can provide AI that reimagines the hardware that these manufacturers produce," he says.

"Deep learning has great chemistry with hardware," Matsuo emphasizes. He envisions using AI to automate the craftsmanship that Japanese professionals display in industries like agriculture, medicine and construction. One example is DeepX, a startup that one of Matsuo's current PhD students founded in 2016. In August this year, the company raised US$15 million to expand its team of engineers. In one project, DeepX is fully automating excavators on construction sites. Controlling the machinery requires extensive experience. DeepX engineers are using images from an operator's eye view to model the movements that excavators should make under various conditions.

To foster more such startups, Matsuo supported the launch of KERNEL HONGO, a co-working space for aspiring AI entrepreneurs who pass a strict selection process. KERNEL HONGO is organized by DEEPCORE, a business incubator and venture capital for AI and deep learning.

Giving back to basic research

While the lab is often credited for nurturing startups, "the lab's success ultimately stems from our strength in basic research," explains Matsuo. By raising venture capital, Deep30, with the lab's alumni, Matsuo created a feedback loop in which part of the investment is returned to the basic research being undertaken in the lab. Historically, the lab has focused on topics in social media and web network analysis (for example, how Twitter users report earthquakes; a study cited more than 4,500 times) — research that has a large social impact. This goal of conducting socially relevant research continues to guide the lab.

A key area of focus is world models, an emerging sub-discipline of machine learning. "World models are about predicting events that happen as a result of an action; for instance, foreseeing how water in a cup will behave when the cup is moved in a certain way," explains Yusuke Iwasawa, the basic-research leader in Matsuo's lab. "When coupled with robots, world models can make a robot's movement less awkward — they construct a model of how the world works and act based on it. That allows it to solve tasks that they have never learned to solve before."

While robots have become adept at pursuing single tasks under well-defined criteria, such as placing folded laundry in a designated space, they have a hard time performing general commands like "tidy up". "This is because there are so many factors associated with 'tidy up' that robots have to take into account," he says. "With world models, however, we can teach robots things we consider common sense, for instance, that shelves are for storing things."

Leading the way in education

Matsuo has a suite of initiatives underway to educate the next generation of academics and businesspeople with foundational skills in AI. In 2015, Matsuo's lab began offering non-credit courses at the University of Tokyo on consumer marketing, data science and deep learning. More than 5,000 people have taken these courses. Outside the university environment, Matsuo established the Japan Deep Learning Association (JDLA) to advocate and promote the use of deep learning in Japanese society and industry. Under his guidance, the JDLA established a certification for deep learning in 2017 to facilitate structured learning. More than 40,000 people have already taken the exam, including business people, researchers and students, and there are plans to conduct an English version of the exam in 2021. In 2020, the JDLA launched a business competition called the KOSEN Deep Learning Contest (KOSEN-DCON) in which contestants from KOSEN, an educational institution that fosters technicians and engineers, present business plans that integrate deep learning with hardware. "The students are well trained on hardware, so the aim is to give them hands-on experience with deep learning," says Matsuo. The contestants were evaluated by venture capitalists and investors, gave monetary valuations of the business plans. The best plan was evaluated as having 500 million yen of equity by capitalists. And three start-ups have already been formed. "We've started small, but an ecosystem will emerge once the groundwork has been laid," says Matsuo. "Now it's time for Hongo Valley to grow into a giant hub 100 times its current size." ■

THE UNIVERSITY OF TOKYO

松尾研究室
MATSUO LAB THE UNIVERSITY OF TOKYO

weblab.t.u-tokyo.ac.jp/en

Advertiser retains sole responsibility for content