The doctor is online

AI brings healthcare industry to new digital frontiers

Patients and providers will benefit from innovations such as quicker diagnoses and elaborate cognitive systems.

When Chinese web provider Baidu rolled out its AI-powered medical assistant Melody, not only did users receive instant and real-time access to medical expertise, doctors also found what a day is like without the long check-up queues they're used to. As tech firms increasingly expose users to the myriad benefits of digitalisation, more countries in Asia are expected to embrace artificial intelligence (AI) and integrate it within their own industrial ecosystems.

In fact, Asia is considered to be one of the most promising markets for AI, with an estimated US$1.8t to US$3t added value by 2030 in terms of total AI investment and revenue across all industries. **John Kelly III,** senior vice-president, cognitive solutions and research, IBM, said that the region is extraordinarily well-prepared to

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lead in the Cognitive Era, due to its massive wealth of talent in the fields of data engineering and science. India, for instance, is home to one of the largest populations of developers in the world.

Meanwhile, **Sundeep Gantori,** analyst, UBS, said that Asia's healthcare industry stands to benefit from its talent pool, tech expertise, freedom from legacy assets and massive amount of data being collected. The region is also currently underserved, with significantly low physician density in key countries such as China (1.5) and India (0.7). These numbers are way below statistics in developed markets such as the US (2.5) and the European Union (3.5). Gantori added that with these factors in mind, the key applications where AI holds promise in the region include decision-making support during clinical trials, robots to assist

in surgery and patient monitoring, and managing healthcare data.

Pioneering initiatives
For the past few years, Asia has already been seeing quite a number of AI-related innovations in the healthcare industry. Analysts at McKinsey Global Institute revealed that machine learning is already being applied in payments and claims management, but a wider application of AI may be seen across all aspects of healthcare soon. Medical providers will soon be faced with more choices for more effective digital solutions, from treatment options tailored to suit each patient to real-time health monitoring of their patients' vitals.

Through partnerships with medical providers like Memorial Sloan Kettering Cancer Center, IBM has taught its cognitive system, Watson, how to analyse cancer and enable clinicians to provide personalised medical care to their patients. Watson, which is now being deployed all over Asia, is helping doctors identify personalised treatments and keep pace with the massive volume of new cancer research every year.

Arnab Basu, partner and leader,

technology consulting, PWC India, said AI is also being used to monitor patient vitals as a way to create a baseline for health and well-being. Mobile platform xbird uses AI to help diabetics understand how hypoglycemic attacks work and when they will occur.

Xbird uses over 20 sensors from mobile devices to add up personal and environmental data points and create an automated personal diary, which may be cross-referenced against blood sugar levels. Patients are then encouraged to share the data with their doctors in order to manage diabetes and uncover unique hypoglycemic triggers.

Need for human touch

Whilst already on the crest of their third wave, AI systems still function best when there are humans that monitor and supervise them. Basu said that the 2016 CAMELYON Grand Challenge for metastatic cancer detection revealed that there is 0.5% error rate for physicians augmented by physicians, but this number increases when physicians work alone (3.5%) and goes up further when AI systems function without physicians (7.5%).

Kelly added that IBM does not refer to Watson as merely AI, they call it cognitive computing because it does not work alone and needs the assistance of people. "Our cognitive system, Watson, is already a key part of everyday life for many of us – it's expected to help more than one billion people this year. For example, Watson is helping people in the United States do their taxes better through our partnership with H&R Block, and thanks to IBM's partnership with Quest Diagnostics, it can analyse the genomic makeup of a tumor and identify treatment options or a clinical trial for that patient," Kelly added.

Dominic King, clinical lead, DeepMind, elaborated that AI-assisted healthcare should not only involve the machine and the clinician, but ensure that the patient is involved every step of the way. King said that outcomes are better when patients and clinicians decide together, a principle that should also be applied when developing healthcare technology.

"We continue to run regular public and patient involvement and engagement workshops with patients, and have appointed a patient lead to engage patient and public groups, and to ensure that our work is always in touch with patient needs. We also work incredibly closely with clinicians in developing our technologies," King said.

DeepMind's collaborative principle is evident in its clinical app called Streams. After a few weeks of going online, nurses who used the app reported that Streams has been saving them up to two hours a day, allowing them to reduce time in routine administration and speed up direct patient care. Whilst DeepMind is not yet available in Asia, tech firms in the region can learn from the collaborative principle to gain greater trust from their patients.

"Deep learning algorithms that are opaque to users could create hurdles in domains such as healthcare, where diagnosis and treatment need to be backed by a solid chain of reasoning to buy into patient trust. Trustworthy AI systems are built around the following tenets: transparency (operations visible to user), credibility (outcomes are acceptable), auditability (efficiency can be easily measured), reliability (AI systems perform as intended), recoverability (manual control can be assumed if required)," Basu added.

The prognosis for AI

At present, AI systems in Asia are still mostly focused on several pocket of initiatives in single institutions across the region. However, analysts at McKinsey Global Institue said that machine learning is suited to analysing data in millions of medical histories in order to forecast risks at the population level. "This could be an early win for AI because it brings the potential for large savings and would not require the regulatory scrutiny to be expected when trying to anticipate individual health risks," they said.

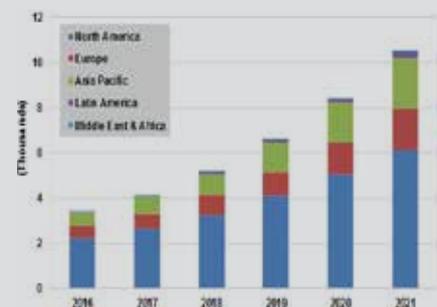As AI or cognitive systems move forward into the fourth industrial revolution, much work needs to be done in order to keep up with the pace of innovation in more advanced industries such as manufacturing and finance.

Gantori said that the global AI industry is expected to grow at a 20% compound annual growth rate (CAGR) to reach US$12.5b in 2020. Once AI has become mainstream, it is expected to continue reaping revenues of up to tens of billions of US dollars by 2030, with Asia a key revenue contributor.

"However, Asia still lags developed markets like the US and the UK in terms of innovation and has not yet developed a robust AI-based ecosystem. We believe AI puts 30–50 million jobs in Asia at risk in the medium to long term. AI presents the most risk to manufacturing-driven economies like China, whilst services-driven economies like Hong Kong, Singapore and India should be less affected. However, within Asia, AI should also create many new categories of jobs, ranging in the millions; so the net job losses should be far less and manageable, in our view," Gantori said.

It does not come as a surprise that currently, Singapore leads the ASEAN region in terms of digital innovations in healthcare. Rising demand for services due to an ageing population, rising affluence, and higher prevalence of chronic diseases have resulted in greater spending by the Singaporean government and increased expenditure in private healthcare. A big chunk of investments have also been directed to robotics, AI and chatbots that continue to greatly benefit the country's ageing population.

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Dominic King

John Kelly III

Sundeep Gantori

Healthcare robotics shipments, 2016-2021

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