

SUCCESS STORY | LINKOU CHANG GUNG MEMORIAL HOSPITAL

CGMH, TAIWAN'S LARGEST HOSPITAL IMPLEMENTS AIRI BUILT ON NVIDIA DGX AND PURE STORAGE FLASHBLADE TO POWER AI TOOLS FOR MICROSCOPY

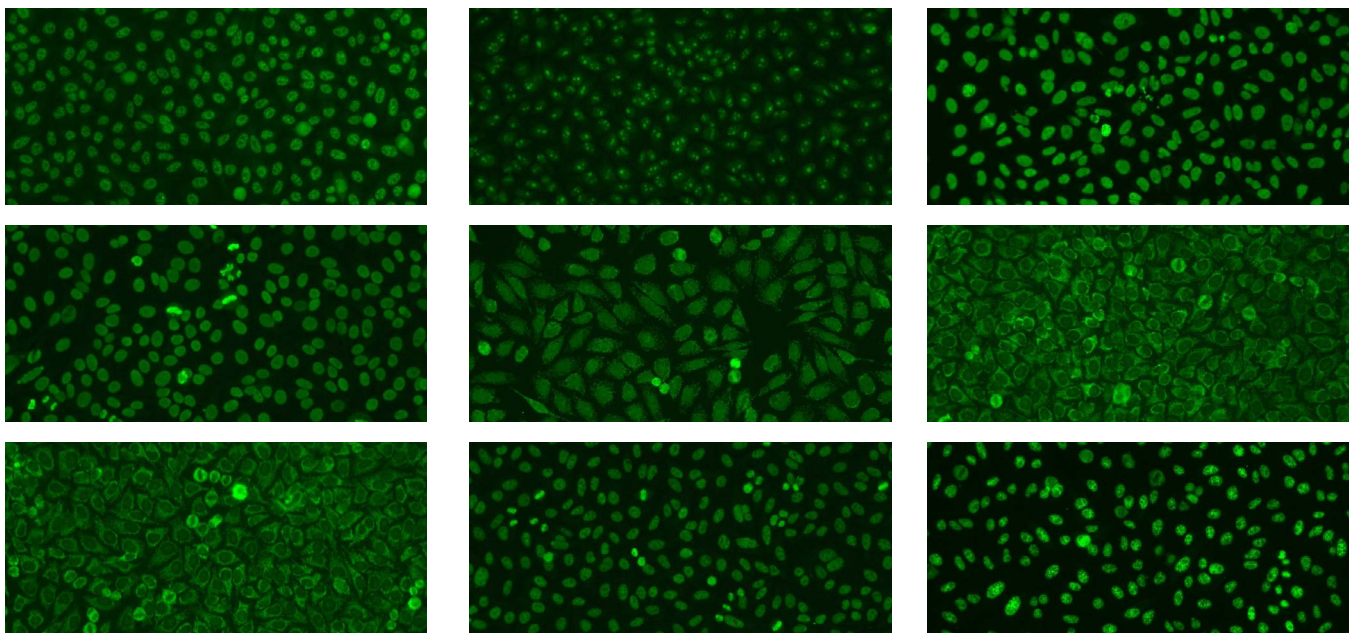


Nowadays, AI and Deep Learning play an increasingly essential role in medicine and related fields. Medical sectors have benefited greatly from technological advancements for a long time. For example, the automation of information flow improves logistics by bringing relevant medical images to clinicians' attention for them to read and make decisions. However, reading medical images is still labor-intensive, time-consuming, costly, as well as error-prone due to the sole reliance of decision making on human experts.

Given the circumstances, Chang Gung Memorial Hospital (CGMH) – Taiwan's largest medical system with a network comprising 7 hospital branches—established the Center for Artificial Intelligence in Medicine (CAIM) in 2018 to develop the AI strategy in CGMH and implement AI technology in real-world clinical practice. Improving the medical diagnosis process by developing an AI medical imaging system is one of the main tasks of the center.

Medical images are not easy to collect for their exclusive acquisition process in the hospital and strict regulatory consideration in terms of data sharing policy. However, CGMH receives an average of 8.2 million outpatient visits every year, and they have been using digital image processing for many years. Thus, CGMH undoubtedly has a great advantage to develop and deploy AI in the clinical process of medical image.

AI Helps Accelerate Anti-Nuclear Autoantibodies Blood Cell Analysis



Benefits of AI Solution

CGMH's annual outpatient visits is extremely high, serving nearly one in seven outpatient visits in Taiwan. To reduce workloads of physicians, CGMH hopes the cumbersome and complicated manual processing will be processed by AI to improve the quality of medical care and the efficiency of diagnosis, and to build better doctor - patient relationships.

"As AI was unfamiliar territory to physicians in the past, they were not able to transfer their knowledge and experience to an AI system," said Chang-Fu Kuo, Director of Center for Artificial Intelligence in Medicine (CAIM), CGMH. "With the consideration of these situations, stability, reliability, scalability, and plug and play capability are the priorities for investing in new AI hardware. Thus, we realized that it's necessary to follow the industry leader and stand on the shoulders of giants to develop AI in medicine. NVIDIA's leading AI platform becomes the only choice for CAIM."

To accelerate its development of AI tools, CAIM implemented Pure Storage AIRI (AI-Ready Infrastructure), integrated infrastructure solution from Pure Storage and NVIDIA, based on the NVIDIA DGX POD reference design and powered by NVIDIA DGX-1 in combination with Pure Storage FlashBlade. CAIM's AIRI deployment is equipped with four NVIDIA DGX-1 systems, each integrating 8 of the world's fastest data center accelerators—the NVIDIA V100 Tensor Core GPUs, delivering over one petaFLOPS of AI compute performance per system. With the AIRI solution, physicians only need to focus on training the AI models and verifying their reliability.

So far, the AIRI solution has been applied to a variety of projects, including the identification of hip fracture from hip radiographs, immunofluorescence pattern recognition and blood cell type classification, etc. The blood cell type classification has reached 99% overall accuracy. When compared to a machine, two medical inspection experts and a clinical expert take about 3-5 minutes to evaluate 25 images to achieve 100% accuracy. However, machine interpretation takes only 2 seconds to complete.

AI Becomes a Win-win-win Solution for All

AI will not surpass medical experts; human decision-making is very much required for complex clinical scenarios. But AI tools—especially when trained by physicians with extensive clinical experiences—will help over-burdened clinicians increase productivity. Thus, doctors will have more face-time to communicate with patients and to make the best and right medical diagnosis.

The AIRI solution has already started to improve clinical processes and increase the productivity of CGMH doctors. For example, CAIM developed an AI tool to analyze antinuclear antibody immunofluorescence patterns, which is an essential medical tests to diagnose complex diseases such as lupus and Sjögren syndrome, and takes seconds to provide accurate answers (>99% accuracy) for clinicians to assist reporting.

AIRI Solution with 4 NVIDIA DGX-1 and Pure Storage FlashBlade



Additionally, since CAIM adopted the AIRI solution, AI has been integrating a wide variety of professionals' expertise to increasingly help uncover hidden insights and extract meaning from previously inaccessible, as well as unstructured, data sets.

This could lead to disease and outcome prediction and help patient stratification which is pivotal for doctors to manage patients precisely and individually. AI becomes the key to the development of medical care and benefits patients, physicians, and administrations. In conclusion, AI is a win-win-win solution for everyone involved.

"AI will not replace physicians but help them focus their attention on the core medical values. Using AI systems in medical image processes, doctors can save invaluable time and effort, which are difficult to quantify, and focus on their expert areas. That's the core value that CGMH expects AI systems to deliver and help clinical practice," said Kuo. "In addition, we've also adopted NVIDIA Clara Platform, in addition to software provided by ChunChi and ZSH corps, to train and deploy AI workflows for enhancing the development of medical care. We're expecting that more and more AI medical applications will be down-to-earth and improve an entire medical ecosystem in Taiwan."

Chang-Fu Kuo, M.D., Ph.D., Director of Center for Artificial Intelligence in Medicine, CGMH.



CUSTOMER PROFILE

Organization

Chang Gung Memorial Hospital offers the largest and most comprehensive health care services in Taiwan, comprised by a network of 7 hospital branches located in Linkou, Taipei, Taoyuan, Keelung, Yunlin, Chiayi, and Kaohsiung.

- > CGMH hospital network contains a total of 10,050 beds.
- > CGMH receives an average of 8.2 million outpatient visits every year.
- > At least 2.4 million hospitalizations occur at our facilities every year.
- > CGMH receives an average of 167,460 surgical patients every year.

CGMH's health care system is also further consisted of Chang Gung University, Chang Gung University of Science and Technology, Acute Hospitals, Chronic Hospitals, and Chang Gung Nursing Home, and Chang Gung Health and Culture Village. (elders' residence).

Industry

Healthcare, Higher Education

Location

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Website

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FB: <https://www.facebook.com/changgungcaresforyou/>

PRODUCTS

Software

- > TensorFlow
- > Python
- > Inference Platform TRTIS

Hardware

- > Pure Storage AIRI built on NVIDIA DGX-1 and Pure Storage FlashBlade
- > NVIDIA Clara

CUSTOMER QUOTES

“Using AI systems in medical image process, doctors can save invaluable time, efforts which are difficult to quantify, and focus on their expert areas. That’s the core value that CGMH expect AI systems to deliver and help clinical practice.”

Chang-Fu Kuo, M.D., Ph.D.

Director of Center for Artificial Intelligence in Medicine, CGMH.
Secretary General, Taiwan Rheumatology Association
Honorary Clinical Associate Professor, University Nottingham

“When considering AI lab investment, CGMH takes stability, reliability, continuity and scalability as top priorities. DGX POD comes to CGMH’s mind because of its complete hardware, software support, addressing design, deployment and operations bottleneck, bringing AI lab up to speed to meet the rising tide of AI-infused application from various CGMH hospital groups.”

Chi Hung Lin, Ph. D.

Deputy Researcher, Center for Artificial Intelligence in Medicine, CGMH