SUCCESS STORY

Healthcare

NISI Revolutionizes Modern Surgery through Deep Learning

NISI | PROBLEM SOLVED

NISI (Non-Invasive Surgical Innovations) adopted NetApp's ONTAP AI to expand its data storage capabilities, empowering the development of its deep learning algorithms.

CLIENT OUTCOMES

NetApp ONTAP AI provided NISI the enablement it to carry out its process-heavy deep learning and AI workloads.

40Gb/s
STORAGE BANDWIDTH

OVER
2GBps
OF SUSTAINED THROUGHPUT

LESS THAN
1ms
OF LATENCY

OVER
95%
OF GPUs OPERATE

NetApp®

> **"NetApp has provided us with top-end, cost-effective solutions. The seamless migration has meant that we have been able to remain focused on furthering our deep learning capabilities, helping NISI move closer to our goals of improving diagnostics and medical technology through data"**
>
> Dr. HP Ng, General Manager, NISI

NISI (Non-Invasive Surgical Innovations), a Hong Kong-headquartered company specializes in medical and surgical innovations, adopted NetApp's ONTAP AI to expand its data storage capabilities for continuing its deep learning solution. Data is the life source of NISI's deep learning system. With NetApp, NISI can scale up its business easily.

Surgical procedures are being performed faster, safer and more frequently than ever before. In 2016 (source) there were over 230 million surgical procedures performed globally, and this number has continued to rise in recent years.

Today we are experiencing a surgical revolution, which is seeing companies leverage AI and deep learning to improve diagnostics and reduce the invasiveness of surgeries - providing faster recovery and better outcomes for patients.

At the vanguard of this transformation is the Hong Kong startup, NISI (Non-Invasive Surgical Innovations), which specializes in medical and surgical innovations. The company has already attracted significant industry and governmental attention since it set up in 2012, securing a total of US $7.45 million of government funding to support its R&D goals.

Dr. HP Ng, General Manager from NISI, said "Our mission is to become a world leader in non-invasive surgery, pushing the limits of technology to lead the development, manufacture, and sales of surgical and diagnostic innovations for the medical market."

MOVING TOWARDS INNOVATIVE MEDICAL DEVICES

In 2018 NISI embarked on a ground-breaking R&D project to develop a deep learning solution to support its medical devices. The Software-as-a-medical-device (SaMD) model improves the functionality of medical devices by using machine learning to identify disease features in medical imaging.

To develop the deep learning solution, NISI has collected medical images from hospitals and clinics, which are labelled and categorized by expert surgeons or clinicians. The data is then uploaded and used to train deep learning algorithms that become increasingly accurate over time as the dataset increases. The deep learning algorithms are then installed on medical devices to perform diagnosis or to increase the accuracy of clinicians' decision making.

GROWING DATASETS

As the project progressed, NISI began collecting increasing numbers of medical images and videos from hospitals and clinics. This exponential growth in the dataset was essential to improve the performance and accuracy of the deep learning algorithms, however this also led to new pressures on the organization's storage and processing capabilities. What's more, the data was unstructured, meaning that NISI required more power-intensive resources to process the datasets at lightning speed.

In short, NISI required more storage and increased data throughput to enable its deep learning process, which is at the very heart of its SaMD model. Its previous storage network throughput speeds clocked around one gigabit per second, which was slowing down its deep learning capabilities and creating a bottleneck.

UNLEASHING THE AI POTENTIAL

NetApp stepped in to provide NISI with an important upgrade to enable it to carry out its process-heavy deep learning and AI workloads. ONTAP AI is a reference architecture that provides compute, storage and networking capabilities and is capable of delivering sustained high input/output (I/O) throughput at high speeds to achieve faster training times.

The infrastructure incorporates the NetApp AFF A300 all-flash storage, which is supported by predictive AI-based analytics to increase performance and IT agility and reduce latencies throughout NISI's deep learning system.

ONTAP AI optimized the NVIDIA DGX-1, a system that deploys high-performance computing nodes, allowing NISI to run its deep learning simulations.

UPGRADING STORAGE CAPABILITIES

Thanks to the NetApp solution, NISI vastly increased its storage capabilities to over 40Gb/s storage bandwidth for deep learning training on the DGX-1. Over 40 times faster than previous speeds.

Today NISI has not only ample space to store its unstructured data, but also the capacity to continue to grow its datasets and improve its deep learning algorithms. Its increased data capacity also means that

the company has been able to migrate some of its business networks to the NetApp solutions, such as its enterprise resource planning (ERP) system.

Deep learning training routines demand massive amounts of compute power. The NetApp storage solution, which can handle thousands of training images per second, goes hand in hand with a high-end compute capability, which is able to keep up with even the most demanding of workloads.

The NetApp solution is able to sustain over 2GBps of sustained throughput (5GBps peak) with less than 1ms of latency, while the GPUs operate at over 95% utilization. A single NetApp AFF A800 system supports throughput of 25GBps for sequential reads and 1 million IOPS for small random reads at latencies of less than 500 microseconds for NAS workloads.

NISI now has access to a far faster image training time, which has cut down its overall compute costs while also accelerating AI innovation and productivity.

Dr. HP Ng, General Manager from NISI said, "NetApp has provided us with top-end, cost-effective solutions. The seamless migration has meant that we have been able to remain focused on furthering our deep learning capabilities, helping NISI move closer to our goals of improving diagnostics and medical technology through data".

DATA PROTECTION

Data is the life source of NISI's deep learning system. Without it, algorithms can't be generated and new transformative software won't be developed. Therefore, the importance of protecting this data cannot be understated. ONTAP AI unifies data management across the data pipeline with a single platform, enabling the end user to securely control and protect all data in flight, in use, or at rest, and meet compliance requirements with confidence. If there was an issue in the deep learning environment, NISI has 24/7 access to NetApp's proven support model to help troubleshoot and provide guidance.

FUTURE-PROOFING NISI'S BUSINESS

As NISI enters clinical trials and begins to commercialize its products, its business will continue to grow. With NetApp's ONTAP AI, NISI has an infrastructure that can be easily scaled up as its business develops.

SOLUTION COMPONENTS

NETAPP PRODUCTS

- AFF A Series All Flash Arrays
- ONTAP AI

PARTNER PRODUCTS

- NVIDIA

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