SOLUTION BRIEF

Intel® Vision Products
AI in Healthcare

OpenVINO™ Toolkit Enables an All-in-One System for Developing AI Solutions for Healthcare

Intel® Vision Products and QNAP/IEI are advancing medical breakthroughs with faster results for better patient care

Executive summary

From fighting crime to fighting disease, AI is helping create a more automated, data-driven world with beneficial outcomes for people everywhere. Advanced image analysis and computer vision, a key component of this AI revolution, is becoming more and more critical for a wide range of industry applications, including healthcare, where this technology is being used to detect anomalies and improve patient care. Due to a lack of integrated tools and experience with these cutting-edge technologies, however, deploying complete systems is difficult—so Intel and QNAP/IEI are working together to make it easier.

Together, Intel and QNAP/IEI have come up with a solution that offers developers, data scientists, medical researchers, and students a quick-to-deploy computer vision system combining a workstation, deep learning software development kit, and powerful NAS.

Challenges

- Healthcare researchers often deal with a multitude of medical images, along with genomic and patient data, that require an enormous amount of compute power, storage, and network connectivity.
- Building a deep learning platform and data management system for healthcare requires a range of highly technical, cross-discipline skill sets not held by most researchers.
- Data scientists' expertise is outside of what is needed to set up drivers, containers, data backup/transfer, and network configurations.

Solution

The Intel and QNAP/IEI offering provides high-performance computing, storage, and networking in a single solution. It provides scalable data management for hospitals and clinics of all sizes that is easy to install and administer.

Built on the Intel® Vision Accelerator Design

QNAP/IEI is currently developing the next generation of its computer vision solutions, based on the new Intel® Vision Accelerator Design products, which are expected to bring significant increases in the performance and processing of medical imaging data.

Intel Vision Accelerator Design products are the newest addition to the already robust Intel® Vision Products portfolio and provide power-efficient deep neural network inference for fast, accurate video analytics. These designs for inference accelerators are compatible with existing devices using Intel as the host processor and can also be designed into new devices, where they offer a range of options to accelerate deep neural networks, depending on customer-specific performance, cost, and power considerations.

Case study: macular degeneration

The Intel and QNAP/IEI solution was put to real-world use in helping doctors at a renowned Taiwan medical facility detect age-related maculopathy in patients. The degeneration of the macula, the central part of the retina, develops with age and leads to impaired vision and eventual blindness. The disease does not exhibit symptoms at its early stages—most patients have problems only at the mid to late stages, when it may be too late to treat. By detecting macula-related lesions through optical coherence tomography (OCT) early, the disease's progression can be treated early and halted.

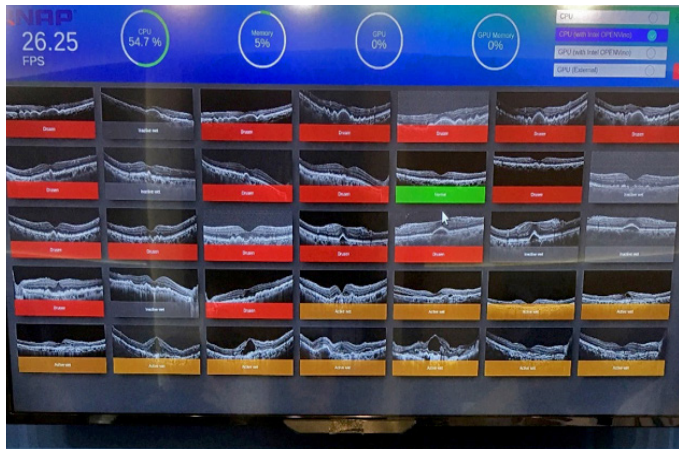
Challenges faced

Diagnosing macular lesions through medical imaging is a time-consuming and labor-intensive task, requiring special training and resources not available at all clinics, especially in rural areas. Furthermore, results can take weeks, delaying treatment. By using AI technology, doctors can shorten the OCT image interpretation time and make more accurate diagnoses.

Quick results

The QuAI team built and delivered an AI diagnostic system in five months that incorporates the QNAP NAS, Intel® Xeon® D processors, and JupyterHub software for algorithm programming. The project team took more than 20,000 OCT images, labeled them with four common conditions, and preprocessed them to help the AI diagnostic system learn image recognition more quickly. The team then constructed a deep neural network and trained and tested the AI models using QuAI and the OpenVINO toolkit in only two months, with results showing significantly improved performance in the system compared to how it would perform without the OpenVINO toolkit.

The final model offers a fast and accurate diagnosis of the disease. The solution's low cost and easy implementation allow its use in locations with limited resources. As a result, elderly patients in remote areas need to complete only the imaging and get their diagnosis the same day.



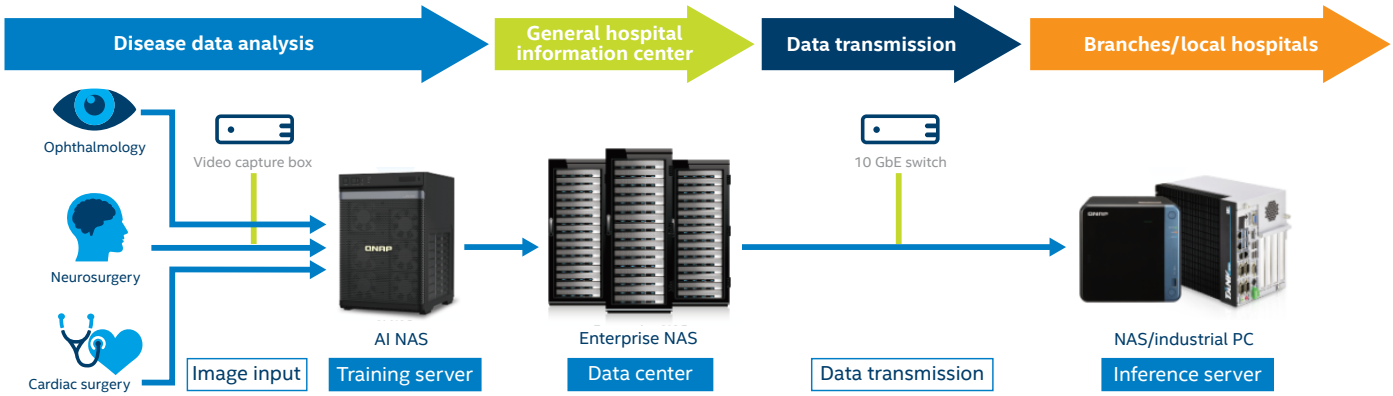
The Intel® and QNAP/IEI solution was used to speed diagnoses of age-related macular degeneration. Tens of thousands of medical images were trained and tested using QuAI, OpenVINO™ toolkit, Intel® Xeon® processors, and the QNAP NAS.

Benefits

- **Efficient** – No need to transfer the large data sets from the NAS to server for deep learning.
- **Streamlined** – Seamless integration between hardware and software components.
- **Easy to use** – Begin using with one click, without the need to install any library or drivers.
- **Lower TCO** – Optimize solution management to get the highest level of control and performance available in the solution design specification.

How it works

Applications that utilize deep learning approaches often require large amounts of highly parallel compute power, storage, and networking capabilities, along with performance optimizations for faster data analysis. The Intel and QNAP/IEI solution combines all these elements in one complete system.



Compute. The IEI Tank AIoT Development Kit is a preconfigured, embedded computer platform designed to increase the availability of computer vision and inference acceleration capabilities for AI solutions. Built on Intel® processors (Intel® Xeon®, Intel® Core™, and Intel Atom® processors), OpenVINO toolkit, Intel® Media SDK, and Intel® System Studio, the platform helps ensure optimal performance to analyze multiple HD video streams and large amounts of data.

Storage. The QNAP NAS offers secure, private cloud storage for the terabytes of data needed for deep learning. It Includes various RAID configurations for redundancy and preinstalled packages with popular AI frameworks (e.g., JupyterHub) and the acceleration cards enable NAS users to study, develop, and share deep learning applications on the same platform.

Network. The solution supports a multitude of PCIe* slots so that users can run HD-, VR-, GPU-related applications on the QNAP NAS, which includes Thunderbolt™ networking capability and built-in 10 gigabit Ethernet.

QuAI. QuAI is an AI developer kit that allows developers to quickly build, train, and optimize deep learning models on the QNAP NAS. It includes preinstalled AI libraries and frameworks through Container Station, such as Caffe*, Apache MXNet*, TensorFlow*, Microsoft Cognitive Toolkit*, and OpenVINO toolkit. Easily migrate existing containerized solutions to the QuAI platform, or create a new one.

OpenVINO toolkit. This toolkit, when paired with Intel® FPGAs, is easy to use and flexible for high-performance, low-latency computer vision that improves deep learning inference. The toolkit's model optimizer and inference engine for heterogeneous accelerator support help reduce development costs and accelerate time to market.

Learn more

OpenVINO toolkit ›

Intel Vision Accelerator Design Products ›

QNAP Medical AI ›

QNAP QuAI ›

QNAP NAS ›

Download the IEI Tank RFP Ready Development Kit ›

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