ACCIPIO®—Solution Architecture and Design

A White Paper

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Introduction

MaxQ AI is ushering in a new era of AI-augmented healthcare through a comprehensive, seamless, and secure platform of patient-level medical diagnostic solutions. We aim to empower care providers around the world to better prioritize life-threatening conditions, such as stroke and head trauma in acute care settings. These solutions will help across the diagnosis, prognosis, and therapeutic pathways; potentially saving lives, improving the quality of care, and lowering healthcare costs.

The Standard of Care

Non-contrast head CT (NCCT) is a cornerstone of radiology in the evaluation of patients suffering from a stroke or head trauma in the acute care setting. NCCT is the standard-of-care approach for evaluating the presence of intracranial hemorrhage (ICH). Overall, it is expected that the performance of general radiologists is very good for detection of ICH, and sensitivity for expert neuroradiologist is likely >98%. However, even with this exceptionally high performance, missed diagnosis of ICH does occur. The implications of which can be extremely high, both in terms of patient mortality and cost of care.

Solution

ACCIPIO Design: Engine and Agent Architecture
ACCIPIO is a software device designed to be installed within healthcare facilities' radiology networks to identify and prioritize NCCT scans based on algorithmically identified findings of acute intracranial hemorrhage (aICH). The device, developed using computer vision and deep learning technologies, facilitates prioritization of CT scans containing findings of acute ICH. There are two main components of the ACCIPIO ecosystem: (1) the Accipio Ix™ Agent and (2) the MaxQ AI Engine. The Agent serves as an active conduit which receives head CT studies from a PACS and transfers them to the Engine. The core of the algorithm is a convolution neural network (CNN) comprised of four variants of UNets. The CNN and its training procedure were implemented in TensorFlow. After successful processing of a case via the MaxQ AI Engine, the Accipio Ix Agent receives the Engine results and returns them to the PACS or workstation for use in worklist prioritization.

Technical Information

GPU vs CPU: Real-World Training Data

A large, diverse set of non-contrast CT exams were used in training with attention to the diversity of CT scanner manufacturers. Data were sourced from a variety of US sites. Image labeling and annotation were done by US Board Certified, expert neuroradiologists, and ground truth was determined by a minimum of two-reader consensus. Training of the algorithm was performed on graphics processing unit (GPU)-based hardware. However, availability of GPUs on premise is still not ubiquitous in the typical healthcare IT infrastructure. Therefore, it is critical to create an algorithm that supports CPU processing to enable broad access. In partnership with the Intel AI Builders, MaxQ AI deploys the ACCIPIO algorithm on CPUs providing a typical case processing time of less than 90 seconds.

Radiologists Desire: Seamless AI Integration into Clinical Workflow

The adoption and utilization of AI technology in a clinical setting will have limited success unless it is seamlessly integrated into the radiologist's clinical workflow and existing PACS and RIS platforms. Accessing AI results on separate workstations or in a new application window is unacceptable and considered suboptimal. Radiologists desire AI to meet them where they live. In the US, that is PACS, the worklist and, at times, the scanner console. MaxQ AI focuses on an automated, zero click, seamless integration into the radiologist's current working environment. Data is automatically routed to the ACCIPIO platform from the CT or PACS. Valid input data are automatically processed without intervention, and the results are returned to the PACS, worklist, originating CT scanner or any combination thereof. Input data are deleted after processing so that no PHI is retained on the ACCIPIO platform.

Worklist Evolution and Sophistication

Standardized output formats (DICOM, HL7, JSON) are supported for generic integration into common PACS and radiology worklist paradigms. However, with the emergence of sophisticated image analysis, historical PACS and worklist functionality may not be able to fully empower functionality not previously envisioned. Many PACS and worklist vendors are developing more advanced presentations of AI results in the prioritization, visualization, and report integration. MaxQ AI is working with an ever-growing list of major scanner manufacturers, PACS and RIS vendors to co-develop and tightly integrate with these exciting workflows. Again, with the guiding principle that AI needs to be seamlessly integrated into the physician's primary reading workflow without the need to deviate to additional applications or environments.

MaxQ AI—The Trusted Brand

At the end process, the results are used in a clinical setting to assist in managing patient care. As such, Max Q AI's, and any medical device manufacturer's, main responsibility is the quality and security of the product. This is a core value for the entire MaxQ AI organization. We take great pride of our leadership in this area with key milestones as detailed below:

- FDA Breakthrough Status, Class II FDA Cleared and IMOH Approved, Class IIb CE Marked and TGA Approved
- ISO13485, FDA QSR, ISO14971, IEC62304, IEC62366 Standards Certified
- GDPR Compliant
- Supports HIPAA Compliance
- ISO 27001 Information Management Security System Certification
- Data truthing by board-certified physicians
- FDA Pre-Certification Member

ACCIPIO is Integrated and Sold through the following Channel Partners

To learn more, visit www.maxq.ai or follow us on LinkedIn

Schedule a demo at maxq.ai/scheduledemo/

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