

White Paper

Medical Imaging Technology
AI Machine Learning

The Intel logo is positioned in the top right corner of the header image. It consists of the word "intel" in a lowercase, sans-serif font, with a small registered trademark symbol (®) to its upper right.

Intel® Distribution of OpenVINO™ Toolkit Transforms AI-Based Medical Imaging



The next generation of medical imaging

Among the many healthcare applications for artificial intelligence (AI) and machine learning, medical imaging is one of the most promising. Researchers have demonstrated the ability of advanced analytics applications to identify conclusive information from CT scans, chest X-rays, and other imaging tests, providing practitioners with a valuable toolset to speed diagnoses and improve patient care and outcomes. Some of these applications have been evaluated by the FDA because of their potential to improve patient experience.

Founded in 2013, South Korea-based Lunit is a medical AI software company at the forefront of developing advanced medical imaging analytics using deep learning technology. By using the Intel® Distribution of OpenVINO™ toolkit to run high-performance deep learning inference, the Lunit INSIGHT CXR Triage application can help clinicians identify suspected cases of pneumothorax (collapsed lung) and pleural effusion (water on the lung). Lunit's software-only solution can quickly process the massive amounts of data generated by X-ray images, helping doctors reduce the time it takes to diagnose critically ill patients.

Overcoming data volume and processing speed hurdles

While AI-based medical imaging has the potential to transform time to diagnosis for clinical care providers, solution providers are addressing several technology hurdles as these imaging solutions enter the mainstream.

The primary challenges are data volume and processing speed. Ninety percent of all healthcare data comes from imaging technology, and over **1.44 billion chest X-rays are performed globally every year.**¹ Given the number of tests and the size and complexity of each data file, processing delays are inevitable. For example, at any given time in the UK, there are an estimated **330,000 X-rays that have been waiting for resolution** for more than 30 days.²

A key benefit of AI-based medical imaging is the ability to process medical images quickly, helping to reduce the time between X-ray and diagnosis; however, traditional hardware solutions may lack the processing power to complete imaging analysis in the necessary time frame.

Some existing AI-based medical imaging solutions employ a dedicated graphics processing unit (GPU) to increase processing speeds. These specialized processors are designed to accelerate graphics rendering and can process many pieces of data simultaneously. While well suited for machine learning and imaging applications, GPU-based solutions are expensive, making them less viable for many healthcare organizations.

The OpenVINO logo is located at the bottom left of the page. It features the word "OpenVINO" in a bold, sans-serif font, with a small registered trademark symbol (®) to its upper right. The letter "V" is stylized with a circular graphic element.



Lunit INSIGHT CXR overview

The Lunit INSIGHT CXR Triage is a software application approved by the FDA³ to:

- Analyze adult chest X-ray images for the presence of prespecified suspected critical findings (pleural effusion and/or pneumothorax)
- Use an artificial intelligence algorithm to analyze images for features suggestive of critical findings
- Provide case-level output for worklist prioritization or triage

As a passive notification for prioritization within standard-of-care workflow, the Lunit INSIGHT CXR Triage does not send a proactive alert to the appropriately trained medical specialists and is not intended to direct attention to specific portions of an image. Its results are not intended to be used on a stand-alone basis for clinical decision-making.

Lunit INSIGHT CXR Triage

The Digital Imaging and Communications in Medicine (DICOM) specification is used for the creation, transmission, and storage of digital medical image and report data. Lunit INSIGHT CXR Triage is radiological computer-assisted triage and notification software that can be installed on a desktop, workstation, or laptop. It uses artificial intelligence to evaluate a series of patient images (also known as a DICOM study) and generate case-level output that can be used to assist clinicians in providing diagnosis for pleural effusion and/or pneumothorax.

The INSIGHT CXR Triage uses the industry-standard DIMSE C-STORE protocol to send, receive, and output DICOM data, so it can be easily integrated into existing imaging systems and workflows. To overcome the relatively high cost of GPU-based imaging solutions, the Lunit team used the Intel Distribution of OpenVINO toolkit to improve the performance of more-cost-effective CPUs that are already found in many of these legacy systems.

The OpenVINO toolkit enables developers to optimize, tune, and run comprehensive AI inference applications faster. The toolkit can run inference workloads across select Intel® processors and accelerators and enhances the performance of AI inference for imaging on CPU-based systems, making Lunit's software more accessible to cost-constrained healthcare providers.

A compelling imaging solution for healthcare providers

Enabled by the Intel Distribution of OpenVINO toolkit and Intel® CPUs, Lunit INSIGHT software provides a highly flexible option for healthcare organizations looking to adopt an AI-based medical imaging solution. The application was designed for simple plug-and-play compatibility with existing infrastructure with no platform migration required.

Research confirms the potential of Lunit's AI technology. Lunit worked with the Seoul National University Hospital to conduct [a study on the use of its application](#) for AI medical imaging. The study determined that diagnostic accuracy improved from 29.2 percent to 70.8 percent for critical-emergency lung-related diseases such as pneumothorax and pneumoperitoneum.⁴

By working closely with Intel and a range of global healthcare providers to continually advance their technology, Lunit aims to ensure the future long-term support and development of the INSIGHT CXR platform. Lunit and Intel share the same goal: faster treatment for patients and streamlined workflows for clinicians.

Learn more

[Learn more about Lunit INSIGHT CXR >](#)

[See how the Intel Distribution of OpenVINO toolkit can optimize deep learning inference applications >](#)



1. "How Data Will Improve Healthcare without Adding Staff or Beds," Kieran Murphy, GE Healthcare. Date of access: September 2021. https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2019-chapter8.pdf

2. "What are the benefits of AI in radiology and how can it be implemented?" Health Europa, March 2021. <https://www.healtheuropa.eu/what-are-the-benefits-of-ai-in-radiology-and-how-can-it-be-implemented/104791/>

3. Thalia T. Mills, Ph.D. 'Re: K211733.' Email, 2021. https://www.accessdata.fda.gov/cdrh_docs/pdf21/K211733.pdf

4. "AI Proves Its Value in Assistance for Emergency Cases-- With Higher Accuracy and Timely Reporting Time of Chest Radiographs," Lunit Media, December 2020. <https://www.lunit.io/en/news/ai-proves-its-value-in-assistance-for-emergency-cases---with-higher-accuracy-and-timely-reporting-time-of-chest-radiographs>

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