

AI-powered medical imaging analytics is transforming healthcare. By boosting accuracy, streamlining workflows, and enabling personalized medicine, this technology area is poised to improve patient outcomes significantly.

Medical Imaging Analytics: Embracing AI for Smarter, Faster, and Stronger Imaging Analysis

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Introduction

The medical imaging landscape is on the brink of a transformative era. No longer are we solely reliant on human interpretation of complex medical images. Instead, we are witnessing the emergence of medical imaging analytics as a paradigm shift that harnesses the potential of cutting-edge computational tools to unlock hidden insights within X-rays, MRIs, and other modalities. This is not just about visualizing images but about transforming raw data into actionable intelligence, equipping healthcare professionals with unprecedented precision in abnormality detection. The result is a revelation of critical insights that may have been previously obscured, paving the way for data-driven decisions that can significantly enhance patient care and outcomes.

The imperative to adopt medical imaging analytics is not just a matter of choice but a compelling necessity. The surge in imaging demands post COVID-19 pandemic, coupled with an aging population and increasing chronic disease burden, presents a complex challenge. A strained healthcare workforce, burdened further by the high cost of medical training, underscores the need for efficient analysis and streamlined interpretation. Medical imaging analytics offers a compelling solution by minimizing human error and ensuring more accurate and timely diagnoses. It is a technological advancement and paradigm shift that promises to expedite diagnoses, optimize resource allocation, and elevate the quality of care delivered to patients.

AI stands at the forefront of medical imaging analytics, dramatically accelerating the analysis and reporting of medical images. For instance, AI-powered algorithms can detect early signs of cancer in mammograms with a higher accuracy rate than human radiologists. This translates to unprecedented speed and accuracy, game changers for diagnostics. AI-powered decision support systems are already transforming healthcare.

AT A GLANCE

KEY STAT

Nearly half (47.2%) of spending on medical imaging analytics is allocated to traditional AI for tasks such as image classification and anomaly detection. However, a larger portion (63.9%) is now being directed toward generative AI for purposes such as creating and enhancing medical images, according to IDC's *U.S. Healthcare Provider IT Survey*.

KEY TAKEAWAY

Medical imaging analytics improves patient care by enhancing diagnostic accuracy, streamlining workflows, and enabling personalized medicine.

Their impact is twofold: boosting diagnostic precision and enabling the creation of personalized treatment plans. IDC's *U.S. Healthcare Provider IT Survey* reveals a staggering rise in AI for medical imaging analytics spending at healthcare provider organizations from 2024 to 2025. The breakdown of this spending is particularly insightful as nearly half (47.2%) have earmarked spending for traditional AI/ML applications, focusing on use cases such as medical image classification, tagging, and anomaly detection. However, the future holds even greater promise. An even larger portion (63.9%) will be directed toward generative AI (GenAI). GenAI has the potential to synthesize medical images for training purposes, creating realistic images that can be used to train AI models. It can also enhance low-resolution scans, improving the quality of the images and the accuracy of the analysis.

Investments in AI for medical imaging analytics testify to its potential to revolutionize healthcare. The challenges and limitations are widely acknowledged, but the transformative power of AI is undeniable. AI algorithms rely on the quality of training data, and biased data can lead to biased results. There are concerns about the ethical use of AI in healthcare, particularly in areas such as patient privacy and data security. As Dr. Curtis Langlotz, MD, PhD, Professor of Radiology, Medicine, and Biomedical Data Science at Stanford University, aptly states, "AI won't replace radiologists, but radiologists who use AI will replace radiologists who don't" (source: *Rise of Robot Radiologists*, Nature, December 18, 2019). As medical imaging analytics continues to evolve, it will undoubtedly become an indispensable pillar of modern healthcare, driving improved patient outcomes and significant operational efficiency.

Benefits

Medical imaging analytics is a game changer for how we diagnose and treat diseases. It enhances diagnostic accuracy, streamlines workflows, and improves patient outcomes, painting a brighter future for healthcare. In detail:

» Diagnostic accuracy:

- **Enhanced precision:** AI algorithms excel at analyzing complex medical images, significantly increasing the accuracy of detecting and diagnosing medical conditions. Subtle anomalies and disease markers are identified with greater precision, improving early detection rates.
- **Reduced errors:** AI helps minimize human error by reducing false positives and negatives. Fewer unnecessary procedures and missed diagnoses lead to better patient care.

» Operational efficiency:

- **Streamlined workflows:** AI automates repetitive tasks and streamlines workflows, freeing up healthcare professionals' time to focus on more complex cases. This reduces administrative burdens and improves overall efficiency within healthcare institutions, including for medical imaging workflows.
- **Faster turnarounds:** AI-powered analysis significantly reduces turnaround times for imaging results. Patients receive diagnoses and treatment plans quickly, leading to improved patient satisfaction.

» Patient outcomes:

- **Personalized care:** AI allows for the integration of imaging data with patient history and other clinical information. This facilitates the development of personalized treatment plans tailored to each patient's unique needs, improving treatment effectiveness.

- **Improved engagement:** Faster diagnoses and clear communication of medical imaging results lead to better patient engagement and understanding of their condition. This empowers patients to participate actively in their healthcare decisions.

Trends

A confluence of technological advancements is fueling medical imaging analytics:

- » **Algorithmic power:** Deep learning algorithms, particularly convolutional neural networks, excel at analyzing complex medical images. Techniques like transfer learning allow pretrained models to excel at specific tasks, improving accuracy and efficiency. Generative adversarial networks create synthetic medical images for training and testing AI models, which is especially valuable for rare conditions with limited real-world data.
- » **Clinical integration and workflow optimization:** AI-powered diagnostics analyze vast amounts of data, surpassing human capabilities in identifying subtle anomalies and disease markers. This leads to earlier and more accurate diagnoses, even predicting disease progression and tailoring treatment plans for personalized medicine. AI workflow optimization streamlines diagnosis and frees healthcare professionals for more complex tasks.
- » **Enterprise medical imaging and collaboration:** Enterprise medical imaging strategies and infrastructure convergence, particularly when coupled with cloud technology, fosters collaboration by providing a central repository for medical images accessible from various locations. Edge computing further enhances accessibility by deploying AI models on local servers, reducing analysis latency for real-time applications such as AI-assisted surgery. In addition, edge computing keeps sensitive patient data localized, minimizing privacy risks.
- » **Enhanced visualization and portability:** Miniaturized AI chips enable the deployment of AI models on mobile devices, allowing onsite image analysis even in remote settings. Integrating AI with augmented reality (AR) and virtual reality (VR) further transforms medical imaging visualization. AR overlays digital information on real-world scans, while VR creates immersive environments for surgeons to interact with 3D medical images. Both AR and VR empower professionals with real-time insights and simulations for improved decision-making during procedures.

Notable industry developments include:

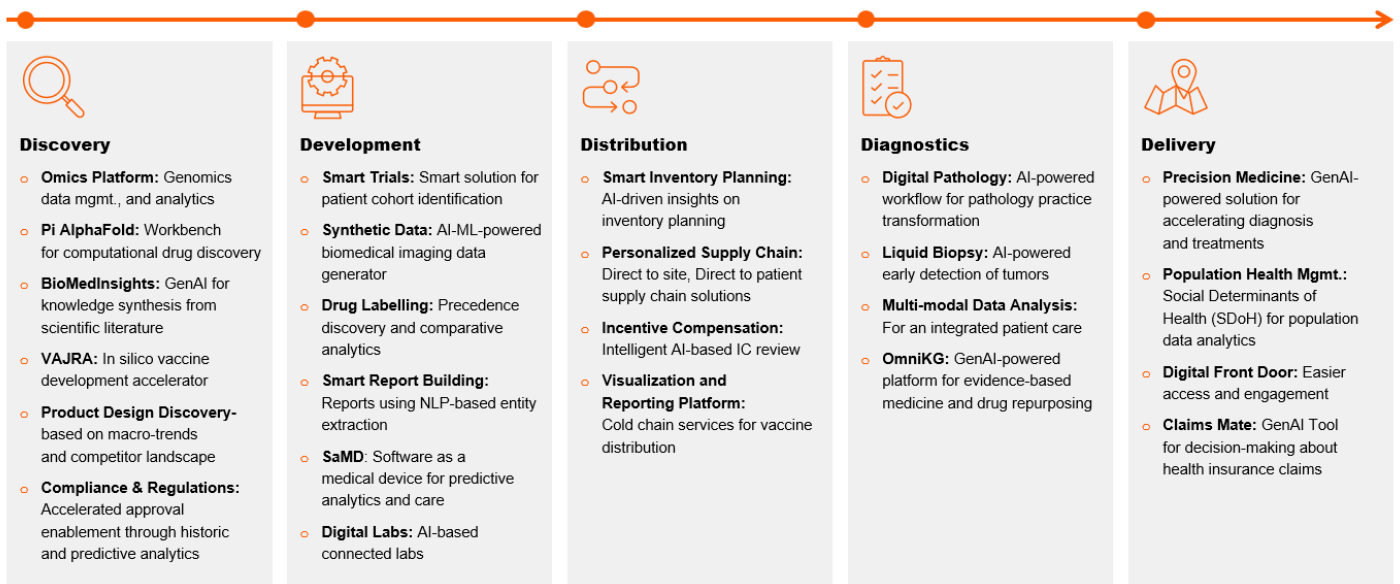
- » Over 700 AI-enabled medical imaging devices and algorithms have been approved by the FDA (as of May 2024). This signifies a rapidly growing regulatory framework for AI in analyzing medical images.
- » Companies are developing explainable AI models for medical imaging analysis. For example, AI for mammogram analysis highlights the specific features (e.g., microcalcification clusters) that led to its recommendation. This transparency fosters trust between radiologists and the AI's suggestions, improving diagnostic outcomes.
- » AI models are being tailored to detect various cancers directly from medical images, such as an AI system that analyzes pathology slides (essentially digital images) to identify signs of breast cancer, potentially aiding in faster and more accurate diagnoses.
- » Early detection of diabetic retinopathy is crucial for preventing vision loss. Companies are developing AI models that analyze retinal scans (a type of medical image) for diabetic retinopathy, allowing for faster and more scalable screening programs.

- » Companies are also developing AI-powered robotic surgical systems. These systems can analyze medical images during surgery, assisting surgeons with improved precision and control during minimally invasive procedures.
- » As AI adoption in medical imaging analytics increases, so do patient data privacy and security concerns. Existing regulations such as HIPAA (United States) and GDPR (European Union) are being adapted to address these concerns. Federated learning is an emerging technique that allows AI models to be trained on distributed data sets across multiple hospitals without directly sharing patient imaging data.
- » Cloud computing platforms are becoming increasingly important for medical imaging analytics. They provide secure storage for vast amounts of medical images, enabling easy access and collaboration among healthcare providers across locations. This facilitates the rapid development and deployment of AI models for image analysis.

Considering Persistent Systems

Persistent Systems serves the healthcare and life science industries with a blend of deep domain and technology expertise. Fueled by over 30 years of experience serving more than 125 clients, the company's core offering is a comprehensive portfolio of services designed to empower healthcare and life science organizations across the entire "Cell to Cure" journey via proprietary accelerators utilizing AI to unlock insights from data. This approach translates to being seen as a single, trusted partner with the proficiency to cater to the specific needs of clients across healthcare and life sciences (see Figure 1).

FIGURE 1: *Persistent Systems' "Cell to Cure" Journey*



Source: Persistent Systems, 2024

Persistent Systems' GenAI offerings hold value for healthcare providers in medical imaging analytics, specifically radiology groups and hospitals. The company's persona-based approach enables custom solutions that cater to the distinct needs of radiologists and technologists. Radiologists can leverage AI-powered tools for faster and more accurate image analysis, while technologists benefit from streamlined image acquisition and management workflows. Such a targeted approach

optimizes user experience and fosters improved efficiency within radiology departments. Persistent Systems' expertise in migrating healthcare systems to multicloud environments directly benefits medical imaging analytics. Cloud storage offers vast scalability to handle the ever-growing volume of medical images. In addition, cloud accessibility allows radiologists to access and analyze images remotely, improving turnaround times and facilitating collaboration among specialists across locations. Disaster recovery capabilities inherent in cloud platforms ensure continuous access to critical medical imaging data. Persistent Systems' call center management system features seamless data interoperability, which is crucial for managing patient inquiries related to medical imaging. This system helps healthcare providers streamline communication and ensure patients have timely access to imaging results. Transparency fosters trust and improves patient satisfaction.

Persistent Systems emphasizes that its solutions utilize AI to expedite the analysis of complex medical images, such as those of cells or tissues, significantly reducing analysis and processing time while minimizing any dependence on subjective interpretations. This approach aims to produce more objective, actionable insights, thereby accelerating drug discovery and development. With strategic partnerships in place with major hyperscalers, Persistent Systems is well positioned to leverage the potential of fast-evolving large multimodal models (LMMs) for medical imaging in healthcare and life sciences.

Challenges

The imaging data avalanche poses challenges for healthcare and life sciences. Extracting insights requires robust analytics, but regulatory approval is crucial for all vendors. The industry demands rigorous proof of safety and efficacy for AI-powered tools. Building a solid track record of clinical validation is paramount to gaining widespread adoption. Persistent Systems possesses a significant opportunity as its user-centric approach, evident in its persona-based workspaces, translates well to AI development for image analysis. Furthermore, its expertise in medical imaging data management positions it well for cloud-based solutions crucial for analytics. Finally, the company's work on large multimodal models for complex data analysis is highly relevant. Persistent Systems' ability to navigate the regulatory landscape will be critical to the company's success. Demonstrating clinical value and regulatory compliance to win healthcare's trust alongside similar demands for life sciences will be the defining test for Persistent Systems as it stakes its claim in the medical imaging analytics space.

Conclusion

Medical imaging analytics is transforming healthcare by leveraging AI to unlock hidden potential within medical images. This leads to faster, more accurate diagnoses and improves patient care and outcomes. AI helps identify subtle patterns and abnormalities invisible to the human eye, aiding in more precise and timely diagnoses. Furthermore, AI-based algorithms predict potential outcomes based on medical images and other data sets, enabling personalized treatment strategies.

The use of AI in imaging analytics extends beyond image analysis to other steps of the radiology workflow, including scheduling, resource allocation, triaging, and reporting. This integration presents opportunities to improve automation, speed, and accuracy, improving outcomes and cost savings. The increasing demand for imaging and a strained healthcare workforce underscore the need for efficient analysis and streamlined workflows, which AI-powered solutions address by minimizing human error and expediting diagnoses. However, several challenges must be addressed to fully realize AI's benefits in medical imaging. These include the availability of high-quality

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labeled data, the generalizability and reliability of AI algorithms, integration with existing healthcare infrastructure, and potential biases and disparities in AI performance. In addition, regulatory, security, and privacy challenges must be tackled to establish trust and ensure the safe and effective use of AI in medical imaging.

As AI evolves and regulatory hurdles are addressed, medical imaging analytics is poised to become an indispensable tool for improved diagnostics, ushering in a new era of personalized medicine and preventative care. The future of healthcare is undeniably intelligent, and medical imaging analytics stands at the forefront of this exciting transformation.

About the Analyst



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Mutaz Shegawi leads the provider research practice at IDC Health Insights covering topics of most relevance to healthcare provider organizations looking to digitally transform and become more digitally native than their competition. Mutaz advises the executive, clinical, and technical leadership of the world's foremost health information technology supplier and buyer organizations by producing data-driven research and thought leadership insights that help navigate strategic challenges in health information technology and transform complexity to clarity in decision-making that would decrease costs, enhance quality, optimize access, improve patient safety, and champion patient experience.

MESSAGE FROM THE SPONSOR

With more than 30+ years of rich legacy in data systems and digital engineering leadership, Persistent is the ecosystem orchestrator of choice across a variety of AI platforms. We bring IPs, accelerators, and investments backed by deep domain knowledge and 16,000+ diverse, AI-ready talent to provide game-changing AI-powered solutions for our clients.

At Persistent, our goal is to help our clients utilize AI through connections to a variety of enterprise data sets for scalable solutions that adhere to all security, privacy, and governance requirements. Examples of our GenAI-based solutions include:

- » Helping a large US Pharma leader accelerate proposal response time by 90% with a GenAI-based solution
- » For a world leader in the development of drugs for cancer treatment, we helped accelerate Clinical Trial Protocols with Google Cloud and Generative AI
- » Enabled Generative AI-Powered Patient Case Reviews on Google Cloud for a US-based multinational healthcare corporation

For more details, please visit <https://www.persistent.com/ai/>.



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