What Are the Training Requirements for AI Medical Imaging Systems?

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Abstract

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Artificial intelligence (AI) is a transformative force in healthcare, particularly in medical imaging. AI technologies are enhancing diagnostic performance, improving efficiency, and elevating patient satisfaction [1]. As AI's role expands, health professionals must be equipped with the knowledge and skills to use these systems effectively and safely. This article outlines the essential training requirements for AI medical imaging systems, based on recent academic research and professional recommendations.

The Need for Standardized AI Education

The integration of AI into clinical practice has led international regulatory and professional bodies to advocate for standardized AI education. The Medical Radiation Practice Board of Australia (MRPBA), the UK's Society and College of Radiographers (SCoR), and the American Society of Radiologic Technologists (ASRT) all recommend mandatory AI training in undergraduate curricula [1].

The Topol Review, a key report in this field, recommended that by 2024, education providers should ensure that genomics, data analytics, and AI are prominent in healthcare professionals' undergraduate curricula. The report emphasized that future healthcare professionals must understand the capabilities of digital healthcare technologies, as well as their ethical and patient safety implications [1].

Core Components of an AI Medical Imaging Curriculum

To meet the demand for AI-proficient healthcare professionals, a structured curriculum is essential. A proposed modular framework for AI education in medical imaging includes modules on Data Science Fundamentals, Machine Learning, AI Ethics and Patient Safety, Governance and Regulation, AI Tool Evaluation, and Clinical Applications [1]. This modular approach allows for the longitudinal integration of AI concepts throughout a degree program, combined with hands-on experience and work-integrated learning. This ensures that students develop a thorough understanding of AI principles, the skills to use AI tools effectively, and the ability to critically evaluate their implications.

The Critical Challenge of Training Data

One of the biggest hurdles in developing and implementing AI algorithms is the availability of large, curated, and representative training data. The performance of AI models is heavily dependent on the quality and quantity of the data they are trained on. However, preparing medical imaging data for AI development is costly and time-consuming [3].

The main challenges with training data are data scarcity, the time and expertise required for data curation, and the poor generalization of algorithms trained on limited or biased datasets. To address these challenges, new approaches like **federated learning** are being explored. In a federated learning model, data remains at the local institution, and the AI model is sent to the data for training. This approach helps overcome data privacy and security concerns while enabling the development of more robust and generalizable AI models [3].

The Role of Educators and Higher Education Institutions

While medical imaging educators are aware of the importance of AI, there is a gap in their preparedness to deliver AI-related content. A recent survey found that many educators feel they lack the necessary support from their higher education institutions (HEIs) to effectively integrate AI education into their curricula [2].

To bridge this gap, HEIs must prioritize the development of AI-focused curriculum resources and provide professional development opportunities for educators. A collaborative, multidisciplinary approach involving educators, clinicians, and industry professionals is essential for maintaining an up-to-date and relevant curriculum that prepares future radiographers for the evolving technological landscape [1, 2].

Conclusion

The integration of AI into medical imaging offers both opportunities and challenges. To harness the potential of AI while ensuring patient safety and quality of care, a comprehensive and standardized approach to education is essential. This includes a robust curriculum covering AI fundamentals, data management challenges, and the ethical and regulatory implications of these technologies. Furthermore, higher education institutions must support their educators in developing the skills and resources to deliver high-quality AI

education. By investing in the training of our future health professionals, we can ensure they are well-equipped to navigate the complexities of an AI-driven healthcare landscape.

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