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Editorial

Revolutionizing Radiology: The Role of Large Language Models

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Since Roentgen's discovery of X-ray, radiology as a specialty has grown by leaps and bounds, with an increasing number of imaging studies, including radiographs, computed tomography (CT) scans, and magnetic resonance imaging (MRI) scans. With radiology being one of the most technologically driven medical specialties, artificial intelligence (AI) driven adjuncts have already made great inroads and are revolutionizing how radiologists interpret and report imaging studies. In this context, large language models (LLMs) have also started entering various realms of radiological practice. LLMs are AI-driven computer programs that primarily involve text analysis and text generation based on deep learning methods.[1,2] Over the last few decades, LLMs have evolved markedly for use in real-world scenarios, thanks to the background data on which these systems have been pretrained.

LLMs can assist radiology units in optimizing workflows with the huge number of requests for imaging being automatically screened and prioritized for early scheduling based on clinical requests. They can save time for radiologists in being also able to summarize clinical details, including relevant laboratory investigations of patients from available documents of the patient giving us a better understanding of the patient's clinical background and differentials, thus ensuring we get a better background clinical perspective, with a resultant improved and useful imaging report generation. In this issue of the journal, there are articles evaluating LLMs in structured report generation in head and neck cancers and another on translating reports to native languages for a better understanding.

LLMs can also potentially change how radiology courses are taught effectively. They can generate explanations for specific imaging findings, including the entire clinico-patho-physiological aspects of imaging findings, which will ensure trainees develop the aptitude to ensure they grow into clinical radiologists rather than just basic "image interpreters."

Naturally, the challenges of LLMs are considerations that limit their free usage in all respects. Primarily, the reliability of data generated is a question that requires continuous supervision and validation since, invariably, LLM use would entail a critical component of patient care management decisions. The same was analyzed between various LLMs by Sarangi et al in pulmonary embolism.[3] Additionally, patient data privacy may also be an issue since these would involve the transmission of medical data over various platforms. Bias within the LLMs may also affect the generated response, which in turn depends on the background data on which the systems are trained. Hence, the applicability of LLMs across populations may be a concern, with Western data-driven ones being invalid when applied to an Indian subset, especially when it comes to medical use.

Certainly, LLMs will alter how a radiologist works. Undoubtedly, these will eventually improve efficiency in reporting and training the next generation of radiologists. These should not be seen as likely to replace human expertise, and the relationship should be mutual, ensuring better patient disease management. As LLMs continue to evolve, they will become indispensable in radiology catering to the specialty's ever-growing demands. However, like any new addition, their integration will entail better background data training and feedback, as well as addressing the ethical issues of data privacy with the framing of regulatory guidelines and security measures to ensure patient well-being as the primary goal.

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