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GUEST EDITORIAL

Special Section Guest Editorial: Global Health, Bias, and Diversity in AI in Medical Imaging

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Equity, diversity, and bias in artificial intelligence (AI), and the impact of AI on global health, and as a potential factor exacerbating existing inequities, continue to be of significant social concern and stated political and policy priorities.[1–3] While AI applications such as filtering and selecting job applicants, assigning loan risk, or selecting information individually tailored to social media feeds receive significant public and research attention, AI in medicine, and in particular medical imaging, has similar potential transformational benefits and concerns.

Our interest in curating a special issue dedicated to "Global Health, Bias, and Diversity in AI in Medical Imaging" began over two years ago, and the present collection of articles demonstrates not only topics of interest but also serves as a sort of documentation of what has transpired in the field during that time. The articles in this special issue of the *Journal of Medical Imaging* (JMI) cover a wide range of diseases and physiologies, including brain, chest x-ray, breast imaging, and retinal imaging. The latest deep learning techniques are covered, as are methods for measuring representativeness and characterizing bias in big data derived from medical imaging. Altogether, the special issue reflects the trajectory and general landscape of health equity studies in the context of artificial intelligence.

A notable change over the last two years has been the successful development and increased use of large language models, image generating models, and various forms of multimodal models, including vision-language models. We did not receive any papers in this domain, marking it as an area for us to monitor closely.

In a special issue dealing with bias, it is important to acknowledge our own biases. Despite the best efforts to reach far and wide, the representativeness of the contributions is partially driven by the choice of guest editors and by the reach and established constituency of JMI's contributors and consumers. We realize this is a limitation; while contributions span three continents, most contributions originate from the United States of America—where all guest editors are currently based.

Moreover, with the broad scope of the special issue, representativeness of topics is simultaneously broad and yet limited. Fundamental questions of access and availability, key elements of equity and global health when it comes to medical care, and medical imaging in particular, remain largely unaddressed. Further, research presented here raises several unanswered questions. What really is fairness and how far should one go to achieve it? For example, if fairness is defined as equal performance for diagnostic predictions across all subpopulations, should we be more satisfied with a "fair" AI algorithm for which performance is lower than for an AI that is "optimum" for some subpopulations? Should AI algorithms be separately trained on subpopulations to create population-specific AIs? How should protected features (such as race and sex) be handled particularly if new protected features are societally defined over time? How should one

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handle racial fluidity,[4] the concept that an individual's race may be imprecise, variable, or change over time according to different social situations? Understanding what constitutes a fair algorithm and examining biases from various perspectives is a complex task. As summarized by current research, we posit that the field needs to understand how bias is mitigated when using different training systems, such as federated learning or using novel datasets including synthetic data and embeddings.[5] We also need to consider the impact of unknown confounders in datasets collected from various groups, which may have missing data, and how that affects model performance across groups. Importantly, we need to rethink how we curate datasets and what information should be provided, especially if we aim to mitigate biases from shortcut learning,[6] an inherent property of deep learning model training.

These and other unaddressed issues and unanswered questions remain the subject of future research. The charge of this special issue is broad, and from inception, this special issue was always meant as a starting point, that we hope will be followed by more contributions. Together these will enrich the conversation and allow the medical imaging community to chart a just path, where the immense promise of AI in medical imaging will be developed, tested, and delivered in ways that diminish—rather than exacerbate or replicate—existing inequities. We hope the work collected here contributes and deepens the discussion on the implications of artificial intelligence in all aspects of medical imaging.

We extend our gratitude to the contributors and look forward to continued engagement with the research community as we strive to build upon these accomplishments in the ongoing pursuit of ethical, equitable, and diverse AI applications in medical imaging.

Disclaimer

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