An Analysis of Machine Learning Practices in Medical Imaging

(Technical Report)

Automation in Caregiving: Technology and Residential Care for the Aged in the United States

(Sociotechnical Research Paper)

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Preface

To develop useful and usable tools, designers must understand use cases and users' needs, goals, and environment. User-centered design and better communication between developers and users can improve healthcare, including medical imaging analysis and care for the aged.

Machine learning analysis in medical imaging can increase the accuracy, speed, and cost-efficacy of specialists' diagnoses, but poor performance and misleading results still limit its utility. To improve real-world performance, I propose greater transparency in data collection and algorithm development. Biases in training data and model evaluation can misrepresent the effectiveness of a proposed analysis tool. With transparent data and algorithms, researchers, medical specialists, and developers can make more informed decisions on ways to publicize and use machine learning models.

An aging US population and strained healthcare system capacity puts pressure on caregivers, physicians, patients, advocacies, and corporations to automate aspects of aged patient treatment. Automation can let doctors treat more patients, improve access to healthcare, and promote patients' independence. Yet such systems may also become excuses to assign caregivers excessive patient loads, compromise patient safety and privacy, and degrade interpersonal care in the treatment of aged patients. By supporting and augmenting human caregiving instead of displacing it, beneficial automation supports patient-physician relationships and better serves patients' diverse needs.