AAAI Bridge Program 2025: AI for Medicine and Healthcare

Jiayuan Zhu JIAYUAN.ZHU@ENG.OX.AC.UK
University of Oxford

Min Xu MXU1@CS.CMU.EDU
Carnegie Mellon University

Yueming Jin YMJIN@NUS.EDU.SG
National University of Singapore

Alex Novak ALEX.NOVAK@OUH.NHS.UK
Oxford University Hospitals NHS Foundation Trust

Sarim Ather SARIM.ATHER@OUH.NHS.UK
Oxford University Hospitals

Bartlomiej W. Papiez BARTLOMIEJ.PAPIEZ@BDI.OX.AC.UK
University of Oxford

Xiang Li XLI60@MGH.HARVARD.EDU
Massachusetts General Hospital & Harvard Medical School

Junde Wu JUNDE.WU@LINACRE.OX.AC.UK
University of Oxford

Abstract

The AI for Medicine and Healthcare bridge program at AAAI-25 was designed to address the critical gap between the rapid advancement of AI technologies and their effective integration into clinical practice. While AI has demonstrated significant success in medical imaging, diagnostics, and workflow automation, concerns regarding explainability, reliability, and clinical usability continue to hinder widespread adoption. The bridge program provided an interdisciplinary platform for AI researchers, clinicians, and industry experts to collaborate, exchange insights, and discuss strategies for developing AI-driven healthcare solutions that align with real-world medical needs. The event featured research paper presentations, paper poster sessions, and expert panel discussions. This paper provides an in-depth review of the key themes, challenges, and future directions that emerged from AI for Medicine and Healthcare bridge program at AAAI-25.

1. Introduction

Artificial Intelligence (AI) has increasingly become an integral component of modern healthcare, contributing to advancements in medical imaging, diagnostics, and decision support systems. Despite these developments, the adoption of AI in clinical practice remains a challenge due to issues related to trust, explainability, regulatory barriers, and usability. The AI for Medicine and Healthcare bridge program at AAAI-25 was established to foster collaboration between AI researchers and clinicians, ensuring that AI solutions are designed with clinical needs in mind. This paper summarizes the objectives, discussions, and key takeaways from the bridge program, outlining how AI can be effectively and ethically integrated into healthcare workflows to enhance efficiency and improve patient outcomes.

2. Bridge Program

2.1. Bridge Goal

The goal of the event was to bridge the gap between AI development and real-world clinical applications by fostering collaboration among AI researchers, healthcare professionals, and industry leaders. The program aimed to address key challenges such as improving AI explainability and transparency, aligning AI development with clinical needs, and mitigating ethical and regulatory concerns. A particular focus was placed on human-in-the-loop AI systems, where AI operates under clinician guidance to improve decision-making while ensuring patient safety. By facilitating discussions and knowledge exchange, the event sought to pave the way for AI solutions that are not only technologically advanced but also clinically viable and widely accepted in medical practice.

2.2. Bridge Area and Outline

This program encompassed several critical areas at the intersection of AI and medicine. A major theme of discussion was AI explainability and interpretability, which is essential for building clinician trust and ensuring that AI-driven decisions can be validated and understood by medical professionals. Another focal area was regulatory and ethical considerations, particularly how AI systems can meet strict medical compliance requirements while maintaining fairness and mitigating bias. The program also explored AI-driven medical documentation and workflow automation, highlighting how AI can reduce administrative burdens and enhance hospital efficiency. AI-based diagnostics and multimodal learning were discussed as key enablers of more accurate and comprehensive healthcare solutions, integrating imaging, clinical notes, and laboratory results to enhance decision-making. The challenge of data scarcity and generalizability was another significant concern, with discussions focused on how AI models trained on limited or biased datasets may fail in diverse clinical environments and potential solutions to improve robustness and fairness in AI-driven healthcare applications. The event featured a variety of sessions, including research paper presentations, paper poster sessions, and panel discussions. The research paper presentations and poster sessions showcased cutting-edge developments in medical AI, and the panel discussions facilitated dialogue on critical barriers to AI adoption.

2.3. Right Timing

The timing of our event was particularly relevant due to the increasing demand for AI solutions in healthcare and the growing concerns regarding workforce shortages in the medical field. According to the World Health Organization, 40% of its member states report having fewer than ten medical doctors per 10,000 people, with 26% having fewer than three. The African region faces an even greater disparity, with 22% of the global disease burden but only 3% of the world's healthcare workforce. AI has the potential to address these challenges by augmenting clinical workflows, automating routine tasks, and assisting in diagnostics. However, despite the growing acceptance of AI in medicine, the gap between technological capability and clinical adoption remains significant. This event aimed to reduce this gap by encouraging interdisciplinary collaboration, addressing regulatory hurdles, and promoting the development of AI systems that can be seamlessly integrated into clinical workflows while maintaining safety and effectiveness.

3. Bridge Impact

3.1. Community Building

One of the primary achievements of AI for Medicine and Healthcare was the establishment of a vibrant, interdisciplinary community dedicated to advancing AI for medicine and healthcare. The event attracted 154 registered participants from academia, hospitals, and the technology industry, reflecting a strong interest in collaborative AI-driven healthcare solutions. By bringing together AI experts, clinicians, regulatory specialists, and healthcare administrators, the program created an environment conducive to meaningful knowledge exchange and networking. Clinicians gained a deeper understanding of AI's capabilities and limitations, while AI researchers were exposed to real-world clinical challenges that could inform their future research directions. The interactive nature of the workshops and discussions facilitated the formation of new research collaborations and partnerships aimed at developing practical, clinically viable AI solutions.

3.2. Paper Presentations and Research Contributions

Our AI for Medicine and Healthcare bridge program's accepted papers cover a diverse range of topics relevant to AI-driven healthcare. Among the highlights were advancements in AI-driven diagnostics, including models designed to enhance the interpretability of clinical imaging through segmentation-based methods. Papers on trust and safety in AI-driven healthcare addressed challenges such as hallucination detection in AI-generated medical reports and bias mitigation in machine learning models. Additionally, several contributions explored the role of foundation models in medicine, including their potential for medical knowledge graph enhancement and their application in prescribing personalized treatments. AI applications in personalized medicine were also a focal point, with research on multi-modal deep clustering survival models and AI-driven integration of social determinants of health into patient risk assessments. The diversity of topics underscored the breadth of AI's impact on medicine and highlighted the ongoing efforts to enhance AI transparency, trustworthiness, and clinical utility.

3.3. Panel Discussion Insights

A dedicated panel discussion examined the challenges and opportunities associated with AI integration into clinical workflows. Panelists explored the role of AI in automating laboratory testing, including specimen processing, testing, and reporting, where traditional AI methods such as statistical learning and rule-based systems have been widely used. Discussions highlighted how neural networks have improved cell classification, while generative AI, despite its potential, has seen limited adoption due to concerns about reliability and validation. AI applications in radiology and pathology were identified as among the most mature, particularly in diabetic retinopathy screening and imaging-based disease detection. The panelists also discussed predictive models for ICU mortality, which are predominantly ML-based, and noted that AI-driven medical documentation tools, such as automated transcription and clinical note generation, are in the early stages and require further development to ensure accuracy and clinical oversight.

The discussion then shifted to major barriers preventing widespread AI adoption in clinical settings. A key concern was automation bias, where clinicians might over-rely on AI-generated outputs, leading to potential misdiagnoses or errors in decision-making. The panel emphasized that ensuring AI transparency and maintaining human oversight in high-risk scenarios is crucial

for patient safety. Explainability remained a central challenge, with deep learning models often functioning as "black boxes" that clinicians struggle to interpret. Ethical concerns were also a major theme, particularly biases in training data that could lead to disparities in healthcare outcomes. Panelists highlighted the necessity of using diverse, high-quality datasets to improve AI fairness and generalizability across different patient populations.

Regulatory and policy considerations were also explored, with discussions on the complexities and necessities of achieving clinical validation and securing regulatory approvals for AI-driven medical solutions. While AI has significantly improved operational efficiency in hospitals by automating administrative tasks, the panelists agreed that direct AI integration into clinical decision-making requires rigorous validation frameworks, ongoing monitoring, and transparent model development. The discussion also underscored the importance of industry and academic collaboration in creating standardized evaluation benchmarks for AI in healthcare.

The session concluded with a forward-looking discussion on AI's trajectory in medicine. While current applications are largely focused on administrative support and workflow automation, panelists predicted a gradual transition toward AI-assisted clinical decision support, particularly in multimodal AI models that integrate imaging, laboratory results, and history of patient encounters. They emphasized that successful AI adoption will depend on regulatory evolution, clinician trust, and the ability to demonstrate tangible improvements in patient outcomes through carefully validated AI systems. The panel provided valuable insights into the future role of AI in medicine, reinforcing the need for continuous interdisciplinary collaboration and responsible AI deployment in clinical practice.

4. Conclusion

The AI for Medicine and Healthcare bridge at AAAI-25 successfully brought together AI researchers, medical professionals, and industry leaders to address the critical challenges of AI adoption in healthcare. Through discussions on explainability, clinician trust, regulatory concerns, and ethical considerations, the program provided a roadmap for the responsible and effective deployment of AI in medicine. The event fostered valuable interdisciplinary collaborations and set the stage for continued research and policy initiatives aimed at ensuring that AI advancements align with real-world medical needs. This event demonstrated the importance of integrating diverse perspectives to create AI solutions that are not only technologically robust but also clinically meaningful and widely accepted in medical practice.