

DISSERTATION DEFENSE



Do June Min

Conversational Modeling for Healthcare Communication

Tuesday, June 3, 2025 2:00pm – 4:00pm 3725 Beyster Hybrid – <u>Zoom</u>

ABSTRACT: Effective communication is essential for achieving successful outcomes across a wide range of healthcare settings, including mental health counseling and long-term patient care. Conversational artificial intelligence (AI) holds immense potential to enhance this communication by improving accessibility, delivering consistent support, and assisting care providers in offering tailored, high-quality responses. However, current AI systems face significant challenges in this domain, particularly due to the complex, sensitive, and multimodal nature of healthcare interactions.

One of the primary challenges lies in the privacy-sensitive context of healthcare, which limits access to annotated datasets and contributes to data scarcity. This limitation makes it difficult to train robust models, especially in specialized domains. Additionally, a large portion of healthcare communication occurs through spoken language, making it crucial to accurately capture the rich and nuanced information embedded in the speech modality. Modeling structured expert behavior further complicates the task, as it requires understanding subtle conversational dynamics and emulating provider expertise.

This thesis introduces a cohesive framework to address these challenges and advance conversational AI for healthcare communication. To combat data scarcity, it proposes methods that leverage unlabeled data through dialog-aware pretraining and context augmentation, improving model adaptability in domain-specific scenarios. For better speech integration, the work explores automatic speech recognition evaluation and speech-augmented counseling models that incorporate paralinguistic features, ensuring that the full spectrum of speech-based signals is used effectively.

To support conversations with diverse and sometimes competing objectives, the thesis introduces templatebased reflective rewriting and dynamic optimization frameworks. These approaches enable systems to adapt in real time while remaining aligned with structured clinical goals. Additionally, tools for analyzing healthcare dialogues, such as models for counselor reflection scoring and multi-step strategy induction, provide actionable insights to support practitioner training and performance evaluation.

Together, these contributions bridge critical gaps in current conversational AI capabilities and help lay the foundation for more accessible, adaptive, and effective systems that can meaningfully support communication in healthcare.

CHAIR: Prof. Rada Mihalcea and Co-Chair: Veronica Perez-Rosas