

School of Health Information Science

Live Seminar

Developing and Evaluating a Human-Centered Retrieval-Augmented Generation Chatbot for Older Adults With Multimorbidity

Speaker: Juhye Choi

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Wednesday August 19 | 12:00pm Pacific

Juhye Choi is a PhD student at the College of Nursing, Chonnam National University. She is currently visiting the University of Victoria through an international collaborative research program. Her research interests include nursing informatics, chronic disease, digital health, and AI-based self-management support. She is particularly interested in approaches that help older adults and vulnerable populations more easily access healthcare services and reliable health information, and support their daily health management and healthcare decision-making. Her current research focuses on developing a human-centered, age-friendly AI chatbot based on public health information and evaluating its usability and performance.

Developing and Evaluating a Human-Centered Retrieval-Augmented Generation Chatbot for Older Adults With Multimorbidity

Aim(s): Vulnerable populations, including older adults with multimorbidity, often face barriers to obtaining timely and reliable health information. This study developed a retrieval-augmented generation (RAG)-based chatbot using authoritative health information from the Korea Disease Control and Prevention Agency (KDCA) and evaluated its usability and performance as a real-world health information support tool.

Methods: Major disease categories were selected based on healthcare utilization, severity, mortality, and prevalence. Disease-specific health information and public Q&A data from the KDCA were processed through document chunking and embedding to construct a vector database. The chatbot integrated a RAG-based retrieval system with GPT-4o. Experts conducted a heuristic evaluation based on Nielsen's usability principles to identify usability issues and areas for improvement. Adult users also completed the System Usability Scale (SUS) and user experience and satisfaction measures.

Results: Expert and user feedback led to shorter responses, improved readability through plain language, and prioritized presentation of key information. The mean SUS score was 71.43, indicating acceptable preliminary usability; the mean rating across nine user experience and satisfaction items was 4.40 out of 5. Performance scores were 0.98 for context precision, 0.80 for context recall, 0.78 for faithfulness, and 0.77 for answer relevancy. The semantic similarity F1 score was 0.89. Emergency referral recall was 1.00, with no under-triage and an over-triage rate of 0.26.

Conclusions: This study proposes a health information delivery model that combines evidence-based public health information provided by public institutions with generative AI technologies. By applying a RAG architecture to generate responses grounded in authoritative health information, this study offers a potential approach to mitigating reliability issues associated with generative AI in healthcare information services and contributes to expanding the use of AI-based health information systems in public health communication and digital healthcare services.

Keywords: Retrieval-augmented generation; health information; chatbot; public health; usability

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