AI-Driven Wound Care: Enhancing Access and Quality

Andrew Schroeder, MD[1,2], Jenna Altaii, BS[2], Leah Thomas, BS[2], Arnold Salzberg, MD[1,2], Chris Arena, Ph.D[2]

[1]Department of Surgery, Carilion Clinic - Virginia Tech Carilion School of Medicine, [2]Virginia Polytechnic Institute and State University

Background

Patients who attend regular wound clinic visits have a 25% lower readmission rate[1]. Traditional digital wound care solutions present a gap in offering consistent home monitoring for wound management[2-4]. There is a need for improved remote monitoring, patient empowerment, and efficient use of health care resources.

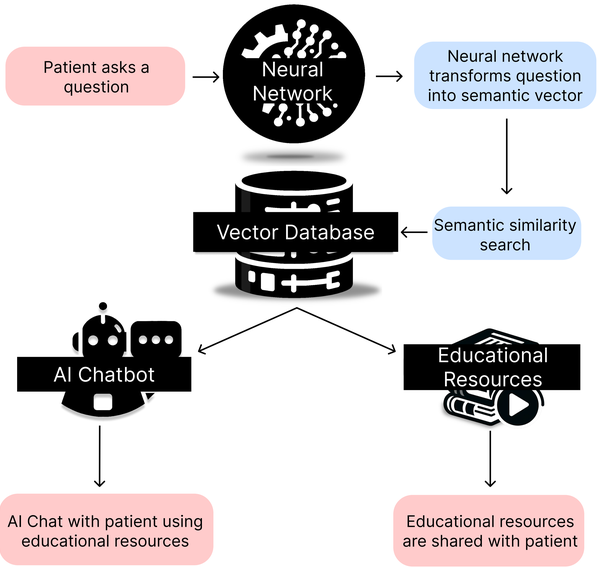


[2] [3] [4]

Current solutions lack tailored educational material[2], require external component[3], or use less robust image analysis tools[4].

Methodology

A database of common wound care conditions and therapies with detailed descriptions were augmented using a large language model (LLM) trained to generate logical statements in question, rationale, and answer format. We used this dataset to train an open-source LLM[5], which can be run locally allowing protection of private data. We implemented a Retrieval Augmented Generation (RAG)[6] pipeline to answer patient queries.



Our Solution: A home monitoring app that uses AI wound image assessment and tailored educational resources to address challenges in wound care management and education access.

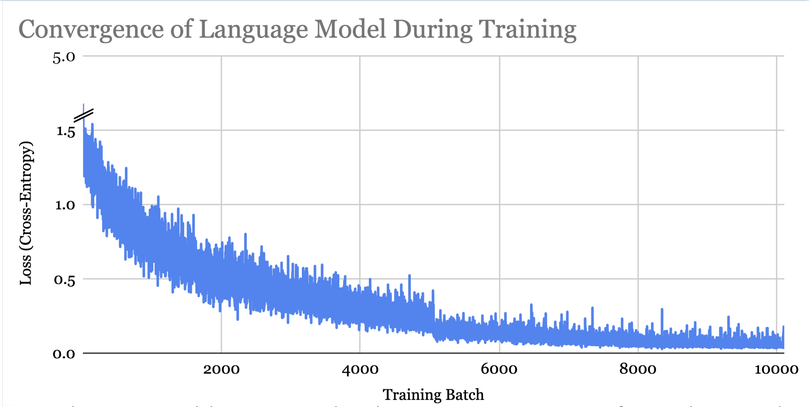


Fig 1. A decrease in model cross-entropy loss demonstrating convergence of LLM with outputs that better match training data

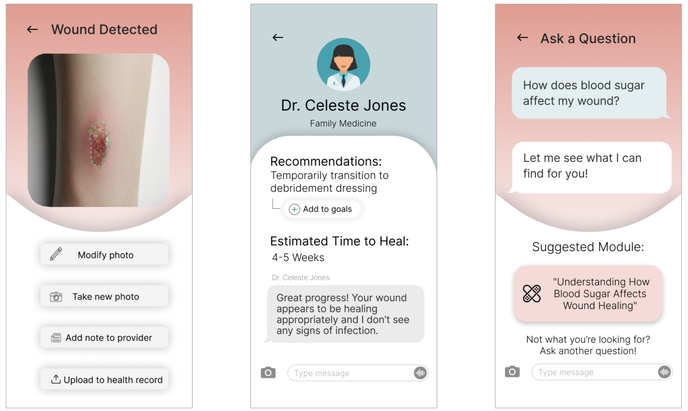
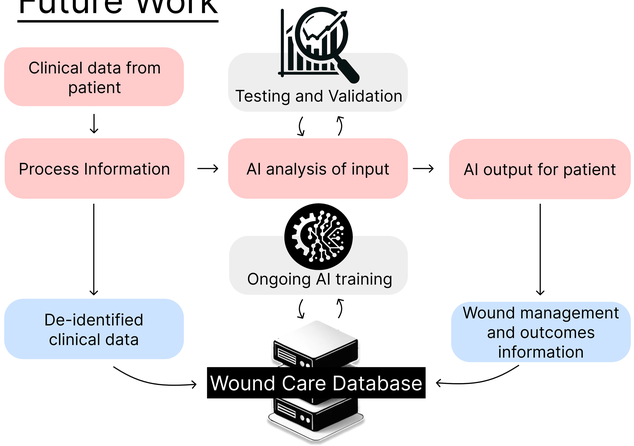


Fig 2. UI/UX design of mobile application for patient use of semantic search of educational database

Discussion

Our project uses AI to transform wound management, employing a conversational interface trained on wound care data. Through the use of an LLM and a vector database RAG pipeline, we enable remote monitoring and patient education, advancing personalized care. This system delivers dynamic, tailored educational content, enhancing patient engagement and empowerment in managing their conditions from home.

Future Work



We will expand the machine learning models' capabilities through an iterative improvement pipeline that allow the models to continue learning as they are used.

References: