Product (MedScribe)

Problem

In today's healthcare landscape, significant challenges impact both patient care and physician well-being. Physician burnout has reached public health crisis levels, with up to 78% of physicians experiencing burnout symptoms, significantly impeding healthcare delivery and physician satisfaction [1]. Furthermore, the overwhelming burden of managing Electronic Health Records (EHRs) consumes nearly 6 hours of a physician's workday, accounting for more than half of their total working time [2]. This inefficiency not only detracts from patient interaction but also contributes to the aforementioned burnout. Additionally, critical gaps in patient knowledge aggravate these issues, with only 37% of Americans aware of their family health history [3], and a shocking 40-80% of medical information relayed by healthcare professionals is forgotten immediately, with around 50% remembered incorrectly [4].

Solution

To address these pressing concerns, MedScribe employs the LLM Mistral 7B and LLaVA 1.5 7B models within its Generative AI framework to revolutionize healthcare documentation. This mobile platform not only facilitates real-time recording, categorization, and transcription of doctor-patient interactions but also automatically converts them into SOAP (Subjective, Objective, Assessment, Plan) notes, integrating these directly into the patient's record within the app. Additionally, the use of LLaVA 1.5 7B enhances AI-based diagnostic report analysis, further streamlining the medical documentation process. This comprehensive approach significantly reduces manual data entry, decreases the time physicians spend on Electronic Health Records (EHRs), improves the accuracy of medical data, and helps mitigate factors contributing to physician burnout.

Target Audience

The primary beneficiaries of MedScribe are healthcare professionals and hospitals aiming to optimize the documentation process and patient management. Additionally, patients benefit directly through improved access to their medical history, fostering better-informed healthcare decisions and personal health management.

Engineering

High-Level Design

The high-level design of MedScribe is crafted to ensure operational scalability and robust data security, critical for handling multiple simultaneous user interactions and protecting sensitive

medical information. The platform functions as a standalone system, specifically tailored to provide a seamless user experience in recording, categorizing, and transcribing medical interactions directly into standardized SOAP notes within its own app environment. This design choice simplifies implementation across various healthcare settings without the need for integration with existing healthcare infrastructures, thereby reducing complexity and enhancing reliability.

Role of Gen AI in this Project

Generative AI, specifically through the use of LLMs like Mistral 7B and LLaVA 1.5 7B, drives MedScribe's core functionalities. These models enable real-time transcription of doctor-patient dialogues, accurate medical image descriptions, and automated generation of SOAP notes, significantly improving the efficiency and accuracy of medical documentation for enhanced patient care.

Tools and Technologies

MedScribe uses Flutter for its mobile interface, PostgreSQL for data management, and LLMs like Mistral 7B, LLaVA 1.5 7B for AI tasks and DeBERTa V2 for prompt injection prevention. Whisper X handles speech-to-text diarization, while the GPTrim package compresses large inputs for memory efficiency. The platform, developed in Python and Node.js, is hosted on Google Cloud, utilizing Functions, Buckets, and Kubernetes Engine for scalability and performance. This combination provides a robust infrastructure to support modern healthcare needs.

Results and Analysis

MedScribe utilizes advanced AI models like Mistral 7B and LLaVA 1.5 7B to streamline healthcare documentation, efficiently processing various tasks within approximately 2 minutes. Speech to text with diarization completes in 40-50 seconds, image to text(for AI enabled diagnostic report insights and disease recognition) in about 9 seconds, and conversation to SOAP format in around 30 seconds. This rapid processing demonstrates MedScribe's capability to handle real-time data effectively, significantly enhancing medical record accuracy and reducing the administrative burden on healthcare professionals.

Going Forward

As of now, MedScribe is designed to work with English language interactions. In the future, we plan to extend support to Urdu to increase the accessibility of our platform. We also aim to integrate MedScribe with existing Electronic Health Records (EHRs) systems, which will streamline data management across healthcare platforms. To ensure that we continue to provide top-notch services, we'll keep updating our system with the latest and most accurate Large Language Models (LLMs) to maintain our edge in AI-driven healthcare solutions.

Citations

[1] M. H. Survey of America’s Physicians: Practice Patterns & Perspectives. https://physiciansfoundationorg/wp-content/uploads/2018/09/physicians-survey-results-final-2018pdf. 2018.
[2] Arndt, Brian G et al. “Tethered to the EHR: Primary Care Physician Workload Assessment Using EHR Event Log Data and Time-Motion Observations.” Annals of family medicine vol. 15,5 (2017): 419-426. doi:10.1370/afm.2121
[3]https://healthcare.utah.edu/healthfeed/2015/05/family-health-histories-we-know-theyrevaluable-so-why-dont-we-collect-them
[4] Kessels RP. “Patients' memory for medical information”. J R Soc Med. 2003 May;96(5):219-22. doi: 10.1177/014107680309600504. PMID: 12724430; PMCID: PMC539473.