PROJECT DESCRIPTION
AI-Powered Personal Health Record System - Medivise

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1 Introduction & Relevant Works

Personal Health Records (PHRs) have transformed healthcare by enabling centralized storage and access to patient information, improving continuity of care and patient engagement (Detmer et al., 2008) [1]. However, most patient-facing platforms remain largely passive, serving as data repositories that present medical information without interpretation or actionable guidance. This limits their potential to support proactive, patient-driven health management.
At the same time, recent advances in artificial intelligence—particularly in natural language processing (NLP) and predictive modeling—have shown strong capabilities in extracting valuable insights from both structured and unstructured clinical data. Large clinical language models such as GatorTron have demonstrated state-of-the-art performance in processing complex clinical narratives, enabling richer understanding of patient histories (Yang et al., 2022) [4]. Furthermore, AI systems have achieved high accuracy in predicting chronic disease risks from longitudinal health records, highlighting their potential to support preventive care (Shickel et al., 2018) [3].
Despite these technological advances, patient-accessible health record systems rarely integrate AI to provide personalized, context-aware recommendations (Rastogi & Zaki, 2020) [2]. Few solutions combine structured data, unstructured clinical notes, and patient-generated health information into a unified, intelligent guidance platform. Medivise addresses this gap by offering an AI-powered system that not only stores and secures medical data but also analyzes it to deliver tailored health recommendations. By applying NLP, predictive analytics, and knowledge-based reasoning, Medivise transforms static health records into a dynamic personal health advisor, empowering individuals to make informed decisions and improving long-term health outcomes.

2 Problem Description

2.1 Overview

Current PHRs systems primarily serve as static repositories, allowing patients to store and retrieve their medical data but offering limited functionality for interpretation or guidance. This leaves a gap between data access and actionable health insights, especially for individuals without medical expertise. With the growing availability of structured health data, unstructured clinical narratives, and patient-generated information, there is a significant opportunity to apply artificial intelligence to transform PHRs into proactive health management tools.
Medivise is designed as an intelligent, AI-powered platform that securely stores patients' medical records and analyzes them to deliver personalized, context-aware health recommendations. By integrating the advancements of AI, Medivise aims to empower patients to make informed decisions and engage more actively in preventive care.

2.2 Objectives

- Provide a secure platform for storing structured and unstructured medical data.
- Generate actionable guidance tailored to the patient's health status.
- Use AI models to predict potential health risks and alert patients for early intervention.
- Ensure accessibility and ease of use for individuals with varying levels of technical and health literacy.
- Develop an intuitive, visually clear, and friendly web interface to encourage engagement and trust.

2.3 Core Components

2.3.1 Data Acquisition and Integration

- Import data according to standardized protocols.
- Ingest unstructured data such as clinical notes.

2.3.2 Data Storage and Security

- Use encrypted databases (e.g., PostgreSQL) for structured health data.
- Implement access control, audit logging, and role-based permissions.

2.3.3 AI-Powered Analysis and Recommendation Engine

- Apply large clinical language models to extract key findings from unstructured clinical narratives.
- Build models to forecast disease risk and recommend preventive measures.
- Integrate medical guidelines and patient-specific context to produce personalized lifestyle and treatment recommendations.

2.3.4 Frontend and Backend Systems

- Frontend: Web-based UI for inputting and viewing health data and receiving recommendations.
- Backend: API services to handle data ingestion, AI processing, and secure communication between components.

2.3.5 Monitoring and Maintenance

- Real-time performance tracking of AI models and system operations.
- Continuous model updates using new patient data while preserving privacy.

3 Deliverables

- **Functional Web Application:** A fully operational web-based system that allows patients to securely store, view, and manage their medical records, and receive AI-generated personalized health recommendations. The interface will be intuitive, visually clear, and user-friendly to ensure accessibility for individuals with varying levels of technical literacy.
- **Integrated AI Recommendation Engine:** A deployed AI pipeline combining NLP for unstructured clinical text processing, predictive analytics for risk assessment, and knowledge-based reasoning for generating actionable health advice tailored to each patient.
- **Secure Data Storage Infrastructure:** An encrypted database for data (e.g., PostgreSQL) with full implementation of role-based access controls and audit logs.
- **Comprehensive Technical Documentation:** A detailed set of documents covering system architecture, data schema, AI model design, deployment steps, API specifications, and user manuals to support future development and maintenance.

4 Work Schedule

- **In weeks 1 to 2**, finalize requirements, design system architecture, and set up the database and secure storage. Implement initial pipelines for importing structured and unstructured health data.
- **In weeks 3 to 4**, develop AI components, including NLP for clinical text and predictive models for risk assessment. Build backend APIs with authentication, encryption, and recommendation delivery.
- **In weeks 5 to 6**, design and implement a user-friendly web interface, integrate frontend with backend APIs for real-time recommendations, conduct testing, optimize performance, and deploy the system to a secure hosting environment. Finalize documentation and ready for final presentation.

References

[1] Don Detmer, Meryl Bloomrosen, Brian Raymond, and Paul Tang. Integrated personal health records: Transformative tools for consumer-centric care. *BMC Medical Informatics and Decision Making*, 8(1), Oct 2008. doi: https://doi.org/10.1186/1472-6947-8-45.

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