Unified Medical System for India with Early Disease Outbreak Detection

1. Abstract

This project proposes a comprehensive unified medical system for India. It integrates data sharing, appointment booking, medical record access, and a patient support chatbot. Additionally, the system utilises machine learning to detect potential outbreaks of viral diseases and pandemics at an early stage by analysing patient symptoms collected from various regions. This unified approach aims to improve public health outcomes in India by facilitating efficient healthcare delivery, data-driven disease surveillance, patient empowerment, and improved patient education through a chatbot interface.

2. List of Users

- **Patients (All Citizens):**
    - Register and manage profiles
    - Book appointments with healthcare providers
    - Access and manage personal medical records
    - Download medical certificates
    - Log symptoms for disease outbreak detection
    - Interact with the patient support chatbot for basic medical guidance and appointment scheduling
- **Doctors:**
    - Register and manage profiles
    - Secure access to patient medical records (with patient consent)
    - Manage appointments
    - Exchange data with other healthcare providers within the system (adhering to data privacy regulations)
    - View potential disease outbreak information (restricted access level)
- **Hospitals:**
    - Register and manage profiles (hospital administration)
    - Manage appointments for their doctors
    - Access anonymized data for internal analytics (with proper authorization)
    - View potential disease outbreak information (restricted access level)
- **Admins:**
    - System administrators with the highest level of access
    - Manage user accounts and access levels
    - Monitor system performance and security
    - Oversee data privacy and compliance
- **Main Users with Access to Health Symptoms and Outbreak Findings (Restricted Access):**
    - Public health officials
    - Epidemiologists
    - Authorised researchers (with additional access controls)

3. List of Modules to be Developed

- **Patient Portal:**
    - User registration and login
    - Appointment booking and management
    - Secure access to personal medical records (including prescriptions, lab results, medical history)
    - Downloadable medical certificates
    - Symptom logging for disease outbreak detection

- **Healthcare Provider Portal:**
    - User registration and login (for doctors, nurses, etc.)
    - Secure access to patient medical records (with patient consent)
    - Appointment management
    - Data exchange with other healthcare providers within the system (adhering to data privacy regulations)

- **Unified Health Data Platform:**
    - Standardised data storage for medical records
    - Secure data exchange between patient portals, healthcare provider portals, and disease outbreak detection module
    - User authentication and authorization

- **Disease Outbreak Detection Module:**
    - Real-time data collection and analysis of patient symptoms from various regions
    - Machine learning algorithms for anomaly detection to identify potential disease outbreaks
    - Alert generation for public health authorities

- **Patient Support Chatbot:**
    - Answer frequently asked medical questions
    - Guide patients towards appropriate resources within the system (e.g., booking appointments, symptom logging)
    - Provide basic health information and self-care guidance

- **Additional Features (to be explored):**
    - Telemedicine integration for remote consultations
    - AI-powered chatbots for patient self-service and basic medical guidance

4. References of Similar Features

- **Unified Health Interface (UHI):** India's Ayushman Bharat Digital Mission (ABDM) initiative with UHI can serve as a foundation for data sharing within the system https://uhi.abdm.gov.in/.
- **HL7 FHIR:** A standard format for healthcare data exchange can be adopted for data standardisation within the platform https://hl7.org/.

5. Unique Features

- **Pandemic/Viral Disease Early Detection:** This system leverages machine learning for real-time analysis of patient symptoms to detect potential outbreaks at an early stage.
- **Easy Health Data Transfer:** Secure data exchange between healthcare providers facilitates seamless patient care transitions.
- **Patient-Centric Design:** Patients have easy access and control over their medical records, empowering them to manage their health information.
- **AI-powered Chatbot for Patient Support:** The chatbot provides patients with convenient access to basic medical guidance and assistance navigating the system.

CURRENT TECH STACK:

frontend: Bootstrap, Jinja

Backend: Flask Server and API,

Database: MongoDB (NoSQL)