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AI-Driven Disease Risk Assessment & Warning System

Problem Statement

In many parts of India, disease outbreaks such as dengue, malaria, typhoid, and viral fevers are detected too late, once hospitals are already overwhelmed and infection has widely spread. At the same time, individuals experiencing early symptoms lack access to accurate real-time medical guidance, often relying on online search or misinformation, leading to delayed diagnosis and treatment.

Currently:

- No integrated system exists that combines:
    - Personal symptom analy**sis** for early disease detection
    - Regional outbreak prediction for community-level prevention.
- Medical facilities lack AI-based tools to predict local disease trends from weather, sanitation, and population data.
- Citizens do not have simple digital tools for assessing disease risk or receiving personalized healthcare advisory.

Proposed Solution

The proposed solution is to develop an AI-powered integrated healthcare platform that combines a Disease Symptom Checker Chatbot with an Epidemic Outbreak Prediction System to provide both individual-level medical guidance and community-level disease monitoring. Users can input symptoms through a web or chatbot interface, where NLP-based ML models (BERT / supervised classifiers) analyze the text to predict likely diseases, severity risk scores, and immediate care recommendations. Simultaneously, the system processes regional datasets including weather parameters, sanitation indicators, population density, and historical disease case records using spatiotemporal machine-learning models to forecast outbreak trends and identify high-risk zones on a GIS-based interactive dashboard. The integrated platform enables early disease detection for individuals while supporting public health authorities with real-time alerts, hotspot mapping, and outbreak forecasting, helping to reduce response delays, improve preventive healthcare planning, and minimize the impact of epidemic spread.

Tech Stack

1 AI / ML Layer

- Python
- PyTorch / TensorFlow
- Scikit-learn
- HuggingFace Transformers (BERT)
- Pandas, NumPy

2 Backend

- Flask

3 Database

- SQLlite

4 GIS & Visualization

- Chart.js
- Leaflet.js

5 Frontend

- HTML/CSS + JS

6 Chatbot Platforms

- Web chatbot widget
- Telegram Bot API

7 Data Sources

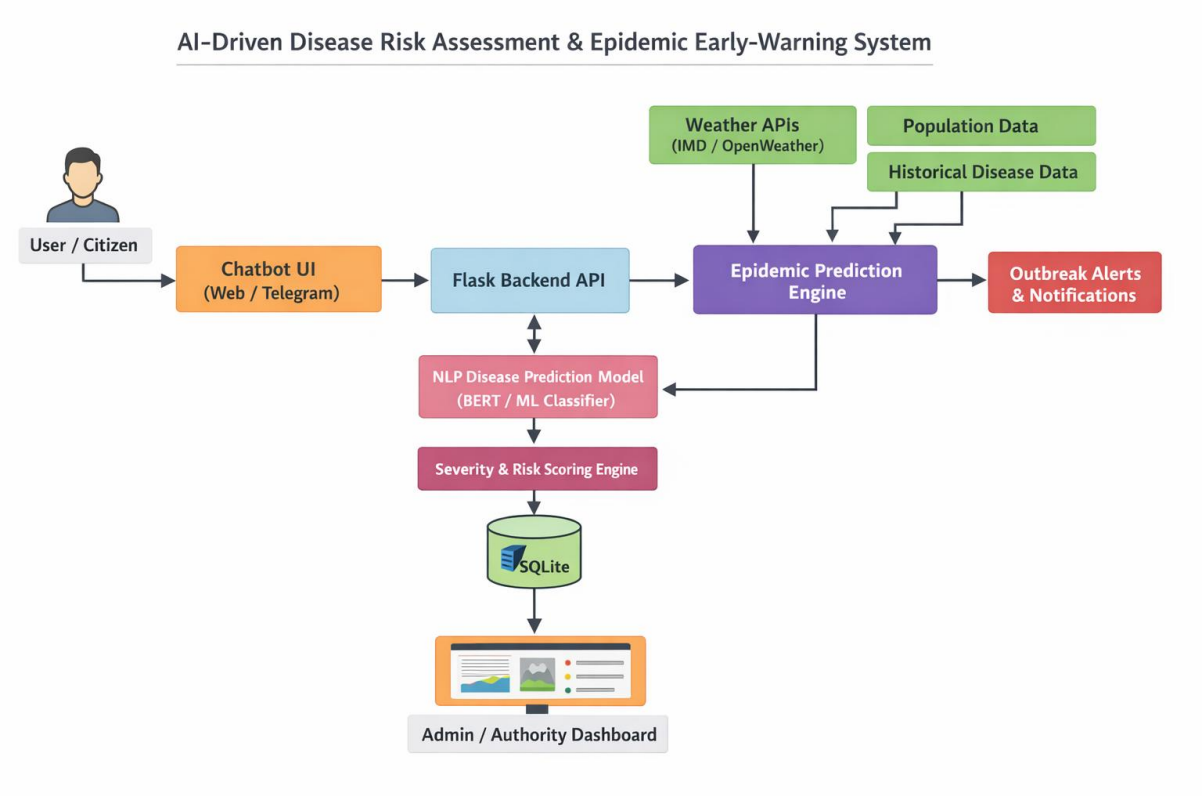
- IMD / OpenWeather APIs
- Kaggle disease datasets
- WHO / public health open portals

Software Requirements

The proposed system requires a Python-based software environment to support AI/ML processing, backend services, and user interaction. The backend will be developed using Flask, which will handle API requests, chatbot communication, and integration of machine-learning models. SQLite will be used as a lightweight local database to store user symptom inputs, prediction results, outbreak forecasts, and historical records.

For AI/ML functionality, the system requires Python ML libraries such as Scikit-learn, Pandas, NumPy, and HuggingFace Transformers (BERT) for disease classification, severity assessment, and outbreak prediction. The frontend can be implemented using HTML, CSS, JavaScript or ReactJS, along with Chart.js and Leaflet.js for data visualization and GIS-based outbreak mapping. External data integration requires access to public weather and health APIs, while the application should run on a standard OS (Windows/Linux) with a modern web browser. This software stack ensures scalability, ease of development, and suitability for a prototype.

Architecture Diagram



Project Highlights

- Combines personal healthcare AI + epidemic analytics
- End-to-end AI platform — not just prediction models
- Real-world preventive healthcare focus
- Social impact + emergency response utility

GitHub Link

https://github.com/Aditya-Sachan-Git/AI-Driven-Disease-Risk-Assessment-Warning-System