

HealthWise

1 Problem Identification and Description

Modern societies face a significant challenge in combating the rapid spread of infectious diseases, which often outpaces the capabilities of current detection and control measures. The lack of an integrated real-time symptom monitoring system hinders the ability to quickly identify and manage potential epidemic outbreaks.

There is also a notable absence of user-friendly tools for symptom reporting and preliminary assessment. This gap impedes efficient data collection and analysis, critical for public health decision-making. A comprehensive solution is required to facilitate the collection, analysis, and visualization of symptom data across various locations while supporting health services in identifying and responding to epidemic threats in a timely manner.

2 Stakeholders

The key stakeholders involved in the proposed solution include:

- **Health Authorities:** Epidemiological institutions, health ministries.
- **Local and National Governments:** Decision-makers in public health policies.
- **Researchers and Scientists:** Experts in epidemiology and data analysis.
- **Emergency Service Workers:** Medical teams and first responders.
- **Patients:** Individuals experiencing symptoms.
- **Healthcare Providers:** Doctors and clinics.
- **Medical Data Providers:** Health databases, apps.
- **Epidemiology Specialists:** Data analysts and modelers.

3 Applications

The envisioned system will serve multiple purposes:

1. Conducting preliminary diagnoses based on reported symptoms.
2. Assisting medical professionals in diagnosing patients.
3. Recommending specialists to users based on symptoms.
4. Identifying and localizing infectious disease outbreaks.

4 Proposed Solution

To address the identified challenges, we propose an innovative system that enhances early identification and management of potential epidemic hotspots. The system comprises the following features:

- **Symptom Reporting:** Users can report symptoms through an intuitive, natural language interface, enabling preliminary medical assessments without the need for direct healthcare visits.
- **Health Data Collection and Analysis:** User-provided data will be stored and analyzed in real-time to identify patterns of illness across locations.
- **Support for Health Authorities:** The system will offer valuable insights to healthcare institutions, aiding in monitoring epidemiological trends and making informed decisions.
- **Feedback and Recommendations:** Users will receive guidance on the next steps, such as consulting a specialist or visiting a nearby medical facility.

This system promises not only to improve individual health management but also to empower health services to respond to public health crises effectively, contributing to overall public health and epidemiological safety.

5 Proposed Architecture

The system will employ a multi-agent architecture powered by large language models (LLMs). This setup allows for efficient task delegation among specialized modules, enhancing data processing and analytical capabilities. LLMs enable the system to better understand user intentions and adapt to dynamic conditions.

The core agents in the system include:

- **Chatbot Agent:** Engages users in conversations, considering their history of interactions.
- **Validation Agent:** Analyzes user messages, normalizes symptoms, and requests location data if necessary.
- **Advisory Agent:** Recommends medical specialties and provides initial medical insights to the Chatbot Agent.
- **Data Analysis Agent:** Identifies trends in symptom reports and alerts relevant authorities to potential outbreaks.
- **Visualization Agent:** Maps outbreaks by symptom patterns and geographic location.

6 Potential System Extensions

Future enhancements to the system may include:

- **Epidemic Forecasting Agent:** Predicts the spread of outbreaks and models potential future scenarios.
- **Integration with Medical Facilities:** Enabling data sharing to improve case analysis and forecasting.
- **Healthcare Recommendations:** Suggesting nearby medical facilities based on user location and reported symptoms.

7 Functional Requirements

- **Symptom Reporting:** A user-friendly interface for reporting symptoms.
- **Health Data Analysis:** Real-time data processing to identify patterns.
- **Healthcare Support:** Providing actionable insights to medical institutions.
- **User Guidance:** Delivering personalized recommendations.

8 Non-Functional Requirements

- **Scalability:** Capable of handling a large user base simultaneously.
- **Security:** Compliance with data protection regulations.
- **Availability:** Operational 24/7.
- **Usability:** Intuitive user interface design.

9 Technical Requirements

- **LLM Integration:** Leveraging large language models for data analysis and user interaction.
- **Multi-Agent Architecture:** Modular design for efficient task management.

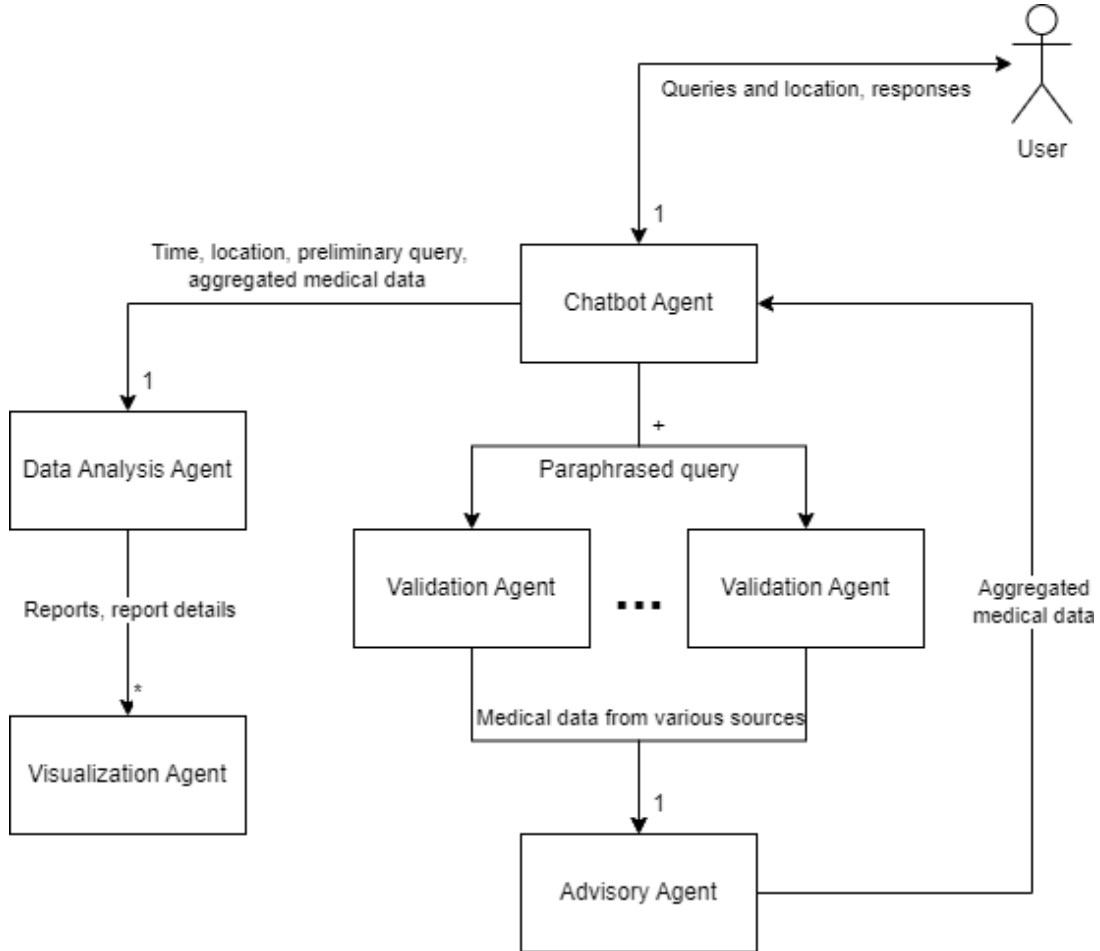
10 Stakeholder Requirements

- **Healthcare Authorities:** Access to timely and actionable data.
- **End Users:** Easy-to-use system for patients and healthcare providers.

11 Roles and Interactions

Key roles within the system include:

- **Users:** Report symptoms and receive feedback.
- **Chatbot Agent:** Interacts with users and coordinates with other agents.
- **Knowledge Agents:** Retrieve relevant medical data from various sources.
- **Aggregator Agent:** Combines data from knowledge agents into actionable insights.
- **Medical Data Analyzer:** Stores and processes detailed reports for visualization.
- **Administrator Frontend:** Visualizes outbreak data and enables deeper analysis.



12 Conclusion

This real-time infectious disease monitoring system has the potential to significantly enhance the detection and control of epidemic outbreaks. By leveraging advanced technologies and fostering collaboration among stakeholders, it offers a scalable and secure solution to improve public health outcomes.