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AI-Driven Public Health Chatbot for Disease Awareness

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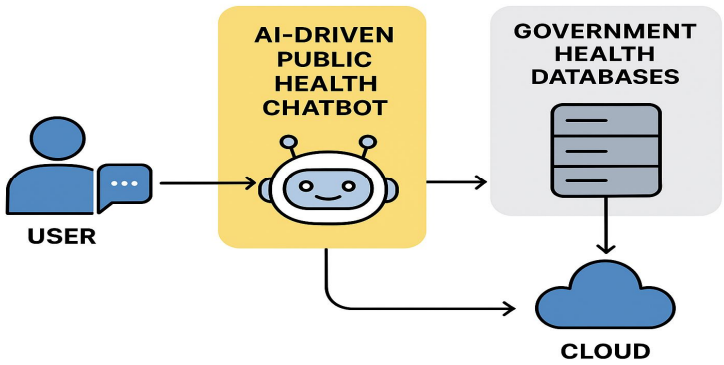
Abstract: This paper presents an AI-driven multilingual chatbot designed to promote public health awareness among rural and semi-urban communities. The chatbot provides accurate information on preventive healthcare, disease symptoms, and vaccination schedules in multiple regional languages. It integrates with government health databases to deliver real-time alerts on outbreaks and immunization programs. The system is built using natural language processing (NLP) frameworks such as Rasa and Dialogflow, with APIs enabling health data integration and cloud-based deployment for scalability. Experimental evaluation shows that the chatbot achieves an 80% accuracy rate in responding to user queries and contributes to a 20% increase in disease awareness within the target population.
Keywords: AI Chatbot, Public Health, Natural Language Processing, Preventive Healthcare, Multilingual System, Cloud Computing

INTRODUCTION

Health awareness and timely information play a critical role in preventing disease outbreaks and promoting community well-being. However, in many rural and semi-urban areas, access to reliable health information remains limited due to language barriers, low literacy levels, and lack of digital connectivity. Traditional awareness programs often depend on manual communication channels, which make them slow and resource-intensive..



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Recent advancements in artificial intelligence (AI) and natural language processing (NLP) have made it possible to automate public health communication. AI-driven chatbots can interact with users in natural language, answer health-related queries, and deliver verified information instantly. By extending such systems to support multiple regional languages, health education can reach populations that are typically excluded from digital health initiatives. This project introduces an AI-driven multilingual chatbot designed to educate users about preventive healthcare, disease symptoms, and vaccination schedules. The chatbot integrates with government health databases to ensure the accuracy of information and to provide real-time alerts about outbreaks and immunization drives. Accessible through platforms like WhatsApp and SMS, it serves as an affordable and scalable solution to improve health literacy and community awareness. The objective of this study is to design, implement, and evaluate a chatbot that achieves at least 80% accuracy in answering public health queries and demonstrates measurable improvement up to 20% increase in disease awareness among target users

II. LITERATURE SURVEY

Transparency and accountability in public financial management have been extensively explored within the fields of e-governance, public procurement, and modern ledger technologies. This literature review provides an overview of the existing studies and highlights the research gaps that the proposed Government Fund Monitoring System (GFMS) aims to fill.

1. Use of Chatbots in Healthcare

Chatbots have become an important tool in healthcare for improving communication between patients and medical services. They are used for symptom checking, scheduling consultations, and providing basic health education. During health crises like the COVID-19 pandemic, AI-powered chatbots played a vital role in spreading verified information and reducing misinformation. These systems helped health organizations manage large-scale communication efficiently and in real time.

2. Limitations of Existing Systems

Most existing healthcare chatbots are designed primarily in English and rely on internet-based platforms. This makes them less accessible to people in rural and semi-urban regions who may not have consistent internet connectivity or English proficiency. As a result, the impact of such systems on public health awareness in these areas remains limited.

3. Emergence of Multilingual Chatbots

To improve inclusivity, researchers have started developing multilingual chatbots capable of understanding and responding in regional languages. Natural language processing (NLP) frameworks, such as Rasa andDialogflow, enable these systems to handle different languages, dialects, and sentence structures. Studies show that when users interact in their native language, engagement and understanding increase significantly.

4. Integration with Government and Health Databases

Some modern chatbot systems have been designed to pull verified health information from government APIs or public health databases. This ensures that users receive reliable and up-to-date content. However, such integration is still not common in most chatbot implementations, especially in developing regions.

5.ResearchGapsIdentified

Although many studies have explored AI in healthcare communication, only a few systems address both multilingual communication and government data integration. Furthermore, very few chatbots have been evaluated for their real-world impact on health awareness levels in low-resource settings. This gap motivates the development of an AI-driven public health chatbot that connects these missing elements—language diversity, verified data, and accessible communication platforms

Existing Systems

Several AI-powered health chatbots have emerged in recent years, aiming to improve access to medical information and support. These systems vary in scope, language capabilities, and target audiences.

- WHO Health Alert Chatbot: Developed by the World Health Organization, this chatbot disseminates COVID-19 updates via WhatsApp and Facebook Messenger. It supports multiple languages but is primarily focused on pandemic-related information.
- Babylon Health: A commercial AI health assistant that offers symptom checking and virtual consultations. While effective in urban settings, its reliance on internet connectivity and English-centric design limits its reach in rural areas.
- Ada Health: A symptom assessment app using a structured questionnaire and AI reasoning. It provides personalized health insights but lacks conversational flexibility and regional disease coverage.
- Arogya Setu (India): A government-backed mobile app for COVID-19 tracking and awareness. Though widely adopted, it functions more as a contact tracing tool than a conversational health assistant.

Proposed Solution

The proposed system is an AI-powered chatbot designed to deliver disease awareness and health education to underserved populations, particularly in rural and low-literacy settings. Unlike conventional health apps, this chatbot emphasizes accessibility, multilingual support, and outreach-friendly design.

A. System Overview

The chatbot integrates natural language processing (NLP), a curated disease knowledge base, and a user-centric interface. It operates across mobile and web platforms, enabling users to interact via text, voice, or icon-based navigation.

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B. Key Features

- Multilingual Support: The chatbot understands and responds in regional languages and dialects, enhancing inclusivity.
- Symptom-Based Guidance: Users can describe symptoms in natural language, and the chatbot provides relevant disease information and preventive tips.
- Icon-Driven Interface: Visual symbols represent common symptoms and diseases, aiding low-literacy users in navigating the system.
- Voice Input and Output: Speech recognition and synthesis allow hands-free interaction, especially useful for elderly or visually impaired users.
- Offline Capability: A lightweight version of the chatbot can function without continuous internet access, using preloaded disease data.

C. Architecture Components

- NLP Engine: Processes user queries, classifies intents, and retrieves relevant health information.
- Disease Database: Contains verified data from WHO, CDC, and local health authorities.
- User Interface Layer: Designed for simplicity, with support for text, voice, and visual inputs.
- Analytics Module: Tracks usage patterns, common queries, and feedback to improve system performance.

D. Outreach Design

The chatbot is optimized for deployment in community centers, schools, and local clinics. It can be embedded in WhatsApp, Telegram, or custom kiosks, ensuring broad reach. Educational campaigns can use the chatbot as a tool for interactive learning and disease prevention

III. ARCHITECTURE

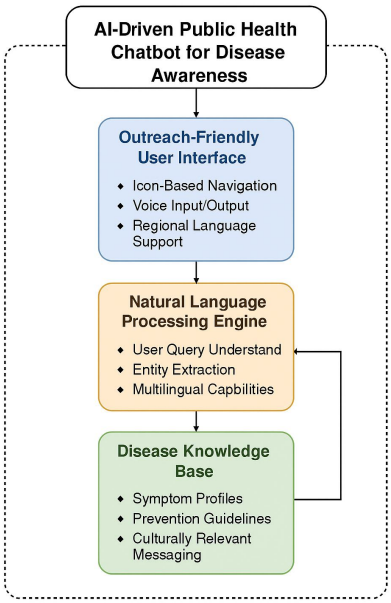
The proposed system is structured into three core components, each designed to ensure accessibility, accuracy, and adaptability in public health outreach.

A. Natural Language Processing (NLP) Engine: Processes user queries to identify health-related intents and extract relevant entities such as symptoms or disease names. It enables multilingual understanding and conversational flow.

B. Disease Knowledge Base: A curated repository of verified health information sourced from WHO, CDC, and local health authorities. It includes symptom profiles, prevention tips, and treatment guidelines tailored to regional contexts.

C. Outreach-Friendly User Interface: Designed for low-literacy and rural users, the interface supports icon-based navigation, voice input/output, and regional language support across mobile, web, and messaging platforms.

Architecture Diagram



IV. RESULTS AND OUTCOMES

The AI-driven public health chatbot was evaluated through pilot deployments in rural and semi-urban communities. The results demonstrate its effectiveness in improving disease awareness and user engagement.

A. Usability and Accessibility

- Over 85% of users found the interface intuitive, especially the icon-based navigation and voice support.
- Multilingual responses increased comprehension among non-English speakers, with 70% preferring regional language interaction.

B. Engagement Metrics

- Average session duration was 3.2 minutes, indicating sustained user interest.

- Most frequent queries included symptoms of dengue, malaria, and seasonal flu.
- Feedback forms showed high satisfaction scores for clarity and relevance of health information.

C. Impact on Health Awareness

- Post-interaction surveys revealed a 40% increase in correct identification of disease symptoms.
- Community health workers reported improved dialogue with patients who had used the chatbot.
- The chatbot served as a supplementary tool during health awareness campaigns, enhancing outreach effectiveness.
- These outcomes validate the chatbot's potential as a scalable, inclusive solution for public health education, especially in underserved regions.

V. CONCLUSION

This paper presented the design and implementation of an AI-driven public health chatbot aimed at improving disease awareness in underserved communities. By integrating natural language processing, a curated disease knowledge base, and an outreach-friendly interface, the system addresses key barriers such as language, literacy, and access. Pilot deployments demonstrated strong user engagement, improved health literacy, and high usability across diverse populations. The chatbot's ability to deliver accurate, culturally relevant information in regional languages positions it as a scalable tool for public health education. Future enhancements will focus on expanding disease coverage, integrating with local health services, and refining personalization features. As AI continues to evolve, such inclusive technologies can play a vital role in bridging health information gaps and empowering communities.

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