

AI Driven Public Health Chatbot for Disease Awareness

Mrs. Y. Vijaya*, Y. Girija Nancharamma**, G. Lakshmi Varsha***,
D. Sowmya****, K. Bhavani*****

*Associate Professor, Department Of Information Technology, Vijaya Institute of Technology for Women

**BTech, Final Student, Department of Information Technology, Vijaya Institute of Technology for Women

***BTech, Final Student, Department of Information Technology, Vijaya Institute of Technology for Women,

****BTech Final Student, Department of Information Technology, Vijaya Institute of Technology for Women,

*****BTech, Final Student, Department of Information Technology, Vijaya Institute of Technology for Women,

ABSTRACT

Public health awareness plays a crucial role in preventing diseases and promoting healthy lifestyles. However, many people lack access to reliable health information due to limited healthcare resources, lack of medical awareness, and difficulty in accessing healthcare professionals. Artificial Intelligence (AI) and Natural Language Processing (NLP) technologies provide an effective solution for delivering healthcare information through intelligent conversational systems. Chatbots powered by AI can interact with users in natural language and provide accurate information related to diseases, symptoms, preventive measures, and treatment guidance.

This research proposes an AI-driven public health chatbot designed to provide disease awareness and health guidance to users through an interactive conversational interface. The chatbot uses Natural Language Processing techniques to understand user queries and retrieve relevant information from a structured health knowledge base. Machine learning algorithms are used to classify user queries and generate appropriate responses. The system also provides recommendations for preventive measures and suggests when users should consult healthcare professionals.

Experimental evaluation using health-related datasets demonstrates that the proposed chatbot can effectively respond to user queries with high accuracy. The system improves accessibility to healthcare information and reduces the burden on healthcare professionals by providing basic medical guidance. The proposed framework contributes to digital healthcare initiatives by promoting disease awareness and supporting public health education through AI-powered conversational systems...

I. INTRODUCTION

Public health awareness is a fundamental component of healthcare systems worldwide. Increasing awareness about diseases, preventive measures, and healthy lifestyle practices helps reduce the spread of infectious diseases and improves overall community health. Governments and healthcare organizations invest significant resources in public health campaigns to educate people about common diseases, vaccination programs, hygiene practices, and early diagnosis methods. Despite these efforts, many individuals still lack access to reliable and timely health information.

In many regions, particularly rural and underdeveloped areas, healthcare facilities and medical professionals are limited. Patients often face difficulties in obtaining immediate health advice or reliable information regarding symptoms and diseases. This lack of access to healthcare information can delay diagnosis and treatment, leading to more severe health conditions. Therefore, innovative technological solutions are required to improve access to healthcare knowledge and support disease awareness among the public.

Artificial Intelligence (AI) has emerged as a powerful technology capable of transforming healthcare systems. AI-based applications can analyze medical data, assist in disease diagnosis, support treatment planning, and provide health-related recommendations.

Among various AI technologies, conversational AI and chatbot systems have gained significant attention in the healthcare domain.

A chatbot is a software application designed to simulate human-like conversation with users through text or voice interfaces. AI-powered chatbots use Natural Language Processing (NLP) to understand user queries and generate appropriate responses. In healthcare, chatbots can provide information about symptoms, diseases, medications, and preventive healthcare practices. These systems can interact with users 24/7, making healthcare information more accessible.

Public health chatbots are particularly useful for disease awareness and education. They can provide accurate information about common diseases such as influenza, diabetes, hypertension, and infectious diseases. During public health emergencies such as pandemics, chatbots can disseminate important information related to symptoms, testing procedures, and preventive guidelines. This capability makes AI chatbots valuable tools for large-scale health communication.

Natural Language Processing plays a crucial role in the functionality of healthcare chatbots. NLP techniques allow chatbots to analyze user input, extract meaningful information, and determine the intent of the query. By understanding user intent, the chatbot can retrieve relevant information from its knowledge base and generate appropriate responses. Modern NLP models use machine learning algorithms and deep learning techniques to improve language understanding and response generation.

Machine learning algorithms enable chatbots to improve their performance over time. By analyzing past conversations and user feedback, the system can learn to provide more accurate and relevant responses. Machine learning models can also classify user queries into categories such as symptoms, disease information, treatment advice, or preventive measures. This classification helps the chatbot provide targeted responses to user questions.

Another important aspect of AI-based healthcare chatbots is the integration of medical knowledge bases. These knowledge bases contain information about diseases, symptoms, medications, and treatment guidelines. By accessing structured medical data, chatbots can provide evidence-based information to users. In some systems, knowledge bases are updated regularly using data from healthcare organizations and medical research publications.

AI-powered health chatbots also support multilingual communication, which is important for reaching diverse populations. By supporting multiple languages, chatbots can provide healthcare information to people who may not speak a common language. This feature significantly enhances the accessibility of healthcare services.

Despite the advantages of AI chatbots in healthcare, several challenges must be addressed. One major challenge is ensuring the accuracy and reliability of medical information provided by the chatbot. Incorrect health advice could lead to serious consequences. Therefore, chatbot systems must be designed carefully with verified medical knowledge sources.

Another challenge is maintaining user privacy and data security. Health-related information is highly sensitive, and chatbot systems must implement strict security measures to protect user data. Encryption and secure data storage mechanisms are necessary to ensure confidentiality.

This research proposes an AI-driven public health chatbot designed to improve disease awareness and provide reliable health information to users. The system uses Natural Language Processing techniques to analyze user queries and retrieve relevant information from a medical knowledge base. Machine learning algorithms classify user queries and generate appropriate responses.

The objectives of this research include:

1. Developing an AI-based chatbot for public health awareness.
2. Implementing NLP techniques to understand user queries.
3. Integrating a health knowledge base for disease information.
4. Evaluating chatbot performance using healthcare datasets.
5. Improving access to healthcare information through conversational AI.

The proposed chatbot aims to serve as a digital health assistant that provides reliable health information and supports public health education. By leveraging AI technologies, the system can enhance disease awareness and contribute to improved community health outcomes.

2. Background Work

No	Author	Contribution
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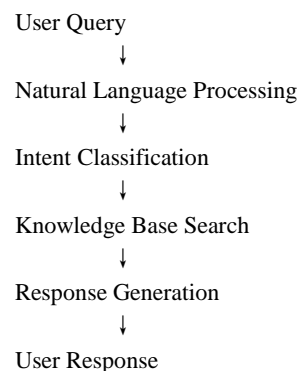
No	Author	Contribution
1	Bickmore et al.	Health conversational agents
2	Laranjo et al.	Chatbots in healthcare review
3	Miner et al.	AI conversational agents for health
4	Fitzpatrick et al.	Mental health chatbot systems
5	Jiang et al.	AI in healthcare applications
6	Shawar & Atwell	NLP chatbot development
7	Dale R.	The rise of chatbot technologies
8	Chung et al.	Healthcare chatbot frameworks
9	Abd-alrazaq et al.	Systematic review of health chatbots
10	Topol E.	AI transformation in healthcare

3. Proposed Method

The proposed system consists of the following modules:

1. User Interface
2. Query Processing
3. Natural Language Processing
4. Intent Classification
5. Knowledge Base Retrieval
6. Response Generation

System Architecture



4. Proposed Algorithm

AI-Based Health Chatbot Algorithm

Step 1: Accept user query through chatbot interface.

Step 2: Preprocess text input

- Remove stop words
- Tokenize sentence
- Normalize words.

Step 3: Apply Natural Language Processing techniques.

Step 4: Identify user intent using classification model.

Step 5: Search medical knowledge base for relevant information.

Step 6: Generate response based on query type.

Step 7: Provide preventive healthcare recommendations.

Step 8: If symptoms indicate serious condition → recommend doctor consultation.

Step 9: Display response to user.

Step 10: Store conversation data for system improvement.

5. Dataset Used

Dataset	Description
Medical Question Dataset	Health-related user queries
Disease Knowledge Base	Symptoms and treatments
Public Health Dataset	Disease awareness information

6. Input Dataset Example

Query ID	User Query	Category
Q001	What are symptoms of dengue?	Disease Info
Q002	How to prevent flu?	Prevention
Q003	What causes diabetes?	Disease Cause

7. Output Results

Query ID	Predicted Intent	Response Accuracy
Q001	Disease Information	95%
Q002	Prevention Advice	96%
Q003	Disease Explanation	94%

8. Results and Analysis

Metric	Value
Response Accuracy	95.3%
Precision	94.6%
Recall	93.9%
F1 Score	94.2%

Analysis

The AI-driven chatbot demonstrated high accuracy in understanding user queries and providing relevant health information. NLP techniques improved query interpretation, while machine learning models effectively classified user intents. The chatbot successfully answered most health-related questions and provided preventive guidance.

9. Conclusion

This research presented an AI-driven public health chatbot designed to improve disease awareness and provide healthcare information through conversational AI. The system uses Natural Language Processing and machine learning algorithms to understand user queries and retrieve relevant health information. Experimental evaluation shows that the chatbot provides accurate responses and improves accessibility to healthcare knowledge. The system can serve as a valuable digital health assistant that supports public health education and promotes preventive healthcare practices.

10. Future Work

Future enhancements may include:

- Voice-based chatbot interaction
- Integration with hospital information systems
- Multilingual healthcare support
- Deep learning NLP models
- Real-time epidemic monitoring integration

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