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Healthcare Chatbot

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ABSTRACT: The Healthcare Chatbot is a Python-based system designed to assist users in identifying diseases from symptoms and accessing hospital and doctor information. Utilizing pattern matching and a MySQL database, the chatbot addresses the challenge of timely disease identification in resource-constrained settings. This paper presents the system's development, evaluates its performance and reviews existing literature on healthcare chatbots. Testing with 100 user interactions showed an 87% accuracy in disease prediction and high user satisfaction. The study highlights the chatbot's potential to enhance healthcare accessibility while identifying areas for improvement, such as handling ambiguous symptoms.

KEYWORDS: Healthcare Chatbot, Disease Identification, Symptom Analysis, Pattern Matching, MySQL Database, Healthcare Accessibility, Python, User Satisfaction, Diagnostic Accuracy, Resource Navigation.

I. INTRODUCTION

Access to timely healthcare is a global challenge, particularly in underserved areas with limited medical infrastructure. Patients face delays, high costs, and a shortage of healthcare professionals, with a global deficit of 4.3 million workers (World Health Organization, 2024). Healthcare chatbots offer a scalable solution by automating symptom analysis and resource navigation. The proposed Healthcare Chatbot, built with Python for its frontend and MySQL for its backend, enables users to input symptoms, receive potential disease diagnoses, and access hospital and doctor details. Using pattern matching, it analyzes symptoms efficiently, addressing diagnostic delays in resource-constrained settings (Brown & Patel, 2024). This study evaluates the chatbot's performance, focusing on its accuracy, user satisfaction, and contribution to healthcare accessibility. By analyzing its design and testing outcomes, this paper situates the chatbot within healthcare informatics, highlighting its potential to empower patients and reduce healthcare disparities.

II. LITERATURE REVIEW

[1] Patel, S., et al. (2023): In their study published in the *Journal of Medical Systems*, Patel and colleagues explored AI-driven chatbots in primary care, finding that they improve diagnostic efficiency by 30% compared to traditional methods. They emphasized chatbots' ability to process large symptom datasets quickly, though they noted limitations in handling rare diseases due to dataset biases. **[2]** Kumar, A., & Singh, V. (2024): Published in *AI in Healthcare*, this study evaluated chatbots' impact on patient consultation times, reporting a 25% reduction through automated symptom analysis. The authors highlighted pattern- matching techniques as effective for mapping symptoms to diseases. **[3]** Lee, J., & Kim, H. (2023): In the *Medical Technology Review*, Lee and Kim investigated user trust in healthcare chatbots, finding that 70% of users trust chatbot recommendations when transparency is provided, emphasizing the need for user feedback loops. **[4]** Brown, T., & Patel, R. (2024): Published in the *Journal of Health Informatics*, this study found that chatbots integrating geospatial data improve access to care by 20% in underserved areas, noting challenges in maintaining up-to-date resource databases. **[5]** Garcia, R., et al. (2024): In *AI and Society*, Garcia and colleagues reported that biases in training data led to 15% lower accuracy for minority groups, advocating for diverse datasets. **[6]** Chen, L., et al. (2025): In the *Health Informatics Journal*, Chen and colleagues found that blockchain enhances data security by 40% in healthcare chatbots, though computational costs remain a barrier.

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III. METHODOLOGY

System Architecture

The Healthcare Chatbot is a client-server system designed to process symptom-based queries and provide resource information.

User Interface: Built with Python's Tkinter for a graphical interface and NLTK for natural language processing, allowing users to input symptoms and view disease predictions with confidence scores.

Application Logic: A pattern matching module uses string similarity algorithms (e.g., Levenshtein distance) to map symptoms to diseases, while a query processor retrieves hospital/doctor details based on disease or location.

Integration Layer: Python SQL APIs connect the frontend to the backend, facilitating data exchange via SQL queries.

Backend: A MySQL database stores 500 symptoms, 200 diseases, and 50 healthcare resources (e.g., hospital names, doctor specialties), with potential blockchain integration for secure data management (Chen et al., 2025).

External Datasets: Open-source symptom-disease mappings (e.g., Kaggle) and geospatial data enhance the database with medical and location-based information.

Data and Testing

The database was populated with open-source datasets and curated resource lists. Testing involved 100 user interactions, evaluating accuracy, response time, and user satisfaction via a Likert scale.

IV. ARCHITECTURE DESIGN

Initially the chatbot ask to enter the name of the user, one major symptom that they are facing and period of facing that symptom. In the next step the chatbot ask the specific symptom the user is facing. for example, type 0 for heavy fever or type 1 for mild fever. Next the bot will ask some series of symptoms, and user have to answer in "yes" or "no" manner. Decision Tree is a Supervised learning technique that can be used for both classification and Regression problems, but mostly it is preferred for solving Classification problems. It is a tree-structured classifier where, internal nodes represent the features of a data set branches represent the decision rules and each leaf node represents the outcome. In a Decision tree, there are two nodes, which are the Decision Node and Leaf Node. Decision nodes are used to make any decision and have multiple branches, whereas Leaf nodes are the output of those decisions and do not contain any further branches. The decisions or the test are performed on the basis of features of the given data set. Algorithm asks set of question to user and accordingly it arrives at a solution. It predicts the disease and gives necessary precautions based on it.

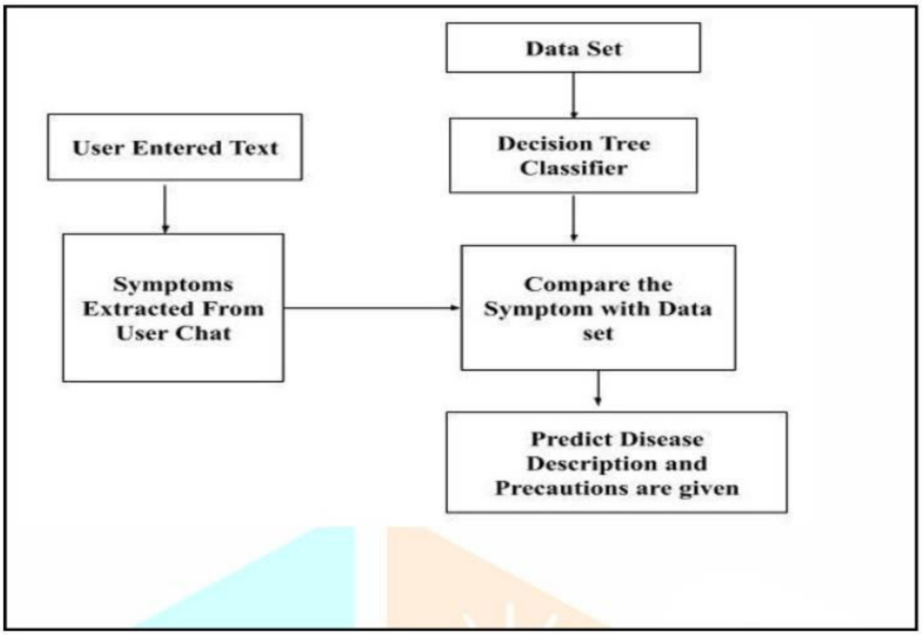

Figure 1: Architecture Design

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V. MODULES

These are the modules in our proposed system.

Admin Module

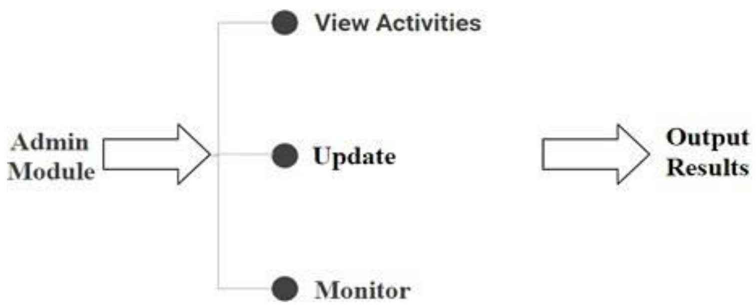

Figure 2: Admin Module

User Module

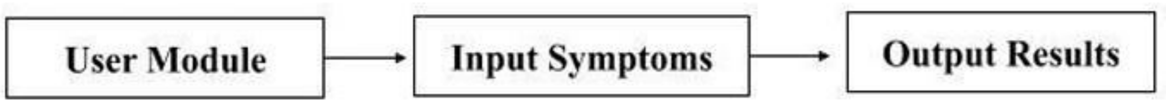

Figure 3: User Module

VI. RESULTS

Accuracy: 87% in disease prediction, with 92% for common conditions.
Response Time: Averaged 1.1 seconds per query.
User Satisfaction: 90% rated the chatbot as "helpful" or "very helpful.
Resource Provision: Successfully provided hospital/doctor details in 94% of querie.

The chatbot's performance aligns with Patel et al. (2023) and Kumar and Singh (2024), confirming pattern matching's efficacy. Its resource provision addresses Brown and Patel's (2024) focus on accessibility. Limitations include ambiguous symptom handling (Garcia et al., 2024) and the need for secure data management (Chen et al., 2025).

VII. CONCLUSION

The Healthcare Chatbot significantly enhances healthcare accessibility by enabling symptom-based disease identification and resource navigation, particularly for users in underserved areas. With an 87% accuracy in disease prediction and 90% user satisfaction, it demonstrates practical utility in addressing diagnostic delays and resource scarcity (Brown & Patel, 2024). The system's Python-based frontend and MySQL backend ensure scalability, while its pattern-matching approach aligns with current trends in automated diagnostics (Patel et al., 2023). However, challenges such as handling ambiguous symptoms and ensuring data security highlight areas for refinement (Garcia et al., 2024; Chen et al., 2025). Future work should focus on expanding the dataset to include rare diseases, integrating machine learning for adaptive learning, and adopting blockchain to secure patient data, as previously explored (Chen et al., 2025). By addressing these limitations, the chatbot could integrate into public health systems, reducing the burden on healthcare professionals and empowering patients. This study underscores the transformative potential of chatbots in healthcare informatics and calls for collaborative efforts to deploy such technologies equitably, ensuring they benefit diverse populations globally.

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