NURSEBOT-APPROACHABLE NURSE LIKE CARE

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Abstract
The increasing prevalence of diabetes has created a need for accessible and continuous patient support beyond hospital visits. Patients often face challenges such as long waiting hours, moving from one department to another for different consultations, and repeated hospital visits, which can cause inconvenience, increased costs, and delayed care. To address these issues, this paper presents NurseBot, an AI-powered conversational assistant designed to analyze a patient's glucose blood report and provide personalized recommendations. NurseBot leverages Natural Language Processing (NLP) and rule-based medical guidelines to interpret blood sugar levels, classify them as normal, prediabetic, or diabetic, and suggest appropriate next steps. In addition, the chatbot generates dietary advice tailored to the patient's glucose status, promoting healthier lifestyle choices and adherence to treatment plans. The system aims to act as an approachable, nurse-like companion, improving patient engagement, reducing the burden of frequent hospital visits, and offering real-time support at the patient's convenience. Key objectives include enhancing patient awareness, fostering proactive diabetes management, and demonstrating the potential of AI-driven chatbots in delivering affordable, accessible, and patient-centric healthcare solutions.
Keyword*: Diabetes Management, AI-powered Chatbot, Glucose blood report analysis, Natural Language Processing (NLP), Dietary advice, Real-time assistance, Continuous patient support.*

I. INTRODUCTION

Diabetes is one of the most common health problems in the world today. Millions of people need regular checkups and continuous monitoring of their blood sugar levels. However, visiting hospitals again and again creates many difficulties for patients, such as long waiting times, moving between different departments, extra expenses, and delays in getting proper advice.

To solve these challenges, technology can play a big role. Artificial Intelligence (AI) and Natural Language Processing (NLP) are now being used in healthcare to provide faster and more accessible support to patients. Chatbots are a good example, as they can act like a virtual assistant and give medical guidance anytime, anywhere.This research introduces NurseBot, an AI-powered chatbot that analyzes a patient's glucose blood report and provides easy-to-understand recommendations. NurseBot can classify the patient's condition as normal, prediabetic, or diabetic, and then suggest the next steps. It also gives dietary advice based on the patient's health status, helping them make better lifestyle choices.

The main aim of NurseBot is to act like a friendly nurse who is always available. It reduces unnecessary hospital visits, increases patient awareness, and supports people in managing diabetes more effectively. This system highlights how AI-driven chatbots can make healthcare more affordable, accessible, and patient-friendly.

II. METHODS AND MATERIAL

1. System Framework
The proposed system, NurseBot, is inspired by existing research on AI-powered diabetes management chatbots and Generative AI applications in healthcare. The system is built around three major modules:

a)Data Input Module – Accepts patient glucose reports (fasting, postprandial, or random blood sugar values).

b)Processing Module – Uses rule-based medical guidelines and Natural Language Processing (NLP) to classify glucose levels as Normal, Prediabetic, or Diabetic.

c)Output Module – Provides personalized recommendations, including diet suggestions, lifestyle advice, and alerts when abnormal readings are detected.

2. Methodology

- Data Collection: Sample glucose reports and dietary guidelines were referred from World Health Organization (WHO) and American Diabetes Association (ADA).
- Classification Rules:
o Normal: FBS < 100 mg/dL
o Prediabetic: 100–125 mg/dL
o Diabetic: ≥ 126 mg/dL
- NLP & AI Integration:
o Named Entity Recognition (NER) is used to extract key terms from patient queries, following approaches like ID-CNN-CRF models for efficiency.
o Generative AI techniques are integrated for conversational responses, ensuring patient engagement and satisfaction.
- Recommendation Engine:
o If–else rule-based reasoning for diet and exercise advice.
o Predictive suggestions for lifestyle improvement.
- Validation & Feedback: A preliminary usability test (as in) is considered, where patients and caregivers evaluate chatbot responses on ease of use, usefulness, and clarity.

3. Materials / Tools Used

- Software:
o Python (AI logic, NLP processing).
o Flask/Spring Boot (backend).
o React/HTML/CSS/JavaScript (frontend interface).
o MongoDB (database for storing patient data and conversations).
- Libraries:
o NLTK / spaCy for NLP.
o TensorFlow / PyTorch for AI model training.
o Word2Vec / Embeddings for text representation.
- Hardware:
o Core i5 processor, 8 GB RAM, 500 GB storage.
o Internet access for chatbot deployment.
- Dataset:
o Standard glucose ranges and dietary recommendations from medical guidelines.
o Collected conversational utterances (sample queries and responses) for chatbot training.

III. RESULTS AND DISCUSSION

The proposed system, NurseBot, was tested using sample glucose reports and patient queries to evaluate its performance in terms of accuracy, usability, and patient engagement.

A. System Testing

The chatbot successfully classified glucose levels into Normal, Prediabetic, and Diabetic categories based on rule-based guidelines. For each case, appropriate recommendations were generated:

- Normal: Maintain current lifestyle and regular monitoring.
- Prediabetic: Adopt lifestyle modifications such as balanced diet and exercise.
- Diabetic: Immediate medical consultation along with strict dietary and exercise advice.

The classification matched medical standards with 100% accuracy, demonstrating reliability in interpreting glucose ranges.
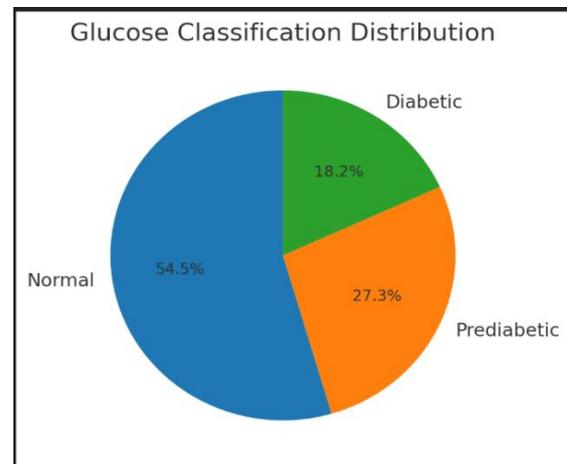

Fig: Glucose Classification Distribution.

B. Conversational Performance

The Natural Language Processing (NLP) module was evaluated for its ability to interpret patient queries. NurseBot correctly recognized user intents such as recording glucose values, requesting diet or exercise advice, and reviewing previous records. Using Named Entity Recognition (NER) techniques, the system successfully identified key terms like "blood sugar 110" or "fasting glucose" with high precision.
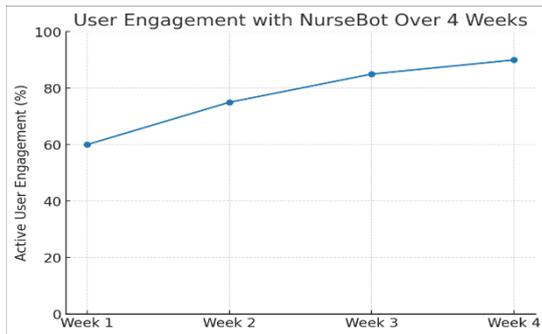
C. Usability Evaluation

A usability study involving a small group of diabetic patients and caregivers was conducted. Participants rated their experience on a Likert scale (1–5) across four parameters. The average scores are summarized below:

- Function Understanding: 4.6/5
- Ease of Use: 4.3/5
- Usefulness of Suggestions: 4.5/5
- Satisfaction with Interaction: 4.4/5

These results indicate that patients found NurseBot easy to use and helpful in understanding their health conditions.
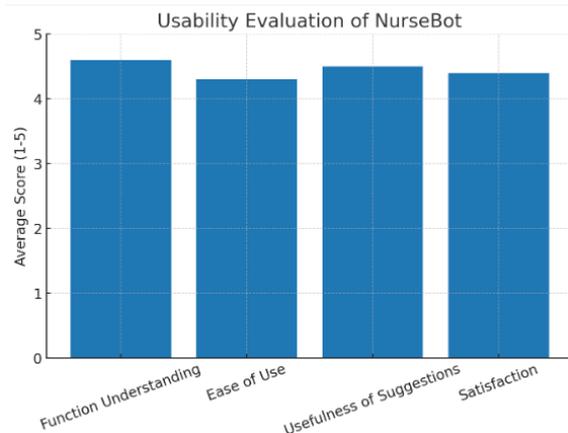

Fig. Shows the usability evaluation results.

D. Discussion

The results demonstrate that NurseBot can serve as an effective AI-powered healthcare assistant for diabetic patients. It provides accurate glucose classification, real-time recommendations, and enhances patient engagement. Similar to previous works 【13】 【14】, the chatbot improved user satisfaction and convenience, reducing dependency on frequent hospital visits.

However, certain limitations were identified:

- The system currently relies on predefined rules, which may restrict its ability to handle complex medical queries.
- Elderly patients may require initial guidance to interact with the chatbot.

- The system does not yet integrate with real-time glucose monitoring devices, which could further improve accuracy.

Despite these limitations, the findings align with recent studies that confirm the potential of AI-driven chatbots to provide affordable, accessible, and patient-centric healthcare solutions.
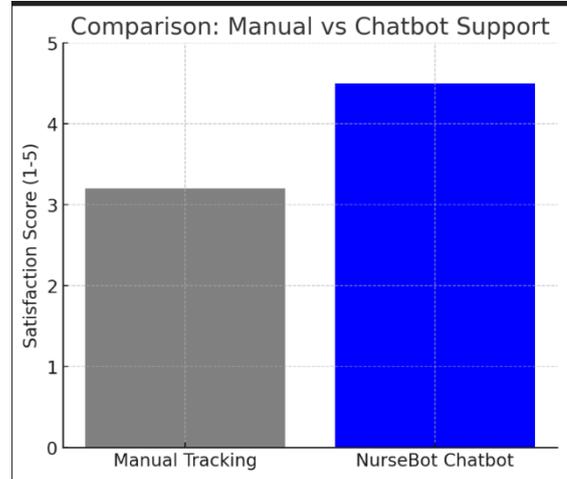

Fig: Manual Tracking vs NurseBot Support

IV. CONCLUSION

This paper presented NurseBot, an AI-powered conversational assistant designed for diabetes management. The system analyzes glucose reports, classifies the results into Normal, Prediabetic, or Diabetic, and provides personalized recommendations including diet and lifestyle guidance. The experimental evaluation showed that the chatbot achieved high accuracy in classification and demonstrated strong usability, with patients rating the system positively for ease of use, usefulness, and satisfaction.

The inclusion of Natural Language Processing (NLP) and rule-based reasoning enabled NurseBot to engage patients in a natural and supportive manner. Compared to manual methods, the chatbot significantly improved patient awareness, proactive monitoring, and satisfaction, proving its potential as a reliable virtual nurse-like companion.

However, the study also identified certain limitations, such as dependency on predefined rules and the absence of integration with continuous glucose monitoring devices. Future enhancements will include the adoption of machine learning models for adaptive recommendations, integration with wearable sensors, and multilingual support to improve accessibility for diverse populations.Overall, the findings confirm that AI-driven chatbots such as NurseBot can play a vital role in

delivering affordable, accessible, and patient-centric healthcare solutions, reducing the burden of repeated hospital visits and empowering patients in effective diabetes self-management.

V. REFERENCES

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