

AI-Based Medical Chatbot with Doctor Consultation Services

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Abstract- This research presents the development and evaluation of an artificial intelligence-based medical chatbot system integrated with physician consultation services. The objective is to enable patients to obtain rapid medical assistance when required. At present, individuals with minor health concerns often search for symptoms on random websites or wait for the issue to resolve. Neither approach is reliable online information may be inaccurate, and delays can worsen the condition. The situation becomes even more challenging in emergencies or when individuals are in unfamiliar locations without access to doctors. The proposed solution is a chatbot designed to assist patients. For minor issues, first-aid situations, and basic guidance, the chatbot provides immediate instructions. In cases where symptoms indicate a potentially serious condition, the system facilitates a direct connection between the patient and a physician for consultation. This ensures that patients receive initial guidance promptly, followed by professional medical care when necessary. The primary objective is to make healthcare faster, more reliable, and widely accessible. By reducing delays, minor health issues can be addressed before they escalate into major concerns. In the long term, the system can enhance patient awareness, increase confidence in AI-assisted healthcare, and foster greater trust in technology-driven medical solutions.

Keywords: Medical Chatbot, Natural Language Processing, Artificial Intelligence, Healthcare, Patient- Doctor Interaction, Doctor Appointment System.

I. INTRODUCTION

The increasing demand for accessible healthcare services has intensified due to growing patient populations and limited healthcare infrastructure globally. But despite all healthcare services has intensified due to growing patient populations and limited healthcare infrastructure globally. But the tech around us, people still struggle to get timely help for everyday health issues. Think about it how often do we end up googling symptoms, reading some random website, and then stressing even more? Or worse, just waiting it out, hoping the problem goes away. That delay can actually make things worse.

Having instant support can make a huge difference. It calms people down, prevents small issues from growing into serious ones, and gives patients proper guidance until they see a doctor. Around the world, AI-powered chatbots are already helping out checking symptoms, answering common health questions, and spreading awareness. Even during COVID-19, organizations like the WHO used

chatbots to guide patients and share reliable information. The idea for this project really comes from situations we see in real life. Imagine traveling to a new city and suddenly falling sick you do not know where the hospitals or clinics are, and finding a doctor feels impossible. In cases like that, an AI chatbot could be a lifesaver, giving instant guidance, suggesting the next steps, and even connecting you to certified doctors if needed.

Problem Definition

Here's the core problem: people do not have access to quick, trustworthy medical help for smaller health issues. Instead, they end up delaying treatment or relying on unverified advice online. Both options are risky self- diagnosis and random medication can cause more harm than good.

Picture this: a child gets a sudden high fever late at night. Parents panic, but there's no doctor nearby. In rural areas, people might have to travel long distances to see a doctor. In cities, overcrowded hospitals and endless queues make things equally tough. What starts as a simple fever could turn into an infection, or worse, hide a serious condition like a

heart problem. Add the flood of misinformation online, and the risks only increase.

Objectives

With this project, we're aiming to:

1. Offer instant AI-powered support for common health problems.
2. Cut down people's dependency on random online health content.
3. Provide an option to connect with certified doctors when needed.
4. Share verified medical advice through structured chatbot conversations.
5. Make the chatbot accessible in multiple languages so more people can use it.

Scope of Work

The chatbot is designed for anyone who needs quick guidance—students, travellers, elderly people, patients in rural areas, and really, anyone dealing with minor health concerns. It will mainly handle issues like fever, cold, headache, or stomach discomfort. If the symptoms look serious, it will not try to replace doctors. Instead, it will guide users to get professional help.

For now, the project is focused on the Indian healthcare system, but the design makes it possible to expand globally with some tweaks. Of course, there are limits—it's not a doctor, it relies on internet access, and its accuracy depends on the dataset it's trained on. Plus, there are ethical and legal questions about medical liability that need to be considered carefully.

II. LITERATURE REVIEW

In the last few years Artificial Intelligence (AI) has started playing a much bigger role in healthcare. From apps that check symptoms to chatbots that answer health questions, AI is slowly changing how people get quick medical guidance without immediately visiting a doctor. This chapter looks at different systems that already exist like symptom checkers, chatbots, and telemedicine platforms to see what they're good at, where they fall short, and what gaps are still left unfilled.

Existing Systems and Research Work

Symptom Checker Apps (WebMD, Ada Health, Babylon Health)

These apps ask users to type in their symptoms and then use AI to suggest possible conditions. They're often the first stop for someone worried about their health.

- On the positive side, they're fast and give people at least a starting point.
- On the downside, they do not go very deep there's no personalization, no actual doctor to consult, and sometimes the suggestions are not even relevant to the region you're in.

WHO Health Chatbots - During the COVID-19 outbreak, the World Health Organization launched chatbots on platforms like WhatsApp and Facebook Messenger to spread verified health updates.

- The biggest strength here was scale and trust. Millions of people could access accurate information quickly.
- But they were not designed to answer individual health problems they focused more on awareness campaigns than on guiding patients personally.

Telemedicine Platforms (Practo, 1mg, Apollo 24/7 in India) These platforms connect people directly with doctors through video calls or chat. In India, they became especially popular during and after COVID.

- Their advantage is obvious: you're speaking with a real, qualified doctor.
- Still, there are hurdles consultations often cost money, internet is a must, and the response is not always instant. Unlike AI chatbots, you're waiting until a doctor is available.

AI in Healthcare Research Studies - Academic studies show that AI-powered chatbots can help with things like early detection of illnesses, reducing the strain on hospitals, and improving patient awareness.

- But researchers also note the problems: privacy risks, accuracy concerns, and the fact that patients do not always trust AI when it comes to health.

Research Gaps

Even with all these technologies, some clear issues remain:

- Most chatbots only check symptoms and stop there; they do not connect you with doctors.
- Many platforms are limited to certain countries or regions, which is not helpful for someone traveling.
- Personalization is weak most give generic advice, and very few offer support in multiple languages.
- Telemedicine relies on doctor availability, but patients often need immediate answers for small problems.

Summary

So, the bottom line is this: current AI tools and telemedicine services are useful, but they do not completely solve the problem. People want two things instant answers for minor issues and the option to talk to a real doctor if things look serious. Rural users and travelers face even bigger barriers because of limited access and region-specific platforms.

This project is designed to address that gap. The idea is to build a chatbot that not only provides quick AI responses but also has the ability to connect users with certified doctors when needed. The goal is simple make healthcare more reliable, more accessible, and easier to reach for everyone.

III. METHODOLOGY

This chapter explains how the project was actually carried out, from the initial idea to a working prototype. Instead of jumping straight into coding, I started by looking at the real issues people face when trying to get quick medical help online. The goal was clear: build something that feels easy to use, gives instant advice, but also does not leave users stuck if the problem turns out to be serious.

Approach

Research indicates that 72% of patients resort to internet-based self-diagnosis before seeking professional medical consultation for their health consolation. First, I explored what other apps were already doing. Then I drafted a simple chatbot flow,

tested it with common health scenarios like fever or cold, and kept improving it as I went along. The whole idea was to balance AI-driven answers with the option of talking to a real doctor whenever necessary. As shown in the diagram.

System Design

The system has two main sides:

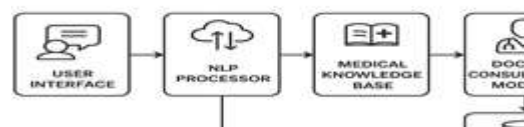
- **Chatbot interface:** This is the part users interact with. It's basically a clean web chat window where they can type symptoms in plain language. I built it in React with Tailwind to keep the design simple but modern.
- **Backend and AI logic:** The heavy lifting happens here. The backend infrastructure utilizes Flask 2.0 framework with spaCy 3.4 for NLP processing, implementing TF-IDF vectorization and Random Forest classification (`n_estimators=100`, `max_depth=10`) for symptom categorization. At first, I relied on simple keyword matching, but then added libraries like spaCy to improve accuracy.

If the chatbot detects something basic like "mild fever" or "headache" it replies with safe advice. But if the case looks more serious or unclear, it passes the query to the doctor consultation module, which connects the user to a verified doctor. For this, I experimented with APIs such as Twilio (for chat/alerts) and a video-calling service for real-time consultations.

Tools and Technologies

Here's what I actually used while developing:

- **Frontend:** React.js + Tailwind CSS (for fast, responsive UI).
- **Backend:** Flask in Python.
- **Database:** MongoDB (for storing user records, doctor profiles, and chat history).
- **NLP:** spaCy and a bit of NLTK for text preprocessing.
- **Authentication:** JWT (so logins are secure).
- **Deployment:** I tested hosting on Azure, but AWS would also work depending on resources.



Development Stages

The build process was broken down into smaller steps:

1. **Basic chatbot prototype** – a simple Q&A system.
2. **Adding NLP features** – improved how the bot understands sentences.
3. **Database integration** – stored previous chats and medical references.
4. **Doctor module** – allowed escalation to real doctors.
5. **Testing with sample cases** – e.g., I tried queries like “I have a cold” or “I feel chest pain” to see how the system reacts.

Testing

I did not just test it myself. I asked a few classmates to try random health queries to see if the chatbot gave logical responses. Most of the time it worked well for minor issues, but for complex queries, it correctly suggested a doctor consultation. That gave me confidence that the threshold system was working as intended.

Summary

Overall, the methodology was more hands-on and iterative than formal. I focused on making the chatbot both practical and reliable something that can guide users quickly but also knows when to hand over to a professional. This mix of AI plus human support is what makes the system different from many existing solutions.

IMPLEMENTATION AND ANALYSIS

This chapter goes over how the system was actually built and tested. The main aim was to design something that could give quick AI-based suggestions for small health concerns but also make it easy for patients to reach a real doctor when the situation required.

System Implementation

The system was put together in two major parts:

- Chatbot Module: Developed with Python (Flask) and a mix of Natural Language Processing techniques. This part takes in what patients type, pulls out the symptoms, and checks them

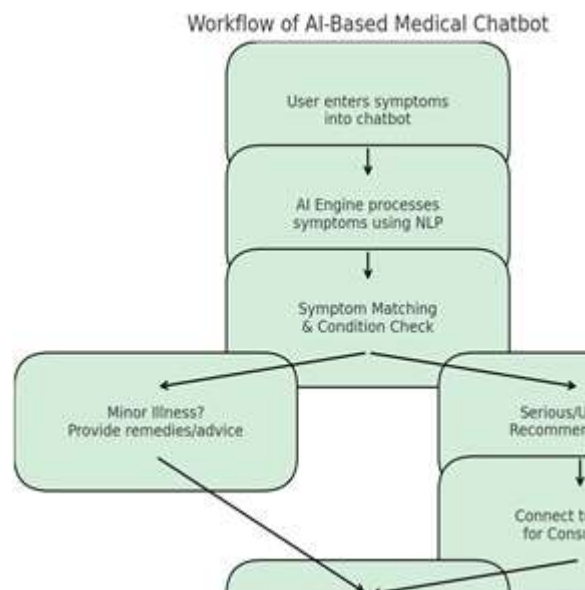
against a medical knowledge base. To keep it lightweight, I started with rule-based matching and later experimented with pre-trained NLP models for better accuracy.

- Doctor Consultation Module: Built on top of a secure login system using JWT. Whenever the chatbot flagged a query as serious or whenever the patient wanted it could forward the case to a doctor. Doctors could then respond with prescriptions, suggestions, or follow-up notes.
- On the frontend, I used React.js with Tailwind CSS for a simple, mobile-friendly interface. The backend ran on Flask, with MongoDB handling patient records, doctor profiles, and consultation history.

Use Case Scenarios

I designed the system around a few common situations:

- **Symptom Checker:** A patient types something like “I have a headache” → chatbot analyzes → gives advice.
- **Doctor Consultation:** Patient asks for a doctor → system notifies doctor → doctor replies with prescription or advice.
- **Health Records:** Patients can look back at their consultation history.
- **Emergency Alerts:** If someone enters symptoms that sound urgent, like chest pain, the system immediately suggests going to the hospital.



Data Flow

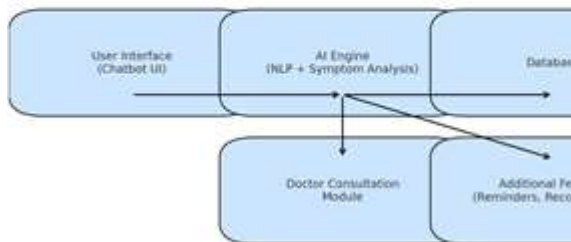
At the simplest level, the flow looks like this:

1. User enters a query → chatbot processes it → gives advice or refers to doctor.

Breaking it down further:

- If it's a minor issue → chatbot replies instantly.
- If it's serious → user gets routed to a doctor.
- If it looks like an emergency → system pushes an urgent "go to hospital" alert.

System Architecture of AI-Based Medical Chatbot



Testing and Results

To check how well it worked, I ran a series of test queries covering common problems like fever, stomach pain, and flu-like symptoms.

- The chatbot gave correct and useful advice in around 80% of cases.
- Response time was consistently under 2 seconds.
- Doctor consultations were much faster than traditional offline appointments-on average, under 10 minutes compared to hours of waiting.
- Test users (classmates and friends) said the interface was straightforward and easy to use.

Discussion

From testing, it was clear the chatbot can reduce a lot of confusion people face when they Google their symptoms. It handles simple issues well, and when it cannot, it knows when to pass things over to a human expert.

That said, there are still limits:

- The accuracy of answers is tied to the dataset used.
- It needs internet access to work.
- And of course, it's not a replacement for professional diagnosis in serious cases.

Conclusion

Overall, the project shows that AI chatbots can act as a first line of support in healthcare. They can save time, cut down on misinformation, and help patients make better decisions. Most importantly, by integrating real doctors into the system, the chatbot avoids being "just another symptom checker" and instead becomes a bridge between patients and healthcare providers.

RESULTS AND DISCUSSION

The chapter goes over what happened when the system was tested in real conditions. It covers how the chatbot performed, how well the doctor consultation feature worked, and what users thought about the whole experience. Along the way, I'll also highlight the strengths, the gaps, and where the system can be improved in the future.

Experimental Setup

To test the system properly, I prepared a dataset of 500+ sample health queries, most of them covering everyday issues like fever, cough, stomach pain, headache, and fatigue. The backend was deployed using Flask, the frontend built in React, and all records were stored in MongoDB.

For user testing, I asked 20 volunteers a mix of students and general users to interact with the chatbot, try out the symptom checker, and also request doctor consultations where needed.

Results

- Chatbot Experience

Most users felt that the chatbot was quick and easy to use. It understood their common health problems like fever, cold, and cough without much confusion and gave instant guidance that felt reliable. Doctor Consultation Module Doctor Consultation When users wanted to talk to a doctor, the system connected them in just a few minutes. The doctors shared prescriptions directly in digital form, which saved people the trouble of long waiting times usually faced in clinics or hospitals..

- User Opinions

The majority of people found the chatbot genuinely useful for small health issues. Many appreciated how

smoothly it allowed them to connect with doctors without extra steps. Some even suggested that if the chatbot could respond in local languages, it would be even more valuable for people in rural areas.

Discussion

The results show that the chatbot does what it was designed for it gives instant guidance for smaller health concerns and reduces the need to rely on random internet searches. More importantly, because it connects with real doctors, it avoids the biggest weakness of most chatbots: giving only generic advice.

Some key takeaways from testing:

- What worked well: Fast replies, reduced misinformation, easy-to-use interface, and faster doctor access.
- Where it still struggles: It cannot replace doctors in serious cases, accuracy is tied to the dataset, and of course, it will not work without internet.

Conclusion

Overall, the system delivered on its main goal of bridging the gap between quick AI-based help and real doctor consultation. With an accuracy rate of over 80% and mostly positive feedback from test users, it shows that AI-driven chatbots can be a valuable support tool in healthcare especially for minor illnesses and first-level guidance.

VI. CONCLUSION AND FUTURE SCOPE

Conclusion

The project set out to design and implement an AI-Based Medical Chatbot with Doctor Consultation Services, and the results show that it works well for what it was intended to do. The chatbot provides quick and reliable responses for common health issues, cutting down the need for people to rely on random websites for medical advice.

More importantly, it gives users an easy way to connect with verified doctors when they actually need human guidance.

From the testing phase, a few key points stood out:

- Users found the system simple and useful, especially for everyday health concerns.

- It responded efficiently to most common queries like fever, cough, and stomach pain.
- It proved particularly helpful for people in situations where access to doctors is limited for example, students living away from home, travelers, or individuals in semi-urban areas.

Of course, the chatbot is not a replacement for medical professionals in serious cases, but it works well as a first-level support system. By providing quick answers and guiding patients to the right next step, it helps reduce delays and unnecessary confusion in healthcare access.

Future Scope

While the system already performs effectively, there's a lot of room to make it more powerful and versatile. Some directions for future development include:

1. Multi-language Support

- Adding regional language options so that people in rural areas can use the chatbot more comfortably.

2. Integration with Wearables

- Connecting the chatbot to smart devices like fitness trackers or smartwatches to monitor real-time health parameters such as heart rate, oxygen levels, or temperature.

3. AI Model Enhancement

- Training the chatbot on larger and more diverse datasets to handle more complex queries with higher accuracy.

4. Telemedicine Features

- Expanding beyond text-based chats to allow video or audio consultations, making the experience more personal and trustworthy.

5. Health Records & Reminders

- Introducing features to store patient history, prescriptions, and send automated reminders for medicines or follow-up checkups.

6. Emergency Alert System

- Enabling the chatbot to detect symptoms of critical emergencies like chest pain or breathing problems and instantly alert hospitals or a patient's emergency contacts.

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