

## Healthcare Chatbot System with an Emergency Virtual Assistance

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### Abstract

*The health-care department and professionals have limited sources of contact as they lack to assist and support their patients in time of emergencies and everyday life. Normally, every human cannot know the symptom of every disease and nor can he always predict the proper use of a medicine or prescription given. It is also time consuming as the patient cannot visit the hospital/doctor for every small reason. So a problem like this can be solved by the Healthcare Chatbot System and Emergency Video Assistance. The Chatbot System aims to provide remedies and diagnosis based on the Symptoms provided to its system. The System has a medicinal decision making mechanism to give suggestion and reports the data history of each patient. Also a professional will be connected to guide in case of emergency.*

**Keywords:** Healthcare, Chatbot, Remedies, Diagnosis, Ehealth, Emergency help, Virtual Assistance.

### 1. Introduction

The E-Health Chatbot is a computer program designed system which will assist the patients 24/7 by solving their queries with instant messaging assistance. The Chatbot system will communicate in human understandable language. The eHealth Chatbot can interact with users, giving them a realistic feeling of communicating with a medical professional.

The user can upload the prescription or the medicine name and get the details of its use. It will have pre-recorded dataset of uses of medicine/prescription which will be provided to the user on demand. The AI chatbot will be backed up by the vast information available on the internet and will provide accurate and efficient guidance.

Sometimes it is possible that the situation may be complicated and confusing, so in this case the user will be connected to a Medical QnA and show them similar questions to their symptoms that doctors may have previously answered. [2]

The Chatbots can also be used for Virtual Assistance in case of emergencies, Online Appointments and also for general conversations. This will surely help the people in gaining the right guidance and can have a proper idea about their health.

### 2. Problem Definition

#### 2.1 Emergency Fatalities Handling

For Emergencies, the Video assistance will be used which will be personally guided by the certified health professionals of different hospitals and organizations. A video professional can

guide the people in cases of immediate pregnancy-help or fatal accidents or any other problems till the help arrives.

### 2.2 24/7 Continuous Care and Guidance

As it has become difficult for physicians and doctors in their daily life to pay attention to the patients 24/7, the patients feel a need to be assisted even for small reasons [8]. Doing these repetitive tasks for patients and taking continuous care can consume a vast amount of physician's time. The primary use of a chatbot is to eliminate unnecessary appointments to the doctor for every small reason [8]. In conditions like these, the chatbot comes into play by providing timely information about the patient's condition and hints on possible actions.

### 3. Literature survey

**Table 1. Literature Survey**

Sr.no	Paper Title	Author	Publication	Findings
1	A Survey on Chatbot Implementation in Health Care using NLTK [1]	J. Jinu Sophia, D. Arun Kumar, M. Arutselvan, S. Barath Ram	<b>2020</b>	A simple chat system using real-time interactive methods of AI to predict diseases based on the symptoms and provides a list of available diagnosis/treatments.
2	<b>Health Care Assisting Chatbot for the symptoms and dosage prediction using IoT</b> [6]	P. Ponmurugan, B. Priyadarshini, P. Preetha, V. Preethikadevi, R. Divya	<b>2018</b>	An interactional real-time chat system to tell the signs of sickness/diseases, plus it tells age-based dosage details based on symptoms and age group with uses and side effects which is very useful as it clears out confusion on dosage intake and provides basic knowledge about it.
3	<b>Emergency Patient Care System using Chatbot</b> [11]	Dr. Paul Raj, Murali Krishna R, Solleti Manoj Krishna, Koppolu Harsha Vardhan, Kameswara Rao M	<b>2019</b>	The system has basic structure for a chatbot that solves the user's queries and comes with a special Emergency SOS option to connect with nearby doctors to seek immediate help using Google map API. This SOS operation is used to send a normal text message to the emergency contact list [11] with current location to seek

				further help.
4	<b>AI Chatbot Design during an Epidemic like the Novel Coronavirus</b> [3]	Gopi Battineni , Nalini Chintalapudi and Francesco Amenta	<b>2020</b>	This system is basically designed for Covid-19 situation to determine the severity of the infection which includes connecting a doctor via its system if the threshold limit of the symptoms has crossed severity level. This helps in keeping track of the patient's health and a way to stop more spreading and take immediate action if needed.

#### 4. Functionality

The chatbot can handle user requests/messages and identify them by understanding the message patterns with an artificial intelligence markup language (AIML) [3][4]. AIML is fused with NLP (Natural language Processing) to understand the human natural language. It processes the command/query and translates it back to the user [3][4]. The basic functionality of a chatbot is defined by the request analysis and return response. The main goal is to provide the user the feel, the experience as if it is having a conversation with a health professional.

On initiating the conversation the Chatbot focuses on the messages that are provided by the user. For the machine to understand the input, the messages entered are then spilt into units using Chunking.

Chunking is the process of splitting the sentences into words that are then tagged with labels for different positions [5]. The output of the chunking results in different phrases and then these phrases are used to process for matching keywords that are stored in the system.

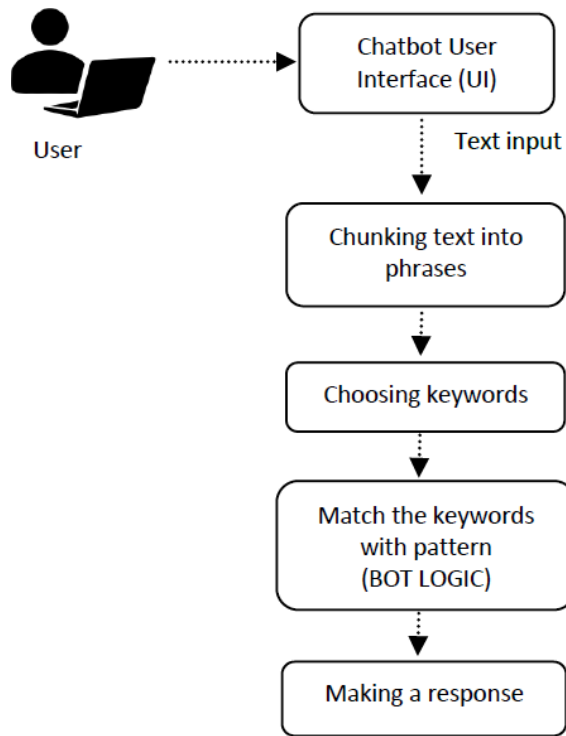


Figure 1. Chatbot Chunking process

The process of matching the keywords with patterns is called **BOT LOGIC** [5]. After processing keywords and knowing the pattern the chatbot gives a programmed response for a particular instance.

### 5. Proposed System

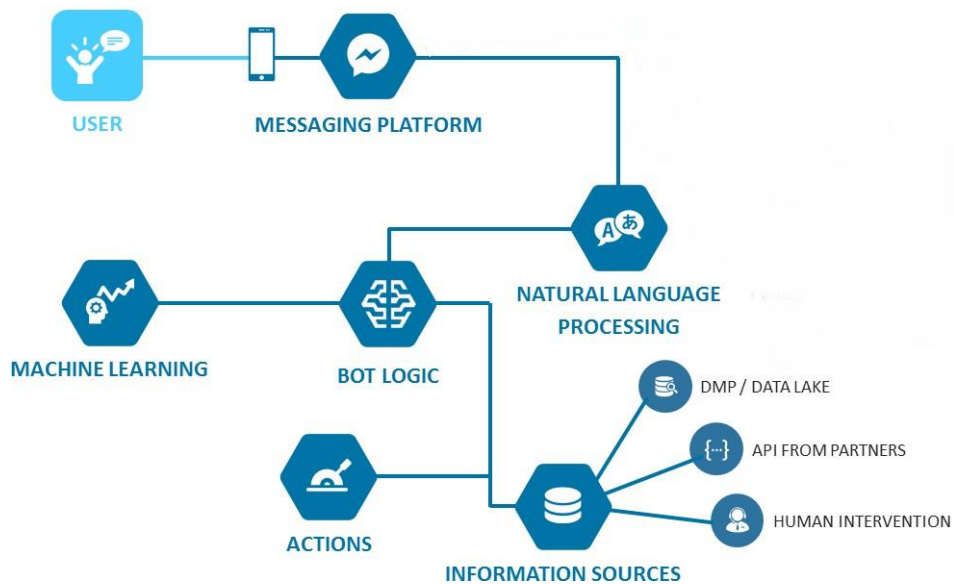


Figure 2. Chatbot System Architecture

The above figure 2 represents the system architecture for the chatbot. Firstly, the user logs in with the users-login details which are stored in the database. Now the conversation starts and the queries/commands are processed using NLP for the machine to understand the human language. Then it performs the basic functions like chunking that leads to ‘Bot Logic’ and accordingly gives the response to the user. The conversation or queries are stored for future references. The responses given by the chatbot are backed-up by various Data Management Platforms (DMP) and government healthcare sites; it interacts and obtains data with them thus taking suitable actions accordingly.

The working of the chatbot system is as follows:

**Login:**

The user registers with the chatbot system and then logs in with validation for the registered details. After this user will be welcomed with a greeting message and then the conversation starts. The personal details of the user after the login are stored in the database for identification and future use.

**Ask Questions/Queries:**

The user can ask health related questions to the chatbot and it analyzes the keywords from the question’s string and gives a proper programmed response based on the keywords.

For example, if, the user enters a query as ‘I have Headache and Back pain’ then the chatbot chunks the string and matches the keywords (Headache, Back pain) that are stored in the dataset [1]. The chatbot then gives the response that is stored for those keywords. Further if the user confirms that there is more to it after reading the response then the chatbot goes for deep questioning based on those symptoms.

**Disease Detection:**

Using BOT LOGIC [5] the chatbot processes the string entered by the user. Further, the chatbot provides the user with a set of symptoms based on the string entered. The user then verifies the symptoms and based on their reply, some diseases are shortlisted and for further confirmation and suggestion, the user undergoes a series of deep questioning [1]. So this helps us in mapping the symptoms of the exact disease.

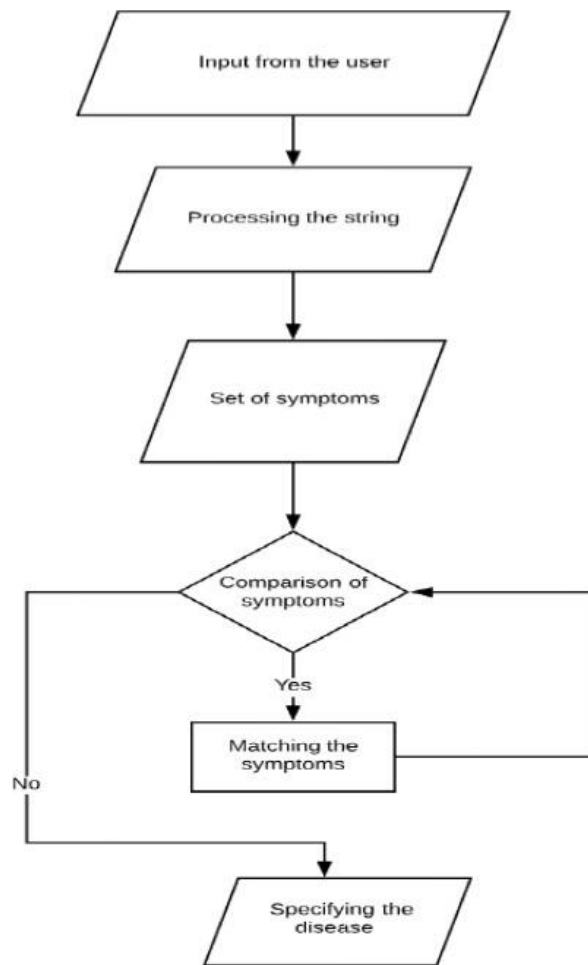


Figure 3. Flowchart

After matching the symptoms of the disease, the chatbot implies the score defined AIML technique, where we have set a threshold limit to check the severity of each disease [3]. So if the threshold limit value has been crossed, the chatbot suggest the user to immediately visit the doctor or will help the user set an appointment or connect a doctor through its system.

The threshold value can be calculated by:

$$H = \Sigma (\text{Score}) / \text{Threshold value} [3]$$

H = It is the decision parameter which is used to check if the threshold level was hit.  $\Sigma$

(Score) = It is the total score of all the symptoms that the user claims to experience.

Threshold Value = It is the upper limit value until which the Chatbot can handle. [3]

If  $H \geq 1$ , then chatbot triggers the severity and connects to the doctor immediately

#### **Get Medicine Details with suggestions:**

The user can ask about medicine related details on the basis of medicine names. The chatbot

will search through the dataset using String Searching Algorithm [1] where substring representing a medicine is identified from the input text. Normally it will be searched through the dataset if only the name is mentioned in the string. The medicine detail format of medicines for the Chat bot is given below:

```
{  
  "Dolo: Paracetamol" {  
    "Id": Med 1  
    "Name": "Dolo: Paracetamol"  
    "Uses: 1. Aspirin is a medicine which is used to reduce mild to not extreme pain from  
    conditions such as muscle-ache, toothache, common cold, and headaches.  
    2. Also helps to reduce fever  
    "Dosage": "4 months to 12 years: Initial Dose: 30 mg/kg,  
    12 years and above: 325 to 650 mg every 4 to 6 hours or 1000 mg every 6 to 8 hours".  
    [10]  
    "Side effects": The very major sensitive reaction to this drug does not occur very often. Stop  
    using this medication and calls your doctor at once if you have a serious side effect such as:  
    low fever with nausea, stomach pain, and loss of appetite, dark urine, clay-colored stools or  
    jaundice (yellowing of the skin or eyes). [10]  
    "Problems to check": Check with your doctor if you have liver or kidney problems  
  } [10]  
  "Advil" {  
    "Id": Med 2  
    .  
    .  
    .  
  }  
}
```

After finding the particular medicine the chatbot will provide the medicine details like the name, side effects and its uses, and also a warning for users to check if they have the mentioned problems before using them. Also with the details it will provide age based dosage details to avoid confusion about the intake [6]. For some important medicines which are used for unique diseases or the medicines that can have strong side effects, the chatbot advises the user to take those medicines only under a guidance of a doctor.

### **Connecting with Doctor:**

The user can set appointments and can also connect with doctors online for guidance and knowledge. Sometimes if the threshold limit is crossed for a disease, the chatbot can connect the user to a doctor for seeking immediate help. This will be registered doctors and physicians and professionals from different health organizations on the chatbot system. The doctor can also update the medication profile of the user and this medication profile will be stored in the database [11] and the user can view the profile for guidance and future use.

### **Emergency Virtual Assistance:**

In case of emergencies the user can use a video/audio calling system for guidance or saving a life (eg. At a time of a car accident) before the actual help arrives. The user will be virtually assisted by a physician /doctor in order to control and ease the situation or panic or any other difficulty that they are going through (eg. A pregnant lady in labor stuck in traffic while reaching the hospital).

## 6. The Scope of the Research Work

It has now become a basic need for humans to have knowledge about any symptoms/allergy that they are facing and then take proper precautions to deal with it and medical chatbots are helping us to fulfill it via the instant messaging system and that too from anywhere anytime. The majority of people search on the vast Internet about their symptoms to find a solution or what the problem is, but they might be fed with false information due to the huge amount of data that vary from article to article on the same topic and also the person can get confused. To avoid all these things, we use a Chatbot which provides accurate information to the user by narrowing down all the data which is verified by the health professionals and organizations into its dataset. [7]

## 7. Survey And Results

A survey was conducted to see and understand the people's perception of the healthcare chatbot system using AI. The survey was conducted among (n=116)116 people between the age group of 18-55 years.

(1) Do you think AI integrated chatbot systems are useful towards human society?

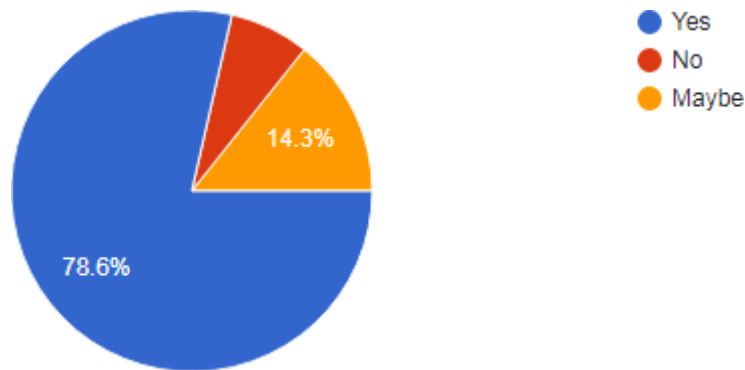


Figure 4.

More than 78% of the people think AI in chatbots are a great source to serve humans efficiently in healthcare.

(2) Have you ever used a Health-care chatbot system?

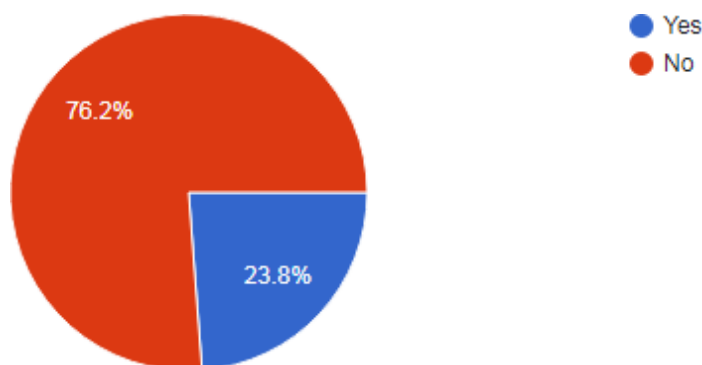




Figure 5.

Upto 76% had never experienced Automated Healthcare Chatbot using AI, this system is surely going to help to change their lives in taking care of their health.

(3) Do ever get confused with the symptoms of any disease or have no clue what's happening to you?

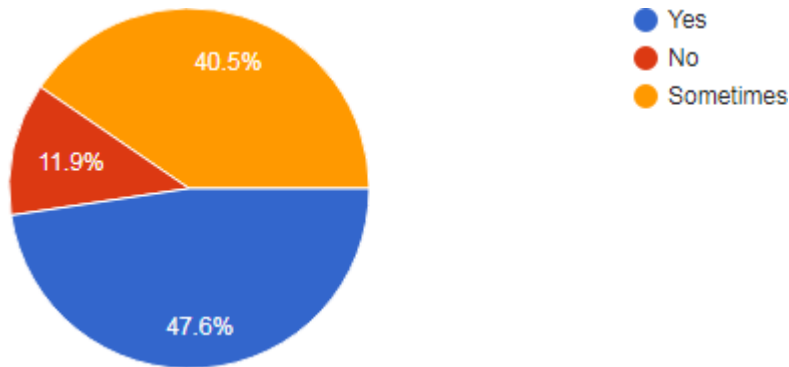


Figure 6.

Only 12% of the people had a clear idea/vision of what was happening to them. So by using our system, it is clearly going to help them keep a track of their medication profile and all the symptoms and diseases that they are going through.

(4) Do you feel a need for medical guidance in case of emergencies until the actual help arrives?

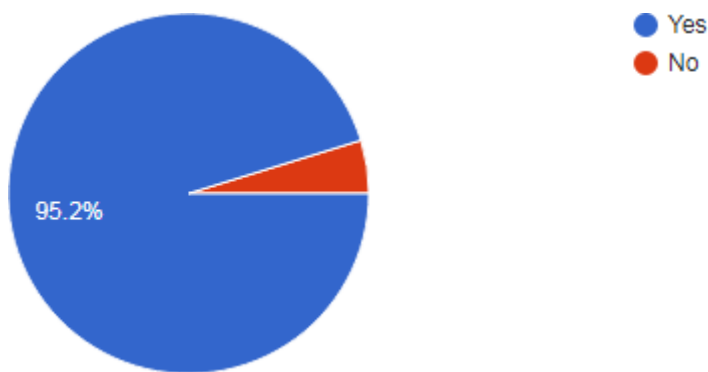


Figure 7.

95% of the total people felt that there should be a way for medical guidance in emergencies until the actual help arrives. We can overcome this situation by using the emergency virtual assistance mode for guidance of our system.

(5) Do you always have a clear-cut idea about the use of your medicine that you buy or which is suggested?

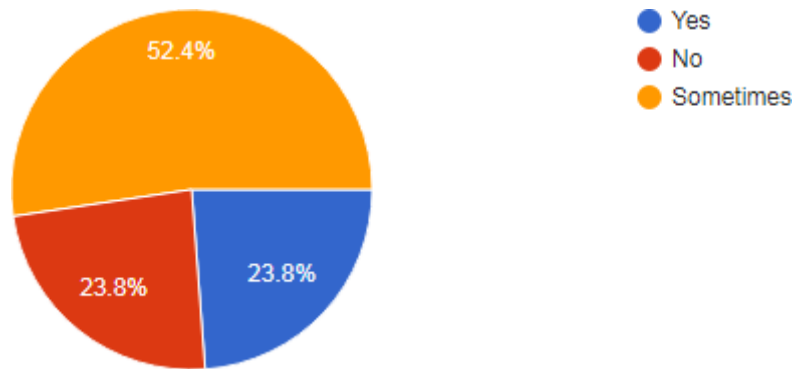


Figure 8.

Almost 76% of the people were either confused or were having no idea about the medication that was given /suggested to them. So through our system they can know every detail of the medicine just by entering the name instantly.

## 8. The Conclusion

The Healthcare chatbot system helps people to keep a track of their health providing 24/7 service via instant messaging and virtual assistance for deep guidance. Users can take advantage of the real-time experience of our healthcare system as it will surely make an impact on the users daily giving them a feeling of carrying a virtual doctor in their pockets which will consult them anytime anywhere as per their need.

## 9. Acknowledgement

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## 10. References

- [1]. J. Jinu Sophia, D. Arun Kumar, M. Arutselvan, S. Barath Ram, “A Survey on Chatbot Implementation in HealthCare using NLTK”, International Journal of Computer Science and Mobile Computing (IJCSMC), Vol. 9, Issue. 3 March 2020.
- [2] Krishnendu Rarhi, Abhishek Bhattacharya, Abhishek Mishra, Krishnasis Mandal,” Automated Medical Chatbot”, SSRN Electronic Journal, April24, 2018.
- [3] Gopi Battineni, Nalini Chintalapudi and Francesco Amenta,” AI Chatbot Design during an Epidemic like the Novel Coronavirus”, MDPI, Basel, Switzerland, Published: 3 June 2020 <https://www.mdpi.com/2227-9032/8/2/154>
- [4] Hira Saeed, “Developing a Chatbot? Learn the Difference between AI, Machine Learning, and NLP”, Nov 4, 2016. <https://chatbotslife.com/developing-a-chatbot-learn-the-difference-between-ai-machine-learning-and-nlp-40a3f745aec4>
- [5] Nahdatul Akma Ahmad, Mohamad Hafiz Che Hamid, Azaliza Zainal, Muhammad Fairuz Abd Rauf, Zuraidy Adnan,” Review of Chatbots Design Techniques”, International Journal of

Computer Applications (0975 – 8887) Volume 181 – No. 8, August 2018

[6] P. Ponmurugan, B. Priyadarshini, P. Preetha, V. Preethikadevi, R. Divya,” Health Care Assisting Chatbot for symptoms and dosage prediction using IoT”, REST Journal on Emerging trends in Modeling and Manufacturing, Vol:4(2),2018

[7] Suraj Yadav, Ravi Madhesiya, Sahil Narkhede, Ajay Babar.” Medical Assistance Chatbot”, International Research Journal of Engineering and Technology (IRJET) Volume: 07 Issue: 04 | Apr 2020

[8] “Chatbots as your Doctors”, <https://marutitech.com/chatbots-as-your-doctors/>

[9] Mrs. Rashmi Dharwadkar, Dr.Mrs. Neeta A. Deshpande,” A Medical ChatBot”, International Journal of Computer Trends and Technology (IJCTT) – Volume 60 Issue 1- June 2018 ISSN:

[10] “Paracetamol”,”Drugs.com”  
<https://www.drugs.com/paracetamol.html> Mar 23, 2020.

[11] Dr. Paul Raj, Murali Krishna R, Solleti Manoj Krishna, Koppolu Harsha Vardhan, Kameswara Rao M ” EMERGENCY PATIENT CARE SYSTEM USING CHATBOT”, International Journal For Technological Research In Engineering Volume 6, Issue 7, March-2019  
<http://www.ijtre.com/images/scripts/2019060729.pdf>