

Intelligent Healthbot for Transforming Healthcare

Ojas Kadu, Shubham Sihasane, Swapnil Naik, Vivek Katariya, Prof. Vitthal S Gutte

MIT College of Engineering, Department of Information Technology, Pune, Maharashtra, India

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ABSTRACT

Healthcare bot is a technology that makes interaction between man and machine possible by using natural language processing with the support of dialogflow. Now a day people tend to seek knowledge or information from internet that concern with health through online healthcare services. The basic aim of this system is to bridge the vocabulary gap between the doctors by providing instant replies to the questions posted by patients. Automatic generated content for healthcare services are chosen instead of traditional community generated systems because they are reliable, compatible, and provide instant replies. This project report proposes a conversational Healthcare bot that is designed to prescribe, suggest and give information on generic medicines for diseases to the patients. The study introduces a computer application that act as a healthcare consultant for the patients or parents who are confused with the generic and various types of medicines for diseases.

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KEYWORDS: Chatbot, machine learning, Healthcare, Dialog flow, Artificial Intelligence, Automation, eHealth, Conversation Agents

I. INTRODUCTION

We have seen robots performing and executing jobs without human assistance in over last 10 years. Not just the mechanical robots but also automated programs which can modify their output based on self learning. Use of machine learning is increasing tremendously in computer industry. There are multiple industry that have significantly impacted through machine learning. Healthcare sector is no different. Right now Machine learning or AI is been used in Medical diagnosis and treatment. Use of Pattern matching has increased in disease detection based on health data. The integration of Machine Learning in healthcare with a chatbot as your doctor is set to witness a significant paradigm shift.

We are already seeing image recognition algorithms assisting in detecting diseases at an astounding rate and are only beginning to scratch the surface. Chatbots are slowly being adopted in healthcare. The global chatbot market is estimated to touch at least \$1.23 billion by 2025.

ELIZA was interestingly one of the first chatbots developed in 1966, which happened to be a psychotherapist. It was just a computer program designed to answer user queries like a psychology professional to an extent where user believed that it is talking to real doctor.

Literature Survey

Table 1.1

Title	Author	Publication year	Findings
Chabot's meet eHealth: automatizing healthcare	Flora Amato, Stefano Marrone, Vincenzo Moscato, Gabriele Piantadosi, Antonio Picariello, and Carlo Sansone	2017	In this recommendation system has been The recent advances of technologies for data processing and analytics have radically changed the healthcare giving rise to digital healthcare solutions, promising to transform the whole healthcare process to become more efficient, less expensive and higher quality.
Text-based Healthcare Chatbots Supporting Patient and Health Professional Teams:	University of St. Gallen, Institute of Technology Management, St.Gallen, Switzerland	2016	Technology-based self-service channels [41] and digital health interventions [1, 31] have the potential to support patients in their everyday life and health professionals likewise. Although there are scalable self-service channels in the form of digital voice assistants and chatbots offered by Apple (Siri), Amazon (Alexa), Google (Assistant), Microsoft (Cortana) or Samsung (Bixby), they cannot (yet) be applied in healthcare.

Chatbots with Machine Learning: Building Neural Conversational Agents:	[Luba Belokon]	Sep 2015-2016	There are two major types of dialogue systems: goal-oriented (i.e. Siri, Alexa, Cortana, etc.) And general conversation (i.e. Microsoft Tay bot). The former help people to solve everyday problems using natural language, while the latter attempt to Talk with people on a wide range of topics.
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II. Ease of Use

A. Chatbot as Healthbot

As chatbots in healthcare are highly in demand, medical institutions can offer various services from symptom checking and appointment scheduling to dealing with additional questions. People are able to get answers to their additional questions with the help of chatbot. There is no need for them to call the clinic to clarify some misunderstanding.

B. An overlook on existing problems

Nationally, medical attention was missing in the case of nearly one-third of all deaths. It is likely that most of those deaths warranted some kind of medical attention, and that such attention would have been provided if the households in which these deaths took place were as rich as the top 15%.

The absence of a well-functioning public health system and the low penetration of health insurance has created a situation, wherein a significant share of India's population seem to avoid the formal medical system, lest they face a debilitating financial burden, and land in a debt trap. The high financial burden is also reflected in the extraordinarily high share of out-of-pocket health expenses in the country. Out-of-pocket expenses are high not just in comparison to other large emerging markets, most of which are richer than India, but also in comparison to countries with a per-capita income level similar to that of India

III. Proposing chatbot as an alternative system

The use of chat-bots has spread from consumer customer service to matters of life and death. Chat-bots are entering the healthcare industry and can help solve many of its problems. Chat-bot is a computer program designed to carry on a dialogue with people, particularly on the Internet. It assists individuals via text messages within websites, applications or instant messaging and enables businesses to attract, keep and satisfy clients. This kind of bots is an automated system of communicating with users.

There are chatbots which can provide information to the following and similar to them questions.

"How long is someone infectious after a viral infection?"

"How can I get a prescription?"

"How can I find out my blood type (blood group)?"

Thereby, clinics building a chatbot for their sites, lower the number of repetitive calls that their specialists have to answer. This, in its turn, enables hospital employees to concentrate on more significant tasks which will lead to better healthcare service quality.

The proposed system will not only provide the personal assistance to the patients but also users can keep their previous medical record on the platform for future use. The platform will provide a conversational experience to patients acting like a doctor is treating them online.

A. Support from Healthcare Industry

The Goal is to introduce Health Bot, a system designed to improve the eHealth paradigm by using a chatbot to simulate human interaction in medical contexts. Based on Machine Learning and Artificial Intelligence techniques, the chatbot is able to overcome the limitation of classical human-machine interaction, thus removing bias and allowing the patient to a freer and natural communication. A chatbot can successfully be designed to work as a helping tool in doctor-patient communication, but it must be emphasized that it should work as a supplement and never replacement.

All healthcare providers are always willing to help their patients and they understand how it is vital to be available if there is urgent need of medical attention. Unfortunately, doctors have limited time and a lot of patients which doesn't allow them to be available anytime. In their turn, chatbots are there for those who need medical assistance at all time. Furthermore, virtual assistants may be responsible for reminding users to take their medicine and monitoring a patient's health status.

B. Proposed Interaction through Healthbot

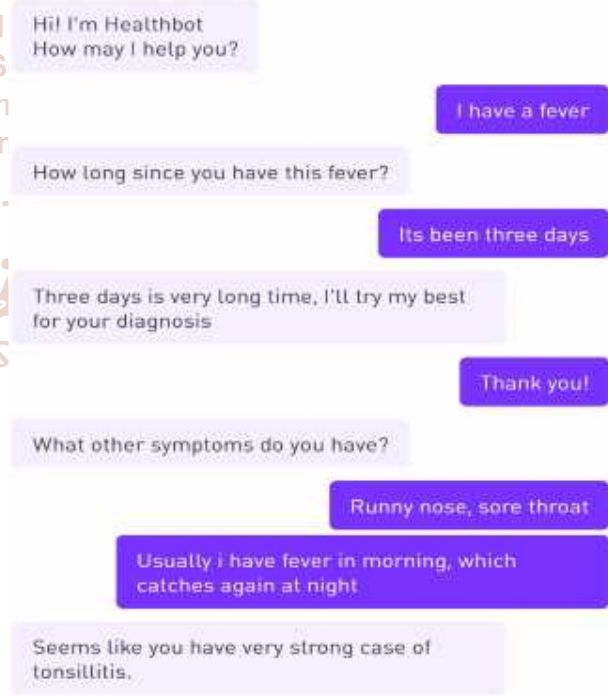


Fig 2.1 A Simple Health based conversation

The system can go forward to do medical counselling based on their symptoms to provide the medicines at first aid level. The users can get a library of various diseases which will provide the basic information about the disease, symptoms, causes, diagnosis, treatment, prevention and other frequently asked questions.

It will improve the healthcare in India at reduced costs. They can always ask medical questions and receive answers promptly and in a timely manner.

C. Study of Existing System

HOLMeS- Holmes ChatBot is the agent designed to make patient feel more comfortable, by interacting with it by a chat. Based on deep learning, it is designed in order to understand and to adapt to several interaction schema, ranging from formal writing to more handy ones. It is the HOLMeS System entry point and interacts with the user to let her/him choose the required service. It is also intended to kindly ask the user for required information (such as age, height, weight, smoking status, and so on) just as a human physician would behave.

IBM Watson- (with its Conversation APIs) is the service used to establish a written conversation, simulating human interactions. Its main features include text mining and natural language processing by means of deep learning approaches.

Computational Cluster-implements the decision making logic. It uses the Apache Spark cluster executed over the Databricks infrastructure, in order to be enough fast and scalable to be effectively used in a very big clinical scenario, ensuring response time comparable to that of a human physician. It uses machine learning algorithms from Spark ML library while the storage service is delegated to Hadoop HDFS.

D. Inference through studies

After studying Existing System we came to conclusion that the current system lack the ability of applying artificial intelligence for disease detection. It uses various machine learning techniques for pattern matching to create smooth interaction with patient and help patient with previously supplied knowledge. These systems are of no use in case of emergencies and exception cases. The current systems lack the ability of creating new knowledge and storing these insights.

IV. Design

The proposed system will interact with user via web based platform by using login/registration system. After that there will be a user dashboard for user profile management and medical records management.

The chatbot can answers to the users based on their disease related queries based on symptoms, causes, and prevention or medicine suggestion.

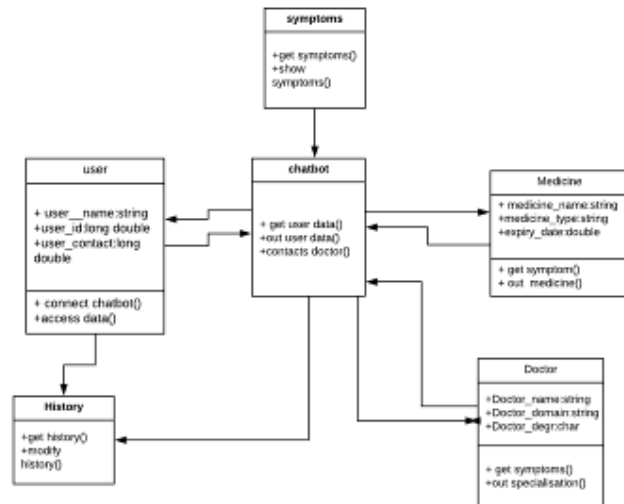


Fig. 4.1

A. Proposed Architecture

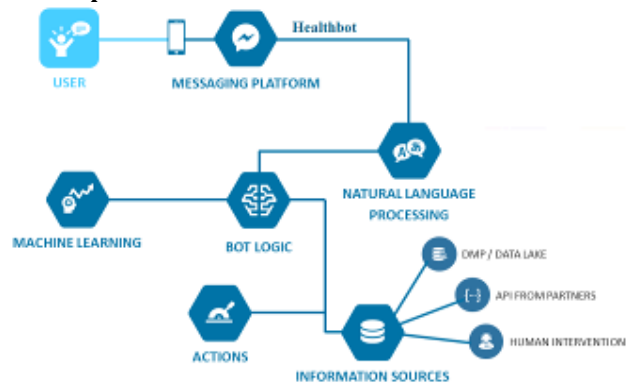


Fig. 4.2 Healthbot Architecture

B. General Functionalities.

- The patient desires to obtain general-level evaluation about the symptoms
- The patient desires to obtain detailed indications about a specific disease prevention pathway (only after a general survey has been carried out).
- The user asks for general information about the system and its functionalities
- The user may like to have detail assessment through a conversation with healthbot, before proceeding towards actual human based medical counseling.
- The patient wants information about previous history generated.
- The user wants information about the affiliated medical centre.

C. Datasets

Healthcare | data.gov.in

<https://data.gov.in/keywords/healthcare>

The Ministry of Health and Family Welfare, Government of India has set up the ... Commission, to provide healthcare related information to the citizens of India.

Data.gov

<https://data.gov.in/>

A single point access to information and datasets provided by gov of India under public domain

HealthData.gov

Site is dedicated to making high value health data more accessible to entrepreneurs, researchers, and policy makers in the hopes of better health outcomes for all. Information includes clinical care provider quality information, nationwide health service provider directories, databases of the latest medical and scientific knowledge, consumer product data, community health performance information, government spending data and much more.

D. Result

The aim of this Conference Paper was to introduce Health Bot, a system designed to improve the eHealth paradigm by using a chatbot to simulate human interaction in medical contexts. Based on Machine Learning and Artificial Intelligence techniques, the chatbot is able to overcome the limitation of classical human-machine interaction, thus removing bias and allowing the patient to a free and natural communication.

A chatbot can successfully be designed to work as a helping tool in doctor-patient communication, but it must be

emphasized that it should work more importantly as supplement and not a replacement.

E. Conclusion

In conclusion the chatbot or healthcare bot was successfully able to understand user/patients healthcare related queries and lead the conversation to final diagnosis by an effective text based diagnostic technique. It applied various Machine Learning algorithm in background for effective text analysis and Also performed Intent and entities based analysis for implementing smooth chatbot conversation.

As a future scope we are working on adding more intents and better specification of entities to cover more symptoms and to make chatbot able to diagnose more diseases.

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