

MEDIBOT: INTELLIGENT HEALTHCARE ASSISTANT

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ABSTRACT

A state of complete physical, mental, and social well-being is called health. Although chatbots have been used in this sector a lot and in many different contexts in the past, there is always an opportunity for additional creative applications. AI use cases for healthcare conversations can be customized and suited to specific industries. Patients may utilize them to learn more about their condition, possible treatments, or even the extent of their insurance coverage. Numerous healthcare organizations are thinking about implementing healthcare chatbots into their operations because studies have shown that they can greatly decrease wait times and increase patient satisfaction.

There are several uses for chatbots in the healthcare industry, including monitoring, anonymity, customisation, in-person interaction, and more. In this case study, the probable illness type of the patient will be ascertained based on the user's input regarding the patient's symptoms. Precautions will be advised based on the nature of the illness, and the patient will be referred to a physician who specializes in that area. The symptoms in the text were extracted using a sequential model, and the patient's condition type was then predicted using the CNN method.

Keywords: Chatbot, CNN, AI, Machine Learning

I. INTRODUCTION

By responding to user-submitted queries, the major objective is to bridge the communication gap between patients and healthcare providers. Internet addiction is more common than ever now, yet self-care is valued less. People sometimes decide against going to the hospital for mild ailments that could easily turn into serious ones. It has been proven that creating question-and-answer forums, as opposed to sifting through a long list of potentially useful web resources, is a successful response to such queries. There are several limitations and shortcomings with the current approaches, two of which are that patients frequently do not receive a prompt answer and must wait a long time for professionals to respond to their demands. With some surgeries, there might be a fee. The system develops a convincing Graphical User Interface to give the user the impression that they are conversing with a real person. a chatbot that might be applied to several industries, including navigation, healthcare, and education.

II. LITERATURE SURVEY

Chatbots with AI can evaluate patients and point them in the direction of the best course of action. Compared to chatbots, web searches are thought to be less reliable and accurate. To have a happy life, one must be in great health. However, making a doctor's appointment is getting harder and harder. The goal is to create a medical chatbot that uses AI to suggest physicians that specialise in a particular area of artificial intelligence-powered chatbots across a range of industries including telecommunications, this article discusses e-commerce, call centres for customers, banking, and health. Additionally, the results of a sample donation service created for a telecom service provider using the suggested design are shown [8].

In-depth evaluations of some of the newest chatbot systems and articles written on a range of topics are conducted in this article. To comprehend the most current developments in the creation of chatbot systems, these recent publications have been evaluated with special attention paid to the type of knowledge offered to these systems, and the domain for which these systems have been established, among other characteristics [9].

This work outlines a novel recommendation strategy that primarily relies on a chatbot that is specifically designed and that can be linked with the website Moodle through a web-based setup. A chatbot is an automated

communication tool designed to simulate human communication skills and participate in conversations with other people. With the suggested strategy, it should be possible to provide real-time answers to learners' questions and a set of concepts that apply to their requirements [10].

The main goal of this post is to showcase Dost, a Rasa-built Telegram chatbot, as a resource for mental health. Before making suggestions for ways to make the user's situation better, it is expected that the system would first try to comprehend the user's difficulties through regular, informal talks. To make mental health facilities accessible to everyone, from students to senior residents, and to provide round-the-clock assistance in the absence of physicians, chatbots will play a critical role in the future of healthcare [11].

This study differs from others in that it uses the Chabot platform to give virtual training in a health enterprise context. The purpose of internal training is to increase the knowledge and skills of the employees so that the health organisation can accomplish its goals. Because there are numerous factors to take into account when choosing between various Chatbot platforms, this study suggests the Fuzzy Analytic Hierarchy Process as a remedy.

Finally, it is advised that the business conduct internal training using the Carik platform [12]. This study is unique from others in that it conducts virtual training for a health organisation using the Chabot platform. Internal training's goal is to improve staff members' knowledge and abilities so that the health organisation can achieve its objectives. This study recommends the Fuzzy Analytic Hierarchy Process as a solution because there are many things to consider while deciding between different Chatbot systems. Finally, it is advised that the company use the Carik platform for internal training [13].

A chatbot that would routinely evaluate senior folks' health was proposed. To construct personal health records (PHR), the data from the elderly is gathered. Conversational chatbots are created to engage with seniors using the LINE platform. Doctors may more correctly diagnose illnesses and offer treatments thanks to the results of this study, which they can use after analysing daily PHR. Additionally, the geriatric blood pressure trend was tracked using the linear regression technique [14].

In this study, Machine learning methods to use characteristics to predict cardiovascular disease are suggested. One of the factors that are focused on for prediction is BMI. For predicting cardiovascular disease, BMI is crucial. The paper's primary discussion points are BMI and the prognosis of cardiovascular disease. It has been proposed that the model make use of a variety of attributes as well as regression and classification techniques [15].

Today, chatbots can do a variety of tasks with the least amount of waiting time and expense, including reducing agent transfers, speeding up issue resolution, enhancing self-service, etc. Other chatbots are now able to carry out prediction tasks thanks to developments in AI and data mining methods, especially in the medical sector. The user's input inquiry would be synced with the knowledge base by the chatbot. Every query has been associated with the knowledge base of the chatbot. From the input sentence, significant keywords are extracted, and the resemblance of sentences is discovered. Applying the N-gram, TF-IDF, & cosine similarity measures, a keyword's ranking and similarities in sentences are determined [1].

Released the retrieval-polished (RP) response generation technology, which refines a brand-new answer based on a recovered prototype. A prototype selector was specifically used to find a prototype with a similar context. To deliver a polished response, the following step is to develop a generation-based polisher. The recovered answer and the polished reply were then chosen as the final results using a polished response filter. Extensive testing on a conversational corpus shows that our approach outperforms retrieval-based and gen-based chatbots about proficiency, contextual relevance, and reply diversity [2].

Currently, there are just two fundamental models used in chatbot creation. models that draw on both generating and retrieval processes. End-to-end trainable neural networks, one of the most recent developments in deep learning and artificial intelligence, have swiftly supplanted prior techniques that depended on written instructions, patterns, or statistical techniques. A unique deep neural network-based strategy for building chatbots is suggested in this study. Using this technique, a neural network with numerous layers is built to absorb and comprehend the input [3].

Users can submit health-related problems to medical chatbots thanks to natural language processing, which underpins how they function. The user can utilise the chatbot to ask any specific queries they may have

concerned their medical care without having to go to the hospital in person. By converting voice to text as well as text to voice using the Google API. The Android app displays a pertinent response after asking a question of the chatbot. This web-based platform was developed by the System primarily to analyse customer sentiment [4].

In this work, the chatbot system can answer questions concerning the public sector's services. The framework supports complex dialogues and assists the user by providing tips and hints [5]. By answering their questions, the suggested chatbot assists users. In addition to features that were taken from our prepared dataset, The system using an ensemble learning technique called random forest is built. The proposed technique is now operational as a Telegram bot [6].

In this study, the corpus dataset is used to train the chatbot. In this dataset, 11,292 unique character pairings from 617 distinct movies interacted with 210,579 times. To convert sequences from a single field to a course in another and retrieve features from the input text, the chatbot makes use of Bag of Words and the seq2seq model. The developer can avoid manually writing the chatbot's replies by using this method. Because of its innovative design and potent NLP technology, the chatbot can provide the user with informed and useful replies. The chatbot's vocabulary may be increased only by adding more text corpora [7].

The basic working theory, core concepts, and applications purpose of this study is to assess the usefulness of the existing chatbots in terms of platforms as well as algorithms to instruments, and software, thereby among other factors [16].

In this post, we'll show you how to create an intelligent chatbot that can handle issues unique to this area of expertise. It plays the part of a teacher, offering direction and teaching the student problem-solving strategies. This programme might keep the student interested by using a chatbot to answer questions. Our system's tutoring is an identical replica of the instruction teachers provide their pupils [17].

This project investigates the concept and creation of a chatbot with sophisticated voice recognition. To illustrate how they recommended their emotions and moods. Contrarily, chatbots are constrained by a set of standards, making it feasible for them to offer a client proper and polite service. Students may ask the chatbot a question at any time of day, and they will receive a prompt response. At any time of day, thousands of individuals can converse with chatbots at once [20].

III. AIM & OBJECTIVE

- Chatbot is smart enough to respond to a particular suggestion from a database stored in it.
- To make user user-friendly GUI-based system that is easy to use by the user and whenever the user enters a text or asks a question.
- To recognize the requirement of users using NLP technology of text.
- CNN algorithm digitization works fast and processes the finding answers from data sets on keyboards written in the text.

IV. SYSTEM ARCHITECTURE

The term “architecture” refers to the conceptual representation of a system’s structure, behaviour, and other characteristics. A formal description and representation of a system designed to make it simpler to reason about its operations and structures is known as an architectural description.

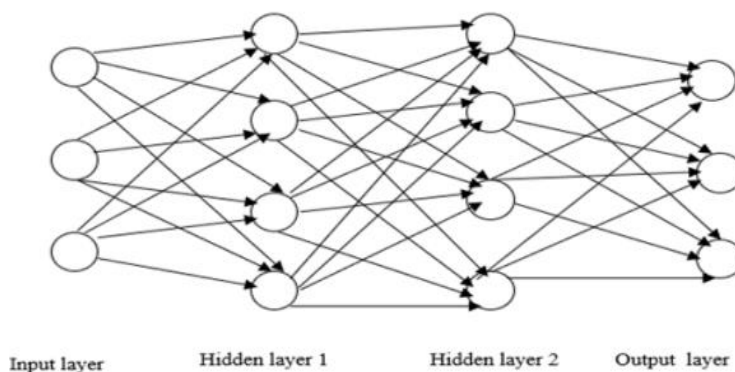


Figure 1: Architecture Diagram of a Sequential Model

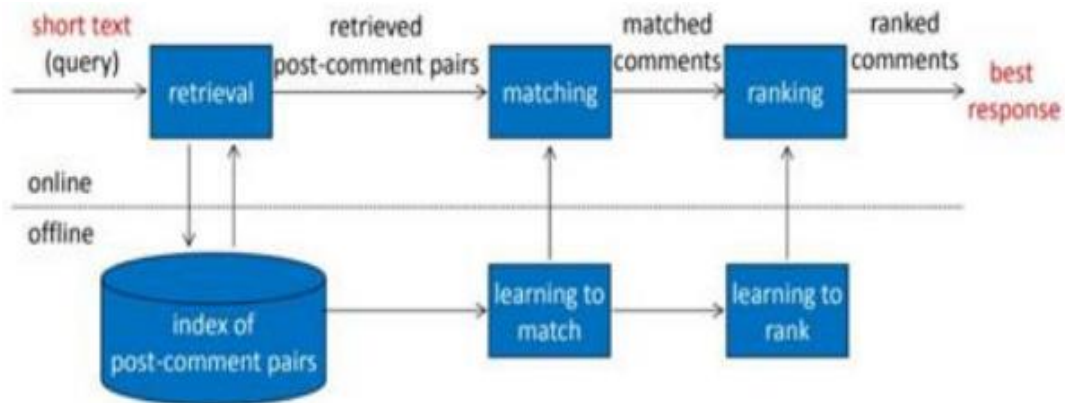


Figure 2: System Architecture

V. METHODOLOGIES

5.1 Dataset

The dataset is in the JSON file type and contains intent and tags. The purpose specifies the specific illness, and the tag for each ailment has several inquiry types.

This dataset consists of two parameters

1. Text
2. Symptoms

This dataset is mostly used to identify symptoms in text.

```

{
  "intents": [
    {
      "tag": "abdominal_pain",
      "patterns": [
        "I have abdominal pain",
        "My abdomen hurts",
        "I have pain in stomach",
        "I feel pain in abdomen"
      ]
    },
    {
      "tag": "abnormal_menstruation",
      "patterns": [
        "I have a heavy period",
        "Heavy flow on my period",
        "Period lasts longer than usual",
        "My period is really painful",
        "I have strong menstrual pain",
        "Menstrual cramps are strong"
      ]
    },
    {
      "tag": "acidity",
      "patterns": [
        "I have acid reflux",
        "I have acidity problems",
        "I have heartburn"
      ]
    },
    {
      "tag": "acute_liver_failure",
      "patterns": [
        "My liver hurts",
        "I have pain around liver",
        "Upper right abdomen hurts"
      ]
    },
    {
      "tag": "altered_consciousness"
    }
  ]
}

```

Figure 3: Sample Dataset for Training Data


```
# synthetic dataset created for neural network validation
xy_test = [
  (['ca', 'n't', 'think', 'straight'], 'altered_sensorium'),
  (['suffer', 'from', 'anxiety'], 'anxiety'),
  (['suffer', 'from', 'anxiety'], 'anxiety'),
  (['bloody', 'poop'], 'bloody_stool'),
  (['blurred', 'vision'], 'blurred_and_distorted_vision'),
  (['ca', 'n't', 'breathe'], 'breathlessness'),
  (['Yellow', 'liquid', 'pimple'], 'yellow_crust_ooze'),
  (['lost', 'weight'], 'weight_loss'),
  (['side', 'weaker'], 'weakness_of_one_body_side'),
  (['watering', 'eyes'], 'watering_from_eyes'),
  (['brief', 'blindness'], 'visual_disturbances'),
  (['throat', 'hurts'], 'throat_irritation'),
  (['extremities', 'swelling'], 'swollen_extremities'),
  (['swollen', 'lymph', 'nodes'], 'swelled_lymph_nodes'),
  (['dark', 'under', 'eyes'], 'sunken_eyes'),
  (['stomach', 'blood'], 'stomach_bleeding'),
  (['blood', 'urine'], 'spotting_urination'),
  (['sinuses', 'hurt'], 'sinus_pressure'),
  (['watery', 'from', 'nose'], 'runny_nose'),
  (['have', 'to', 'move'], 'restlessness'),
  (['red', 'patches', 'body'], 'red_spots_over_body'),
  (['sneeze'], 'continuous_sneezing'),
  (['coughing'], 'cough'),
  (['skin', 'patches'], 'dischromic_patches'),
  (['skin', 'bruised'], 'bruising'),
  (['burning', 'pee'], 'burning_micturition'),
  (['hurts', 'pee'], 'burning_micturition'),
  (['Burning', 'sensation'], 'burning_micturition'),
```

Figure 4: Sample Test Dataset

Finally, using this information, able to determine the type of sickness from the symptoms and present warnings and a description for that particular ailment. Additionally, it recommends a doctor who specializes in treating that illness.

5.2 Sequential Model

Sequence models are machine learning techniques that allow for the input or output of data in sequences. Sequential data includes text streams, audio clips, video footage, time-series data, and more. In sequence models, the method referred to as recurrent neural networks (RNNs) is frequently utilized.

5.3 Work Flow

Medibot

1. The dataset is in JSON format. Patterns and tags exist. The tags correspond to diseases, and the pattern outlines the kinds of questions that will be answered for each tag.
2. Importing the required libraries is the initial step in creating the retrieval-based chatbot.
3. Now, the dataset is added.
4. The preprocessing steps will include tokenization, lemmatization and the elimination of unnecessary symbols.
5. Make list tags for the terms three, X, and all. Although Tag contains all tags and X contains both the pattern and its tag as well as all patterns, All words contain all of the various word types that are present in the text.
6. Sort the words and tag them alphabetically before putting them in a pickle file.
7. Then turn the X into a bag of words using the all words, tag list. (If the term appears in every word or tag, give it a 1; otherwise, give it a 0.)
8. Separate the X into its y and x (from start to end-1) components (end)
9. Use Sequential, Dense to modify the dropout layer. Construct the model. Change the epoch value to get the highest level of accuracy possible.
10. Keep the design

11. Accept the categorization and then make a fresh observation or assertion.

Disease Prediction

1. The dataset is made up of CSV documents.
2. where the type of the disease is listed in the first column and its symptoms are listed in the following columns.
3. The dataset should be adjusted such that the 0/1s are in the rows and the symptoms are in the column. Columns with independent variables are placed after the dependent variable in the figure.
4. Assemble training and testing datasets.
5. Train the model using the CNN method.
6. Compare the results of the y test to your expectations to ensure the truth.

Website

1. A user looks through a webpage.
2. The user enters words to describe their problems.
3. After accepting the string, then do preprocessing on it by deleting any extraneous symbols, tokenizing, lemmatizing, and merging the outcomes into a test list.
4. After that, create a bag of words from the test list using the entire word list. If a word appears in every word, it receives a 1, otherwise, it receives a 0.
5. Forecast the class tag using the RNN model, then add the predicted tag to a list of symptoms.
6. Click Done when the user has finished entering.

VI. EXPERIMENTAL RESULTS AND DISCUSSIONS

```

sentence = "My head hurts"
array([1.19330562e-05, 4.34156050e-07, 3.85600814e-08, 1.04980045e-05,
        1.53186647e-05, 2.04953508e-07, 1.16050721e-03, 3.57316130e-05,
        2.26885386e-05, 8.27601252e-05, 1.02278955e-06, 9.97735441e-08,
        1.40030068e-07, 1.86780289e-06, 2.43614522e-07, 3.54917908e-08,
        2.78845761e-07, 1.13804936e-06, 1.01995215e-06, 4.61822736e-07,
        1.54221880e-08, 7.46847263e-07, 1.07688970e-06, 1.02285740e-05,
        2.24895702e-09, 5.63473634e-07, 7.14551834e-06, 3.27421446e-07,
        [{'intent': 'headache', 'probability': '0.995122'}])
    
```

Figure 5: Extraction of symptoms from the given text data.

```

symptoms = ['headache']
    
```

Hypertension

Figure 6: Prediction of the type of disease based on symptoms.

Hypertension (HTN or HT), also known as high blood pressure (HBP), is a long-term medical condition in which the blood pressure in the arteries is persistently elevated. High blood pressure typically does not cause symptoms.

Figure 7: Description of the disease



Figure 8: GUI Result.

VII. CONCLUSION

The conclusion is that the equipment in this situation achieves the desired results as a result of our examination. To obtain better and more reliable results, and make use of a dataset that is enough for sickness prediction. Additionally, a platform was created that hospitals and other healthcare organizations can use to respond to inquiries and provide information about nearby providers. The interaction between a machine and a user is made feasible via NLP. Therefore, based on chatbot results, disease may be predicted using the KNN algorithm. The user may discover more about their illness and the medical professionals who specialize in it. The use of speech and facial recognition by counsellors to forge closer connections with patients will be replicated by future technologies.

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