



AI POWERED CHATBOT FOR HEALTHCARE SYSTEM

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Abstract: A healthy lifestyle requires access to proper healthcare. To schedule a visit with a doctor for every health issue, though, may be exceedingly challenging. The goal is to build an artificial intelligence-powered medical chatbot that can identify an illness and provide basic information about it to a patient before they contact a doctor. Adopting a medical chatbot will lower healthcare costs and increase public access to health information. Computer programs known as chatbots communicate with people in everyday English. To identify the sentence keywords, choose a query, and provide an answer, the chatbot saves the data in a database.

Index Terms - Chatbot, Tokenization, Lemmatization, Bag of words, PyTorch, Neural Net.

I. INTRODUCTION

Today, health care is very important in our life. People today are busy working from home or in the office and are addicted to the internet. They don't worry about their health. So, avoid going to the hospital for minor problems. It can be a big problem. So, we can offer the idea of creating an AI-powered Chabot healthcare system that can diagnose illnesses and provide basic information about illnesses before consulting a doctor. This allows patients to learn more about their disease and improve their health. Users can get all kinds of disease information. The system application uses a question-and-answer protocol in the form of a chatbot to answer user queries. Answers to questions will be answered based on user requests. Important keywords are retrieved from sentences to answer these sentences. If a match is found, the critical answer is given or similar answers are displayed. The bot will diagnose what disease you have based on your symptoms and provide details of your specific disease to your doctor. By using this application system, you can reduce your health problems. The system is designed to reduce medical costs and the user's time, as the user is unable to visit a doctor or specialist immediately when needed.

II. SCOPE

Most businesses and organizations are becoming increasingly aware of how artificial intelligence and machine learning can improve business operations. Advances in artificial intelligence have made it possible to create more complex chatbots. Businesses are focusing on specific customer-facing activities that take a lot of time, but can be replaced by chatbots.

Instead of requiring customers to follow a multi-step process, chatbots can be captured in a single text. With the help of chatbots, customer care can be automated, allowing employees to spend less time on tedious manual tasks and more time on more important tasks. Most online banking businesses can benefit from using chatbots. Bots are used by internet banking service providers to enhance customer relationships. Customers can complete banking and e-commerce transactions within a single bot discussion and get quick answers to their questions.

A bot or chat robot is a computer that can understand human speech or text. A chatbot is simply a computer program that mimics human conversation at a basic level. It enables communication between humans and machines, which can be done via messages or voice commands. Chatbots are developed to work without the help of human operators. It can respond to requests in plaintext and behave like a human. His answer is based on a combination of pre-built scripts and machine learning software.

III. RELATED WORK

Simon Hoermann describes currently available data on the feasibility and effectiveness of text-based, synchronous chat-based online one-to-one mental health therapy. Synchronous text communication (sometimes called "chat") is increasingly being used as a form of online mental health therapy. This study is based on an analysis of many synchronous web-based chat programs. Existing data on the use of this technique provide preliminary support for interventional approaches. Text-based synchronous communication-based treatments showed superior outcomes to wait-list situations, generally comparable outcomes to usual care, and were at least as effective as comparative interventions. Future studies should evaluate how cost-effective these techniques are in the clinical setting.

Saurav Kumar Mishra claims that chatbots will act as virtual doctors, enabling conversations between patients and virtual doctors. Pattern matching and natural language processing algorithms were used to create this chatbot. Created using Python as programming language. The results of the survey showed that 80% of his chatbot answers were correct and only 20% were ambiguous. This chatbot survey and its data analysis suggest that this program can be used for primary health care, awareness, and education.

One of her ideas put forward by Divya Madhu was for AI to identify diseases based on symptoms and provide a list of viable treatments. By examining a person's body on a regular basis, potential concerns can be anticipated before they harm the body. This study does not address some of the challenges that need to be addressed for successful adoption of personalized medicine, including: B. Government Regulation and Investigation and Enforcement Costs.

IV. SYSTEM DESIGN

4.1 System Architecture

A system architecture diagram is used to represent the component architecture of a system in an abstract way. Briefly describe the component architecture of the system to improve the interaction between components and system performance. System architecture diagram is a visual representation of your system architecture. Describes the relationships between the various parts of the system and the tasks they perform. The major system functions and connections between various system components are mapped to the overall system model.

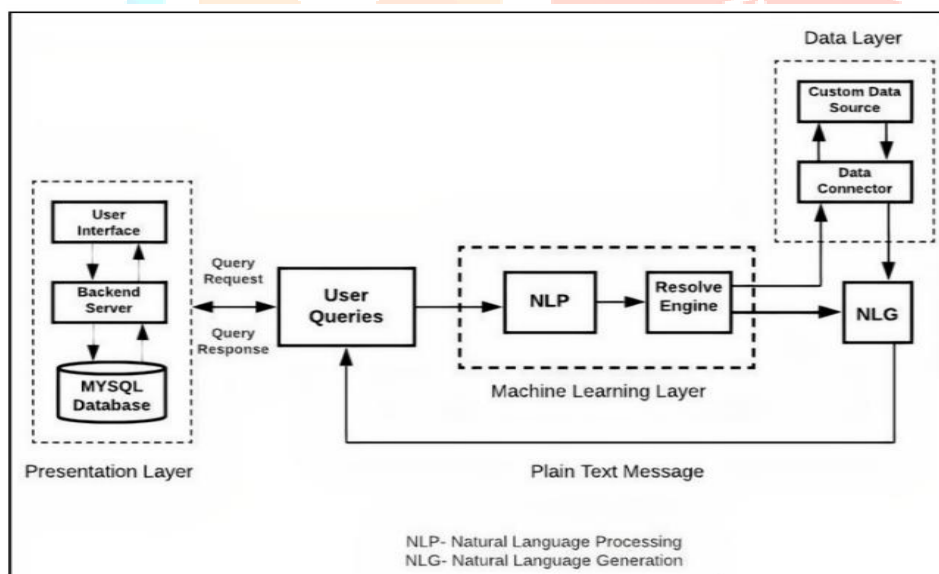


Figure 4.1: System architecture

V. METHODOLOGY

5.1 Data Preprocessing

5.1.1 Tokenization

A text or audio stream is tokenized when it is split into smaller pieces called tokens. These tokens are typically words or punctuation marks separated by spaces or other delimiters. Natural language processing (NLP) tasks such as text classification, information retrieval, and machine translation all require tokenization as an important pre-processing step. Tokenization is primarily used to convert text into a form that can be quickly processed by computer programs. Different tokenization approaches are used in NLP, depending on the specific task and language you are working with.

5.1.2 Lemmatization

Lemmatization is a natural language processing (NLP) technique that transforms words into basic or dictionary forms called lemmas. The main purpose of lemmatization is to group inflections of words such as "run", "ran", and "running" so that they can be analyzed as a single element. Lemmatization is an important preprocessing step in many NLP tasks, such as text classification, sentiment analysis, and information retrieval. It helps to reduce the dimensionality of the text data and improve the accuracy of the analysis. The process of lemmatization involves identifying the part of speech (POS) of a word and applying different rules to convert the word to its base form.

5.2 Feature Extraction

5.2.1 Bag of words

The Bag of Words (BoW) model is a strategy used in natural language processing (NLP) to describe text data as a series of individual words, ignoring order and grammatical structure, but track frequency.

The term "word bag" suggests that text can be viewed as a word bag, with each word treated as a separate object. For NLP applications such as text classification, sentiment analysis, and topic modeling, BoW models are a popular and efficient technique for describing text data. The BoW model first decomposes the text into words, removes stop words (words that are commonly used in the language but have no meaning in the text), decomposes the text again, and extracts the original words from the corpus. Each page in the corpus is given a high-dimensional sparse vector representation by counting the frequency of each word in the lexicon.

5.3 PyTorch

Two high-level features of the Python library PyTorch are:

- Deep neural network based automated grading system using tape.
- Tensor computation with powerful GPU acceleration (such as NumPy).

To build neural networks, PyTorch uses a new technique for playing back recordings made with tape recorders. Most frameworks like TensorFlow, Theano, Caffe, CNTK provide a static representation of the world. The same structure should be used again when creating a neural network.

If you want to change how the network works, you have to start from scratch. Reverse-mode automatic differentiation, a technique used by PyTorch, allows the behavior of the network to be changed at will without delay or overhead.

5.4 Neural networks

5.4.1 Training of Neural Network

You can use the Torch.nn package to create neural networks. A powerful Python library for building deep learning models is PyTorch. Provides everything you need to define, train, and apply inference neural networks.

Neural networks can be created using the Torch.nn package. A neural network is created with only one hidden layer and one output unit. Both the level and the forward(input) method that returns the output are contained in nn.Module.

Take a look at this network for digit image classification as an illustration:

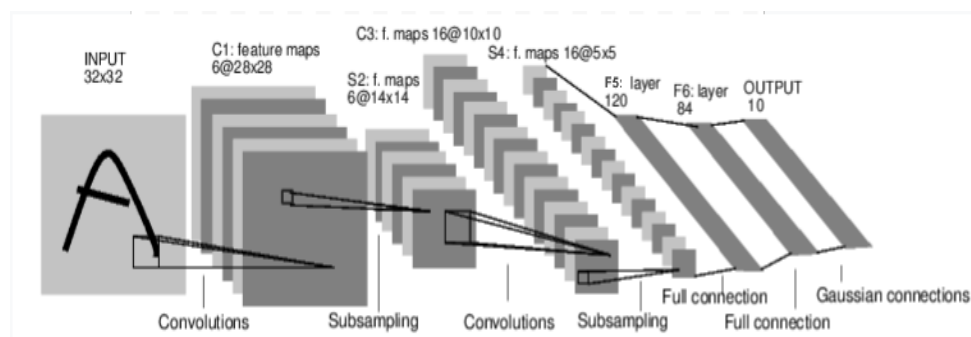


Figure 5.4.1: Network for digit image classification as an illustration

It's a simple feedforward network. It starts with the input, sequentially passes through a series of layers, and then outputs the result.

A typical neural network training process is described below.

- Describe neural networks with specific learnable weights or parameters. It iterates over a set of inputs, processes the inputs through the network, computes the loss (distance from the accuracy of the output), and reproduces the gradient of the network's parameters by computing the loss.
- Update network weights, often using simple update rules.

$$\text{weight} = \text{weight} - \text{learning rate} * \text{gradient}$$
- You just define the forward function and autograd defines the backward function (where the gradients are computed). You can use any tensor operation in the forward function.
- `Net.parameters()` returns the model's learnable parameters.

5.4.2 Working of Feedforward Neural Network

It's time to input our vectors into a neural network and get our chatbot functioning.

A high-level explanation of a neural network:

- An NN takes in input and provides an output as a function. These outputs are generally some sort of prediction.
- There are three types of layers: an input layer, an output layer, and a hidden layer. Input and output layers are pretty obvious. A hidden layer takes the input of the previous layer and applies an activation function (something that changes the value). There can be multiple hidden layers in one network.
- Once we get a prediction, we compare it to the correct value to see how close it is. If the difference between the two is high, we reduce the error. We repeat this process and constantly reduce the error until it's relatively low. This process is called gradient descent.

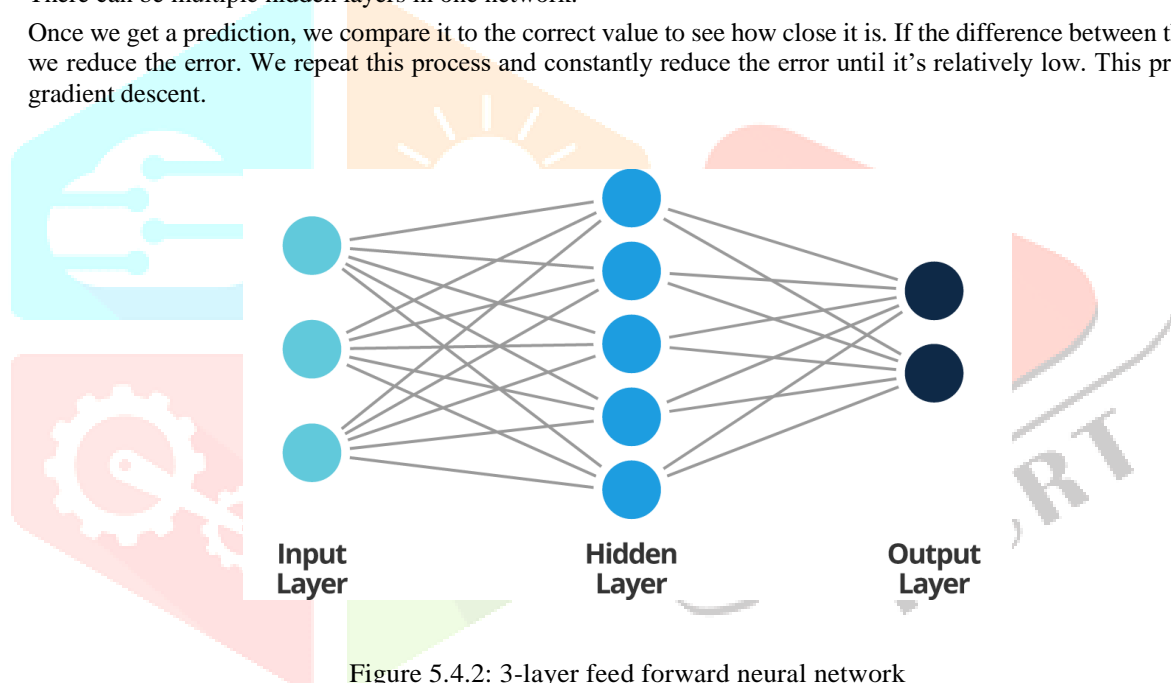


Figure 5.4.2: 3-layer feed forward neural network

5.5 Tkinter

Tkinter is a widely used GUI (Graphical User Interface) toolkit for the Python programming language. Provides a set of widgets that can be used to create user interfaces. Tkinter is a cross-platform toolkit. This means it can be used on Windows, Linux, and macOS operating systems.

Tkinter was developed as a wrapper around his Tcl/Tk GUI toolkit developed by John Ousterhout in the late 1980s. Tcl/Tk was originally used to create graphical user interfaces for tools called "Tool CommandLanguage". It has since been expanded to include other languages such as Python, Perl and Ruby.

The Tkinter library comes with Python as a default module. This means you don't need to install any additional packages to use Tkinter. Tkinter provides various widgets such as buttons, labels, frames, textboxes, radio buttons, check boxes, etc.

VI. RESULTS/OUTPUT

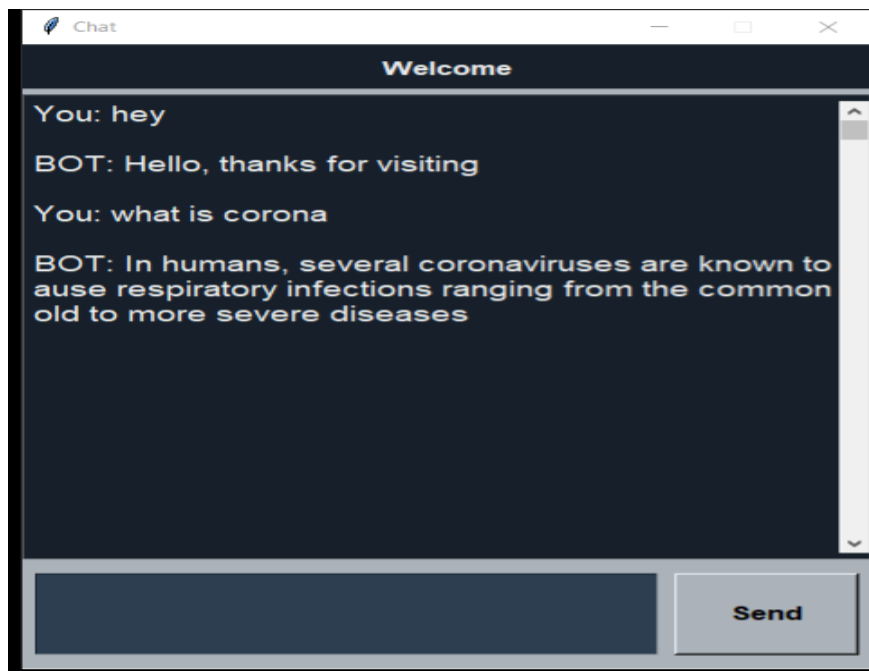


Figure 6.1: Chatbot responses in GUI window

VII. CONCLUSION

Chatbots are great tools for human-machine interaction. This program is made to get an immediate response from the bot. This means users get accurate results instantly.

The use of the chatbot was judged to be easy to use and accessible to anyone who can write in their native language. The chatbot will perform an individual diagnosis according to the symptoms. After researching some magazines, I found that anyone who can type in their native language on his app on mobile or the desktop version can use chatbots. Medical chatbots provide personalized diagnoses based on symptoms. Integrating support for more medical parameters, such as symptom location, duration, and severity, as well as more complete symptom descriptions, could greatly improve the efficiency of bots in diagnosing and detecting symptoms in the future. There is. AI algorithms and training data are widely used to build personalized medical assistants. Finally, the application of personalized medicine will effectively save many lives and raise public awareness of health issues. As mentioned earlier, the future is the age of messaging apps, and individuals spend more time using messaging apps than any other. In addition to personalized diagnoses based on patient symptoms, the bot uses text-to-text diagnostics to converse with patients about health issues. As a result, people become aware of their health and are properly protected.

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