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Food Recommendation System using Chatbot

Praneetha Praveen Kumar[1], Sachin P [2], Manjunath G.S.[3]

[1]VIII Semester, Dept. of ISE, BNMIT
[2] VIII Semester, Dept. of ISE, BNMIT
[3]Asst. Professor, Dept. of ISE, BNMIT, Karnataka, India

Abstract - *Diet is a very important aspect in today's world with the pandemic going on, consumption of right kind of food in right amount can be vaguely defined as diet. Lately, Diet is something which is not given much importance. In 2020, according to the International Diabetes Federation (IDF), 463 million people have diabetes in the world. People suffering from diabetes need to have control about their consumption of food. To make an individual understand the importance of diet and diabetes, we are trying to build a chatbot which serves the purpose. Therefore, a user-friendly conversational agent like chatbot can be implemented for better user interaction which can give solutions to people's common questions like – "What type of food should I eat?", "Can I eat junk food?", "Which diet is better for a person who is suffering from diabetes?" and so on. The proposed system also tries to recommend medicine dosage according to the doctor's prescription. It also calculates the BMI (Body Mass Index) and tries to provide regular diet for individuals too.*

Key Words: **Chatbot, BMI, Food, Diet, RASA**

1. INTRODUCTION

Good amount of nutrients in our body is an important part of leading a healthy lifestyle. Good food combined with physical activity can make a person physically fit and mentally too. To maintain both physical health and mental health, a diet plays a very important role. The proposed system is uses Rasa, which is a python based open source chatbot framework. According to a poll undertaken by the World Health Organization (WHO), roughly 30% of the world's population is affected by diseases such as diabetes, high blood pressure, and so on. Malnutrition is also responsible for around 60% of all child deaths each year. According to a WHO study, poor and unbalanced dietary intake is responsible for roughly 9% of heart attack fatalities and 14% of gastrointestinal cancer deaths worldwide.

Furthermore, around 0.25 billion children are Vitamin A deficient, 0.2 billion people are iron deficient (anaemia), and 0.7 billion people are iodine deficient. Keeping all these statistics in mind, the proposed system tries to provide a healthy and likeable diet to the user in order to improve their food intake and maintain their physical and mental health. After the pandemic hit the world, people are scared to visit hospitals for small diseases. Since healthcare plays a major role in one's life, a chatbot can be of great use at their ease.

The following foods are part of a healthy diet:

- Fruit, vegetables, legumes, nuts, and whole grains are all good sources of fibre.
- A minimum of 400 grammes of fruits and vegetables each day, omitting potatoes, sweet potatoes, cassava, and other starchy roots.
- Less than 10% of total energy intake from free sugars, which is comparable to 50g for a healthy body weight consuming roughly 2000 calories per day, but ideally less than 5% for added health benefits. Sugars added to foods or drinks by the manufacturer, cook, or customer, as well as sugars naturally found in honey, syrups, fruit juices, and fruit juice concentrates, are all considered free sugars.
- Consume less than 5 grammes of salt every day. Iodized salt should be used.

2. LITERATURE REVIEW

1. This paper discloses a virtual conversational method and system to relieve the psychological stress of adolescents. This Chatbot will allow a user to simply ask questions in the same way that they would address a human. The technology at the core of the proposed chatbot is Natural Language Processing ("NLP"). The authors for this paper are Dr. Dipti Patil , Surekha Iyer, Pooja Mehta, Deesha Gavand. The idea behind this chatbot is to develop a BMI calculator by taking in personal details of the user. Based on the user's BMI, the bot calculates required diet system. The methodology used is RASA. [1]

2. The title of the second paper [2] is Diet- Right : A Smart Food Recommendation System and authors of the paper are Faisal Rehman, Osman Khalid , Nuhman Ul Haq , Atta Ur Rehman Khan , Kashif Bilal , And Sajjad A. Madani. Diet- Right is a food recommendation system which is cloud based, which helps in controlling various diseases.

It is collection of many recommendation systems, like

a. Food recommendation System

b. Diet Plan Recommendation System,

c. Health Recommendation System.

The system mainly focuses on diabetic patients. Uses ACO (Ant Colony Optimization) algorithm is used to generate food for the users. It is a constructive and population based-approach which relies on social behaviour of ants. It is used for training the model with the values along with different parameters.

3. By embracing the bottom level implementation of natural language processing, this study presents a mechanism for constructing knowledgable chat applications that do not allow the user to transmit unsuitable or improper messages to the participants (NLP). The author of the paper are N.Naveenkumar, M.Hemanth Reddy, S.Sai Nikitha , T.SaiRam Reddy [3]

4. In this paper [4], the users have to register themselves to initiate conversation with chatbot. If the chatbot isn't aware of the answers, then an expert system is used to answer the queries. Data is stored in database in the form of pattern-template. The user gives the input in a textual format and then the chatbot will perform the pre-processing steps where tokenization is incorporated and along with feature extraction, all words are tokenized and stop words are deleted. n-gram, TF-IDF, and cosine likeness are used to extract features. Stop words extraction aids in the extraction of significant words from sentences.

5. ICD-10 is an essential process in transforming descriptions of medical diagnosis and procedures into universal medical code numbers.

Here, Dialog flow was chosen to develop a chatbot where the input will be processed into intent and context. The result will be selected by chatbot based on how close it is with user's volition and reply can be in text, audio, images etc.[5]

6. Poor nutrition can reduce immunity and are more prone to diseases, reduces productivity, increases physical and mental development. This paper aims in providing healthy nutritional recommendation [6].

3. PROPOSED METHODOLOGY

The proposed system is a chatbot which tries to act as a mediator between the system and the user. Once the user sets up his credentials, the user logs into the system and starts to have a conversation with the system. The system takes in basic information like name, height, weight and other personal details. Our chatbot mainly focuses on diabetes. The system provides a diet for a person suffering from either type 1 or type 2 diabetes. Based on the data collected about the user's health related details, the chatbot goes back to the database to find the response for the user's intent. Once the repose is collected by the chatbot, it is then verified and the response is given to the user. Diabetes is one of the most common chronic disease in India. People do not pay much attention to it and consume any kind of food. In a long run, food which contain a lot of sugar content is not good for the body and will lead to diabetes. It has become so common in the current day world that, children who are about 4 or 5 is suffering from diabetes and are not allowed to eat food containing sweet. Considering all the above facts, a food recommendation system which recommends food to users based on their sugar levels. Rasa is a machine learning framework for creating AI assistants and chatbots that is open source. To work in Rasa, you don't usually require any programming language experience. Although there is a programme called Rasa Action Server that requires you to write Python code, it is primarily intended to trigger external activities such as calling Google APIs or REST APIs.

The following figure shows how the flow of Rasa works:

1. The user receives the message in the bot which is passed to the interpreter. In the interpreter the message is converted into a dictionary which includes the original text, the intent and the entities that were found. This process is handled by NLU.

2. Tracker is an object which keeps track of conversation state. Tracker will be intimidated when a new message arrives.

3. Policy will receive the current state of tracker. It also decides which action to consider next.

4. The chosen action will be logged by tracker as it helps in keeping the track of path or flow of conversation.

5. Response will then be sent to user who then replies accordingly.

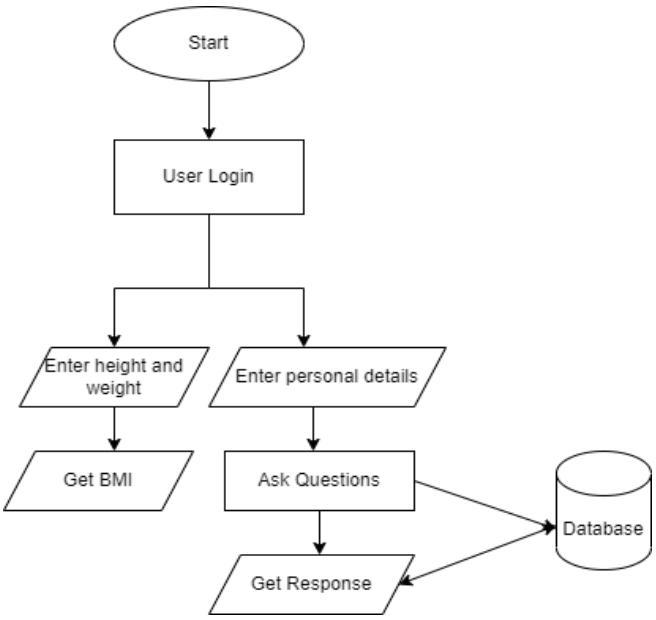

Fig - 1: Flow diagram of proposed system

4. SYSTEM ARCHITECTURE

RASA NLU-The user input is taken and NLU tries to infer the intent and extract the available entities. NLU stands for Natural Language Understanding.

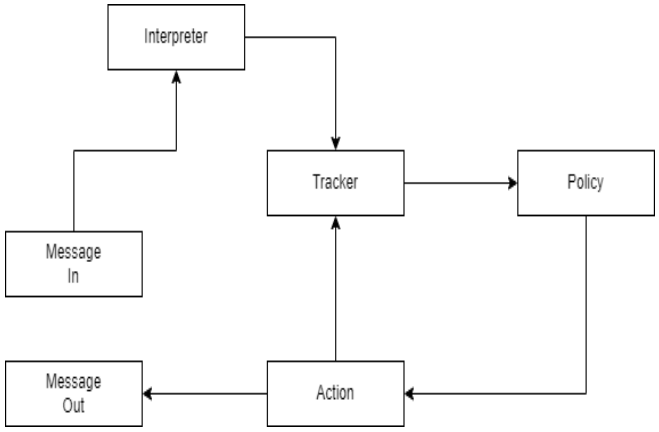

Fig - 2: RASA Framework

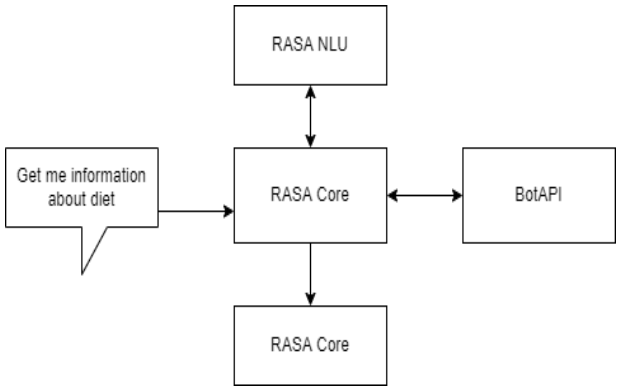

Fig - 3: RASA Architecture

RASA Center-A exchange administration arrangement tries to construct a likelihood demonstrate which chosen the set of activities to perform based on the past set of client inputs a few common catchphrases are

• Intent- What is the client expects to inquire about?

• What are the imperative pieces of data within the user's query?

• Story - What is the conceivable way the discussion can go?

• Action: What activity ought to the bot take upon a particular request?

Rasa NLU strategies consumer enter textual content and is familiar with what the consumer is attempting to say. It takes the consumer textual content as enter and extracts the purpose and entities from it. Intent: An purpose represents the motive of a consumer's enter, what the consumer desires to do. The consumer enter textual content is first vectorized after which the purpose of the textual content is extracted. Entity: An entity represents a time period or item this is applicable in your intents and that gives a particular context for an purpose.

The following are the configurations of Rasa:

1. Actions.py - code for the custom actions. In case Rasa desires to name outside server thru REST API or API call, it may outline the Custom Actions here. It can create a couple of Python Script for Rasa Custom Action.

2. Config.yml - Configuration of NLU and Core models. When Rasa is coping with Tensorflow or Spacy, it's far described as a pipeline. To deal with this record, the version must realize approximately Machine Learning and Deep Learning.

3. Domain.yml - This record combines Different Intent which chatbot can hit upon and listing of Bot replies. Rasa can outline the Custom Action Server Python technique call here.

The chatbot is initiated after the user logs into the chatbot to initiate the conversation. After it is initiated, the user can give either give query or response for the questions presented in the form of text. These responses undergo pre-processing and Natural Language Processing to achieve Tokenization and extraction of keywords which corresponds to database which helps in further processing.

The keywords are passed to a model which inculcates content-based techniques for making recommendations for user with the help of knowledge base or model which helps in recommending based on user's individual characteristics.

If the system has received all the necessary information, the application will provide a recommended diet on the interface else further questions will be asked until the required result can be interpreted.

All the responses are provided to user primarily in textual format. The user can also give the input in terms of voice as Rasa supports voice recognition.

A. Response Retrieval and processing:

The user should provide to the bot what he/she wishes to ask the bot. The question then goes for processing. The process will continue till the chatbot has retrieved responses and the user does not want to provide any more queries. Once the set of information is received, the set of responses undergo textual processing, and the most accurate and appropriate response is given to the user based on his query.

B. Training the model

The model is trained a set of questions and answer, where the set of questions contain queries related to types of diet,

diabetes, kind of food to be taken when suffering from diabetes and so on so forth. It also helps us to find BMI using the formula, (weight in kg)/ (height in m)^2.

C. Recommendation

The proposed model is a content - based recommendation model which can identify the similarity between the user and the food items and ingredients based on their nutritional factors and user's choices.

5. RESULTS AND DISCUSSION

"Health is Wealth" is one of the famous proverbs in English language. Health plays a major role in one's life. Maintaining a proper health depends on the type of food a person consumes. Youngsters these days don't pay much attention to their health and consume all kinds of junk food. This will lead to a lot of problems in the latter half of their person's life. The system proposed tries to provide efficient diet for a person based on various parameters like height, weight and the type of food the person wants to consume. The system also focuses on providing a right set of food style for people suffering from diabetes. The system takes in various personal details along with blood sugar level of the user or patient and gives in various diet plans along with medical dosage if any. All the above features are rendered using a chatbot. Chatbot is great tool for conversation language between human and machine. The application is developed for obtaining a fast response from the bot which helps in providing the correct result to the user.

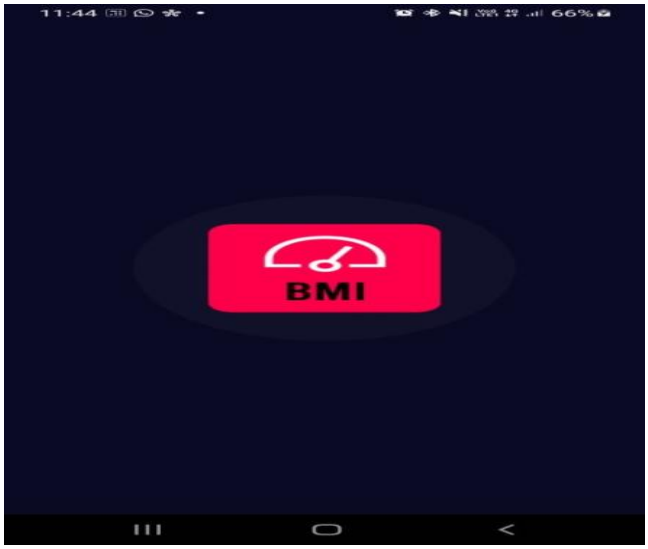

Fig - 4: BMI Calculator

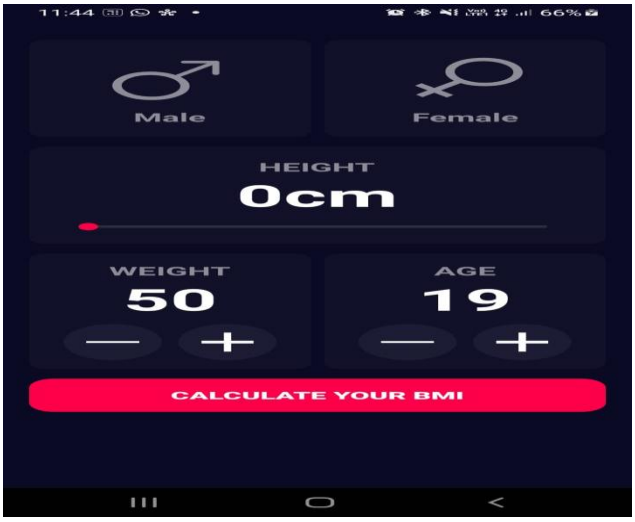

Fig - 5: Basic Layout of BMI

Fig - 6: User Layout

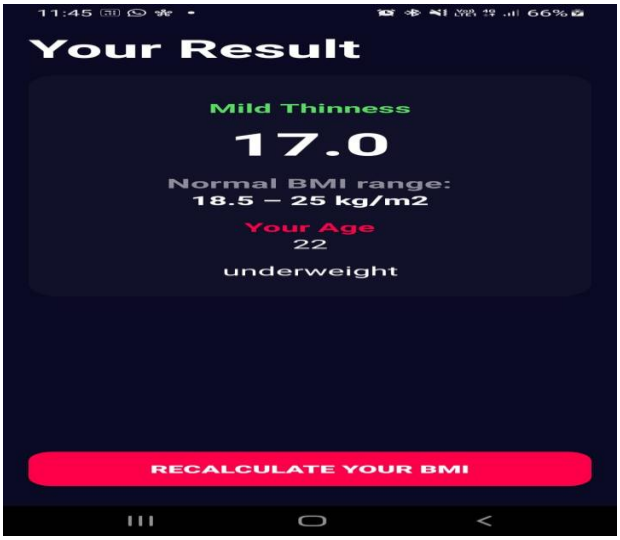

Fig - 7: Result

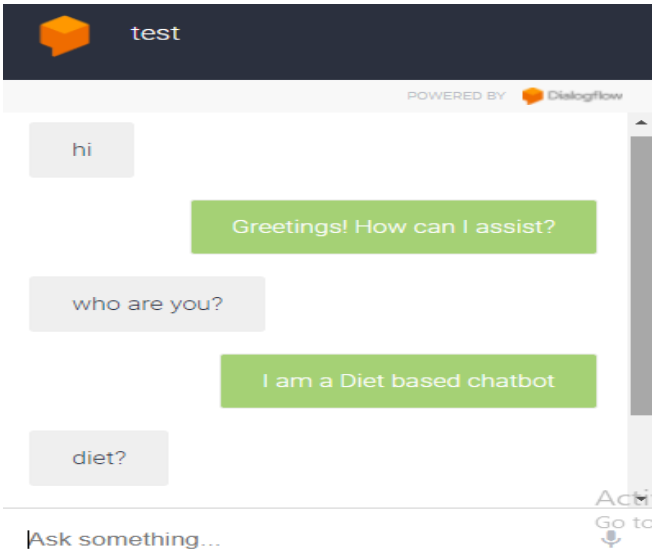

Fig - 8: Basic Conversation between Bot and User

6. CONCLUSION AND FUTURE ENHANCEMENTS

Consumption of healthy and nutritious food is essential for a person to maintain a healthy body. Food provides us essential nutrients and vitamins like carbohydrate, proteins, fats and minerals. all the above-mentioned nutrients will be produced if a person consumes right set of nutritious food or maintains a healthy diet. The system proposed provides the user a recommendation on what type of food a person has to consume to maintain a healthy body. This system mainly focuses on diabetes and the system is inculcated by a chatbot through which the user can interact and receive right set of diet for which a person can maintain his sugar levels. This system tries to reduce the time span and cost of the user. The focus of this system is to include a chatbot which provides healthy diet suggestions or recommendations for users suffering from diabetes and also provides a healthy diet for people to maintain their health.

The future is the era of messaging app because of which people spend longer time on messaging apps rather than other apps. The proposed system mainly focuses on calculating BMI and providing a healthy diet to patients suffering from diabetes. The system can be improvised by providing food recommendation for multiple diseases such as blood pressure, asthma, hypertension. Currently, the system only focuses on English and no other language. Other language options can also be provided for the user to communicate with the chatbot. The system can also include voice inputs from different languages. The system is designed as an application on phone. It can also be integrated as a web-based application. The system can also be added with extra features like calorie meter, which will calculate the amount of calories consumed by the user daily. It can also include various diet plans like Keto diet, Paleo diet, Vegan diet, and other diets.

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