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Acute Diseases Prognosis using Chatbot

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Abstract: *The role of chatbots in healthcare is to help free-up valuable physician-time by reducing or eliminating unnecessary doctor's appointments. As the increase in cost, various healthcare organizations are looking for different ways to manage cost while improving the user's experience. As we know there is shortage of healthcare professionals that makes it increasingly necessary for us to augment technology with health facilities in order to allow doctors to focus on more critical patient needs.*

Keeping this in Mind we are aiming to develop a Project that will basically ask for Symptoms from the Patient and perform the Prognosis on the basis of already developed dataset. The Machine Learning Algorithm will work on that dataset of symptoms and their prognosis to tell exactly what has happened to the Patient and will help to Reach the Desired Consultant/Doctor with respect to the Prognosis. It will also help the Patients to get Useful Information regarding different diseases that may help to deal with some Chronic Diseases at an early Stage!'

Keywords: Tkinter, Machine Learning, Decision Tree, Medical Chatbot

I. INTRODUCTION

Chatbot applications slick interactions between services and people, improving customer experience. A developing number of hospitals, nursing homes, and even private centres, presently utilize online Chatbots for human services on their sites. These bots connect with users that are visiting the site, helping them discover their health specialists, booking their appointments, and taking them one step closer to the correct treatment.

Our Project Model will work in such a way that admin has to collect the user's medical history and then filter it appropriately by applying the data preprocessing techniques. Once our required data comes into the structured shape then it can be fed into the database structure of Excel files. The admin also needs to monitor the predictions and replies of the model to ascertain quality.

Admin's functionalities are to Collect the appropriate medical records of the patients and Visitor (Patient) will perform the basic task of the visitor which is to access the chat bot from the front end and reply to its queries with a binary response (Yes/No). The visitor may also contribute with the help of the admin to add new symptoms and prognosis records to the database of medical history.

II. LITERATURE REVIEW (RELATED WORK)

Many medical Chatbot designs have been proposed in the past few years which aim to provide the user with prognosis and medicine recommendation after extracting the illness information from the user messages.

A similar study is shown in a paper "Pharmabot: A Pediatric Generic Medicine Consultant Chatbot" proposed by Benilda Eleonor V. Comendador, Jefferson S. Medenilla, Sharleen Mae T. Nacion, and Timothy Bryle E. Serac, provides a design for a medical Chatbot that is implemented using technologies like MS Access and Visual C#. For using the proposed design, the user has to navigate using the four options provided by the application. This design aims to work by converting the user input to SQL queries and executing it on MS Access to retrieve the solution to the illness[1].

Also a research paper "MedChatBot: An UMLS based Chatbot for Medical Students" proposed by Hameedullah Kazi, B.S. Chowdhry and Zeesha Memon focus on a design for an AIML based Medical Chatbot. This Chatbot design is implemented by using JAVA based AIML interpreter which is known as Chatter bean. To use this design, the user is required to type a message that should contain the illness name and then it will detect the illness names of illness using AIML patterns. Once the illness is detected, the Chatbot provides the user with the necessary information about the problem[2].

Also a Research Paper "Online-doctor-chat-helps-online-medical-consultation" proposes and overcomes geographic obstacles as well as gives the professional understanding for the patient with their concern, with no need to hold back for any medical expert, journey or even losing business days[3].

Another Research Paper "Novel Approach for Medical Assistance Using Trained Chatbot", by Divya Madhu, Neeraj Jain uses AI (artificial intelligence) to predict the disease based on the symptoms and give the list of available treatments for that particular disease. It can facilitate us to figure out the problem and to validate the solution.

Also a research paper “Designing a Chat-bot that Simulates a Historical Figure ”proposes a system that takes a plain text as input and answers all types of questions output by a qualified user . The purpose of this chatbot is to provide an inclusive solution to this problem. This paper helps in recognizing the reality in texts and giving the past content for developing a conversation[4].

However the previous chatbots did not focus on providing the concerned Doctor name with the concerned Disease as this is just the first level prognosis of the patient.Our Model Prognose the patient on the basis of even one symptom the person might be facing in its initial stage and also providing the related symptoms cling to that particular disease.Along with this our model provides the name of the Concerned Doctor with the Prognosed disease along with its Website URL so that the patient/user can book an appointment with the Doctor for further level prognosis.

III. METHODOLOGY

Our Concerned Project Model will be built using the Python Programming Language and one of it’s very useful Libraries.

The Window Application will Allow the Clients an Easy Medium to Check their Health Issues and Provide Best Doctor According to their Symptoms.

- 1) *Signup Menu:* The Sign up module is developed using the Tkinter GUI framework which is written in Python.The signup form will be directly used to insert the records of doctors who are going to use the disease prediction system. The doctor's data has been scraped from the Internet for research purposes.The signup module opens the prediction window for signed users and displays a toast message box in case of failed Authentication.
- 2) *Prediction Window:* The prediction window can be accessed only by certified and authenticated doctors who are saved in our portal. It provides a start button to start the analysis process of the symptoms. The first step is to start their procedure, then one by one all the symptoms come on the client's screen. They will have to reply with a yes or no answer The prediction window poses questions in the form of symptoms which the user might be experiencing and expects a binary response which can be provided by pressing the yes or no options. Once a problem is found then they will have to click yes, then the patient can see their problem on screen.The system records all the entries given by the user and finally gives a prediction after analysing it . It also describes the symptoms chosen by the user along with the symptoms expected for that particular disease. The model then guesses the disease associated with the following symptoms and then gives a name of doctor specialised in that area to consult in the aforementioned field. The prediction window also gives and displays a verified link to book an appointment of the specialized doctor suggested by the model.
- 3) *Symptoms Window:* The Symptoms window is created at run time when the user is placing the symptoms into the model. When the model is satisfied with an appropriate number of inputs. Then it generates a response in the form of the predicted disease, symptoms given and confidence interval. The Best Part is that it will provide doctor’s information like Doctor name and his/her website link so that one can easily find their doctor with don’t face any type of problem, and start their treatment.The symptoms window will also provides a link to book an appointment with the specialised doctors in that field for further operations.

A. Technology Used

1) FRONT End

- a) *TKINTER:* Tkinter is an inbuilt Python module used to create simple GUI apps. Tkinter is the most widely used module for GUI apps in the Python.
- b) *Tkinter Widgets:* Widget is an element of Graphical User Interface (GUI) that displays/illustrates information or gives a way for the user to interact with the OS. In Tkinter , Widgets are objects ; instances of classes that represent buttons, frames. One will find different types of widgets to the different types of elements in the Tkinter.

Brief introduction to all of these widgets in the Tkinter which we have used.

- **Button:**-It is used to add buttons to your application.
- **Canvas:**It is used to draw pictures and layouts like texts and graphics etc.
- **Checkbutton:**- It displays a number of options to users as toggle buttons . Users can select more than one option at a time.
- **Entry:**- It is used to take single line input from user.
- **Frame:**- It is used as container organize the widgets.
- **Label:**- Label is used to create a single line widgets like text, images, etc..
- **Menu:**- It is used to create different kinds of menu used by an application.

c) *Geometry Management*: To show all the widgets on screen we use geometry management. These measurements give you the ability to organize the widgets and their parent frames, windows, etc.

Tkinter has three Geometry Manager methods.

- pack():-The Pack geometry manager packs widgets in rows or columns.
- grid():-It puts widgets in a two dimensional table.
- place():- It allows users to set the position and size of a window, either or relative to another window.

2) *Backend (Implementation Language)*:-Python:-

Features :

- Easy
- Expressive
- Free and open source
- High Level
- Portable
- Interpreted
- Object Oriented
- Extensible
- Embeddable
- Large Standard Library

IV. RESULTS

A. *Screenshots of the Project Covered so far:*

Graphical User Interface(GUI)

1) *Login/Signup Window*

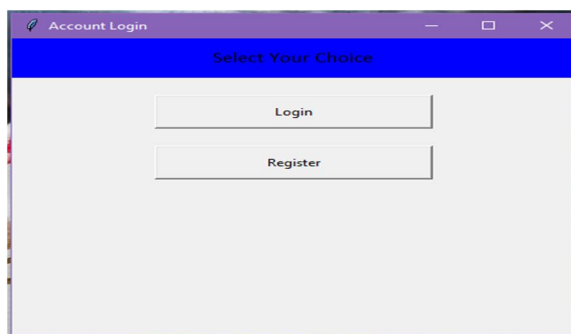


Fig. 1

2) *Entering Credentials*

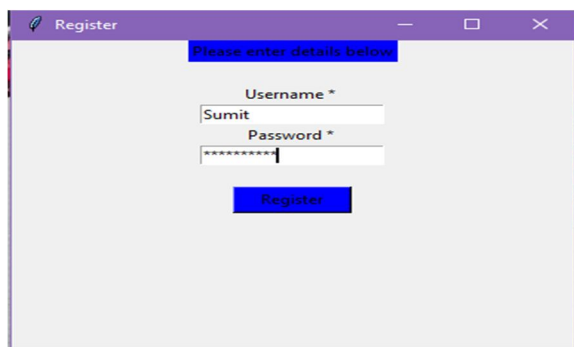


Fig. 2

3) Details Saved

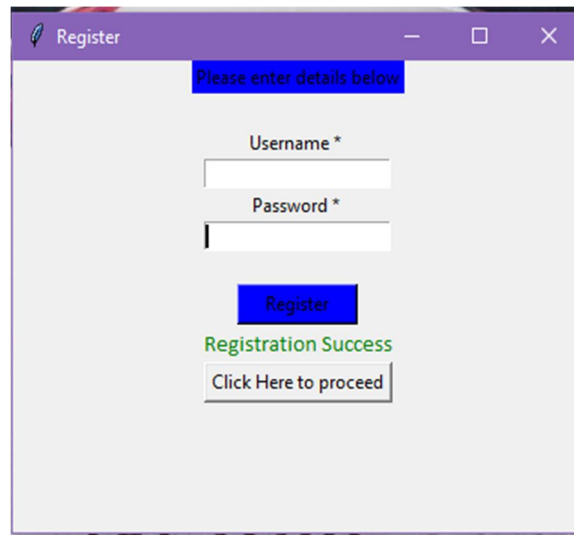


Fig. 3

B. Console Output:

```
In [2]: runcell(0, 'C:/Users/Sumit/.spyder-py3/temp.py')
Please reply with yes/Yes or no/No for the following symptoms
slurred_speech ?

no
pain_behind_the_eyes ?

no
receiving_blood_transfusion ?

no
red_spots_over_body ?

no
unsteadiness ?

yes
['You may have (vertigo) Paroymasal Positional Vertigo']

symptoms present ['unsteadiness']

The model suggests:

Consult ['Dr. Amarpreet Singh Riar']

Visit ['https://www.practo.com/delhi/doctor/amarpreet-singh-riar-
general-physician?specialization=General
%20Physician&practice_id=1026302']

In [3]: |
```

Fig. 4

A Sample Screenshot of the Consent and Denial of the Symptoms asked by the Model and Model predicting the Probable Disease along with all the Symptoms that also result in that Particular disease. Its also Suggests the Concerned Doctor with their website URL so that one could book an Appointment for the same.

C. Database Tables

Name	Type	Size	Value
E	str	1	e
N	str	1	n
S	str	1	s
TclVersion	float	1	8.6
TkVersion	float	1	8.6
W	str	1	w

Fig. 5

Above picture depicts the Attribute/Variable names along with their data-type,Size and corresponding value used for that in the Code.

D. X_TEST DATASET

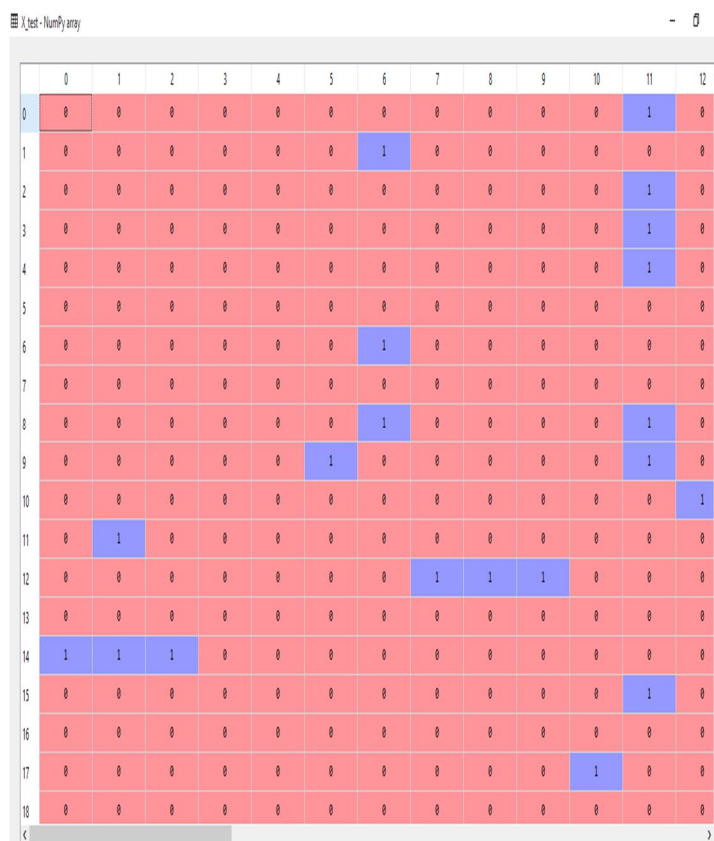


Fig. 6

The “X_TEST DATASET” divides the Input Dataframe that contains all the Symptoms along with their Corresponding Disease in the form of binary,i.e.,0 and 1 to test whether the model is suitably trained or not to give the desired output.

E. X_TRAIN DATASET

It also divide X dataset into another part called as training set.

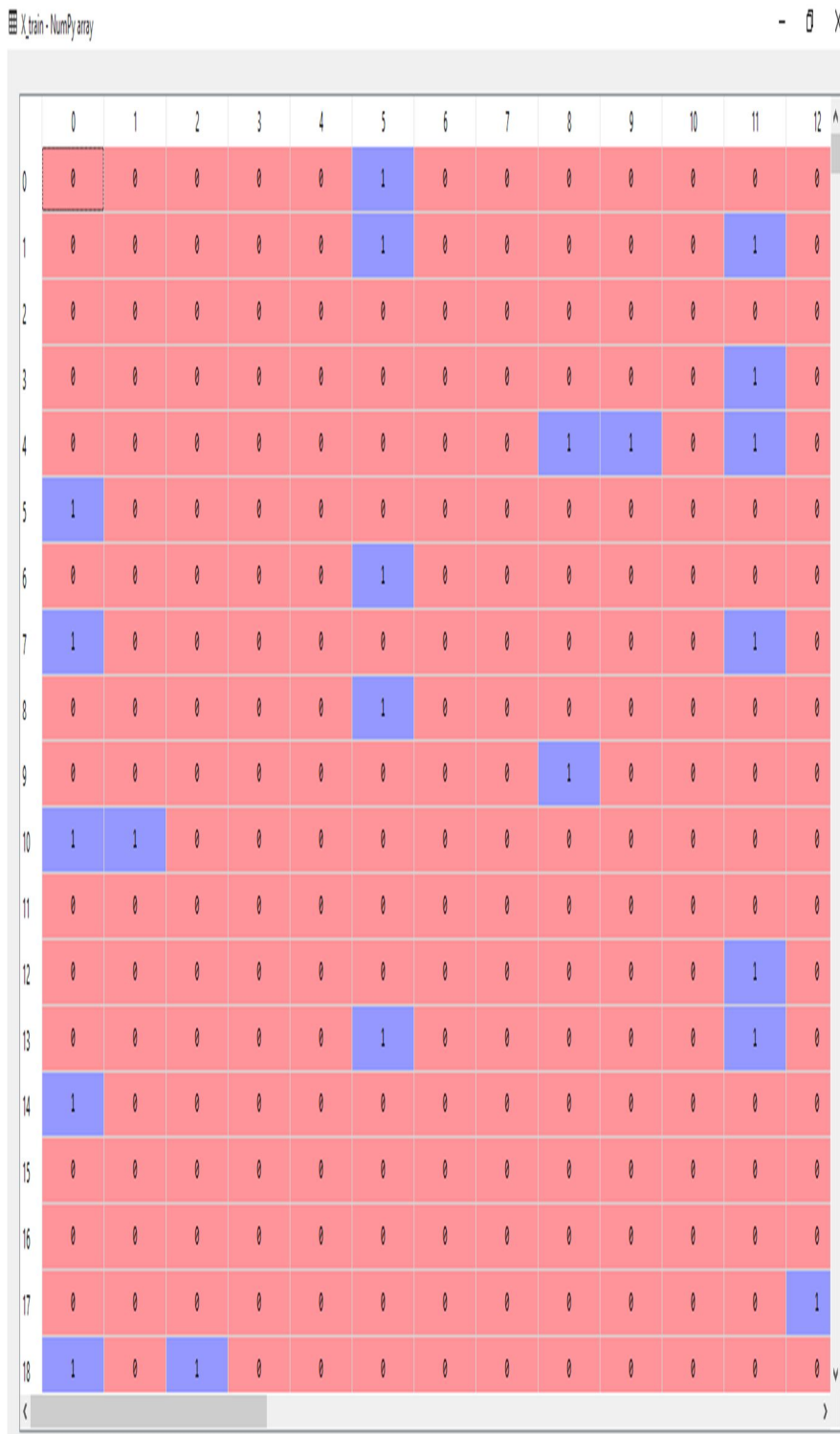


Fig. 7

The observations in the training set form the experience that the algorithm uses to learn. The “X_TRAIN DATASET” divides the Input Data Frame that contains all the Symptoms along with their Corresponding Disease in the form of binary, i.e., 0 and 1 to Train the model so that it learns to give the desired output at runtime inputs provided by the user.

F. Dimensionality_Reduction

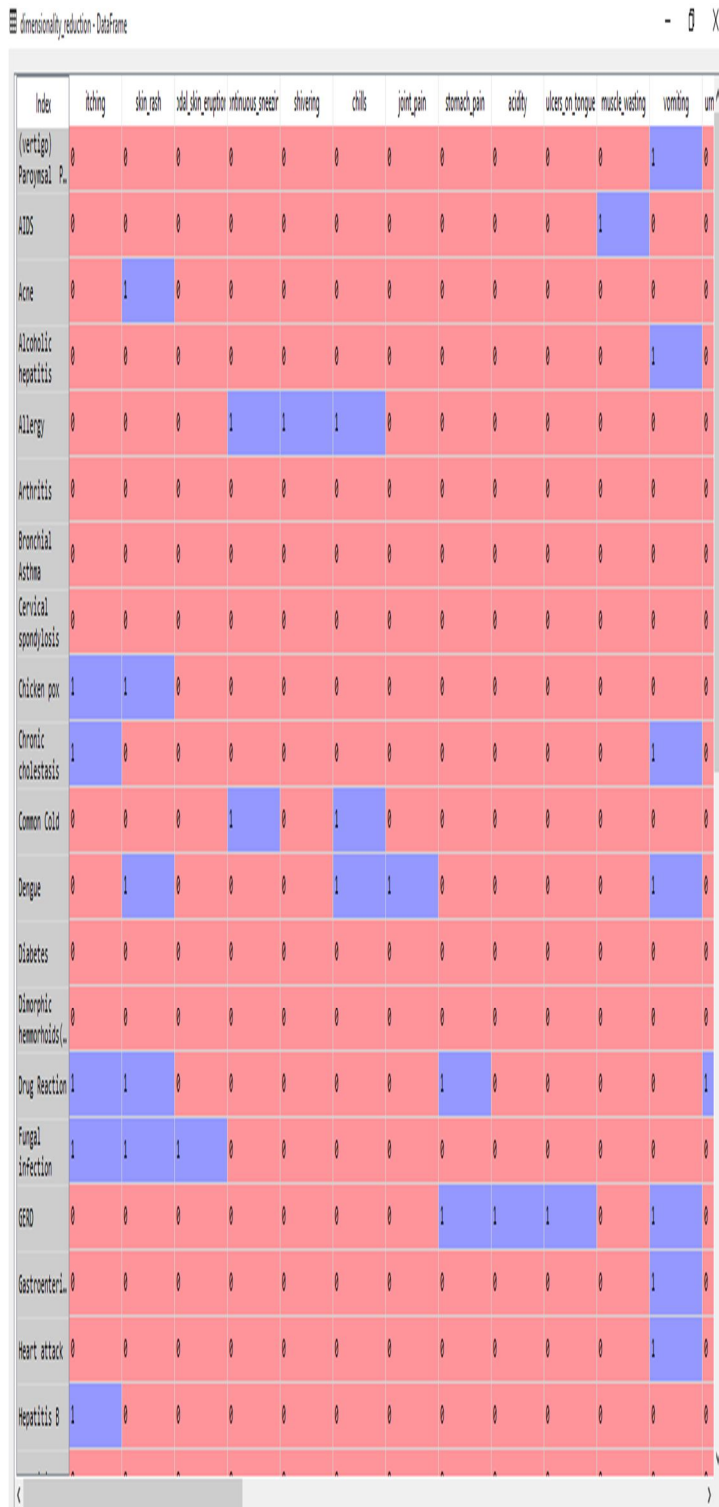


Fig. 8

Dimensionality Reduction is the process of reducing the number of random variables under consideration, by obtaining a set of principal variables. It can be divided into feature selection and feature extraction. To avoid repeated and unique values in the Symptoms dataframe we perform Dimensionality Reduction.

G. Diseases

Number of Diseases

diseases - DataFrame

Index	prognosis
0	(vertigo) Paroymisal P...
1	AIDS
2	Acne
3	Alcoholic hepatitis
4	Allergy
5	Arthritis
6	Bronchial Asthma
7	Cervical spondylosis
8	Chicken pox
9	Chronic cholestasis
10	Common Cold
11	Dengue
12	Diabetes
13	Dimorphic hemmorhoids(...
14	Drug Reaction
15	Fungal infection
16	GERD
17	Gastroenteri...
18	Heart attack
19	Hepatitis B
20	Hepatitis C

Fig. 9

Above snapshot is the data frame of the diseases that the model will Prognose after taking input symptoms from the user.

H. Doctor Dataset

It will provide the Doctor name with its link where one can visit his/her site and also tell the problem. It contains multiple rows and three columns.

doctors - DataFrame

Index	name	link	disease
0	Dr. Amarpreet Singh Riar	https://www.practo.c...	(vertigo) Paroymisal P...
1	Dr. (Maj.)Sharad...	https://www.practo.c...	AIDS
2	Dr. Anirban Biswas	https://www.practo.c...	Acne
3	Dr. Aman Vij	https://www.practo.c...	Alcoholic hepatitis
4	Dr. Mansi Arya	https://www.practo.c...	Allergy
5	Dr. Sunil Kumar Dwivedi	https://www.practo.c...	Arthritis
6	Dr. Chhavi Bansal	https://www.practo.c...	Bronchial Asthma
7	Dr. Sneha Khera	https://www.practo.c...	Cervical spondylosis
8	Dr. Inderjeet Singh	https://www.practo.c...	Chicken pox
9	Dr. Suman Mohan	https://www.practo.c...	Chronic cholestasis
10	Dr. Manish Munjal	https://www.practo.c...	Common Cold
11	Dr. Ajay Jain	https://www.practo.c...	Dengue
12	Dr. Anshul Gupta	https://www.practo.c...	Diabetes
13	Dr. B B Khatri	https://www.practo.c...	Dimorphic hemorrhoids(...)
14	Dr. Rajeev Adhana	https://www.practo.c...	Drug Reaction
15	Dr. Vidit Tripathi	https://www.practo.c...	Fungal infection
16	Dr. Arun Wadhawan	https://www.practo.c...	GERD
17	Dr. Neha Sood	https://www.practo.c...	Gastroenteri...
18	Dr. Vineet Narula	https://www.practo.c...	Heart attack
19	Dr. Yogesh Jain	https://www.practo.c...	Hepatitis B
20	Dr. Rakesh Singh	https://www.practo.c...	Hepatitis C

Fig. 10

Above Snapshot is the Dataframe of the Legit Doctors and their Website URLs along with their specialized disease which they treat and help in cure.

V. CONCLUSIONS

Our Medical Chatbot will have a great impact on the life of its users. The advantage of chatbots is that they carry a virtual Doctor in their pockets. It would also give them the freedom to consult a doctor 24/7.



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