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AI Therapist Using Natural Language Processing

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***Abstract*: The main objective of our project is to handle with the stress of people, especially youth, IT professionals using natural language processing technique. A human being's cognitive system can be simulated by Artificial Intelligence Systems. An Expert System for Stress Management (ESSM) is a system that mimics the role played by a psychologist or counsellor of stress expert to provide a virtual consultancy. Our system is an upgraded version of the old stress detection systems which provides the user-friendly communication, stress detection, and appropriate remedy. The success of implementation and development of this project is expected to help in reducing time consumed and human power in determining the best recommendation and solution for stress management.**

***Keywords*: Natural Language Processing, Flask, Chatterbot, Jinja2, Collaborative filtering algorithm, Naive Bayes algorithm, Training datasets.**

1. Introduction

Everybody experiences stress from time to time. Stress is what happens for your body when it feels threatened. In the simplest sense, it prepares the body to meet a threat by either fighting or fleeing. It is characterized by a racing heart, increased breathing rate, and heightened senses. All of these changes would be very important to an individual who was getting ready to face a life threatening event. However, now that most of us live in a society where we rarely face truly life threatening events, we don't necessarily need or want to have these reactions. In fact, most people's experience far too much stress in their everyday lives. Too much stress can tax the body eventually resulting in a compromise immune system, and other issues. Feeling sick, stuck, overwhelmed, depressed, anxious, or panicked are all reactions to stress that many people face [5]. These are not helpful emotions when what is actually required (and helpful) is the ability to think clearly and rationally. Many people spend much more time feeling worried, guilty, or ashamed for not doing things that they feel they ought to do or should do. The energy used to feed these negative emotions would be better spent focusing on completing your goals. To provide quick and cheaper solution to these problems, an application of artificial intelligence (AI) i.e. Machine learning can be applied, that provides systems the ability to automatically learn and improve from experience without being explicitly programmed [2]. It is a study of algorithms and statistical models that computer systems use to progressively improve their performance on a specific task. It focuses on the development of computer programs that can access data and use it to learn for themselves. It can also be used in mental health management. By using natural language processing, it is easy to process the user's problem and provide appropriate solution. According to conservative estimates in medical books, 50 to 80% of all physical diseases are caused by stress. Stress is believed to be the principal cause in cardiovascular diseases. Stress can place one at higher risk for diabetes, ulcers, asthma, migraine headaches, skin disorders, epilepsy, and sexual dysfunction. Each of these diseases, and host of others, is psychosomatic (i.e. either caused or exaggerated by mental conditions such as stress) in nature. Stress has three prong effects:

- Subjective effects of stress include feelings of guilt, shame, anxiety, aggression or frustration. Individuals also feel tired, tense, nervous, irritable, moody, or lonely [5].
- Visible changes in a person's behaviour are represented by behavioural effects of stress. Effects of behavioural stress is seen such as increased accidents, use of drugs or alcohol, laughter out of context, outlandish or argumentative behaviour, very excitable moods, and/or eating or drinking to excess.
- Diminishing mental ability, impaired judgment, rash decisions, forgetfulness and/or hypersensitivity to criticism are some effects of Cognitive stress.

2. Need of work

Stress, fear, anger, anxiety, depression are the terms that are recognized to be the only cause due to which a person suffers from several physiological disorders. It has a major impact on our body resistance which unknowingly leads to severe

problems. Despite its impact on our day-to-day life, it is still infeasible for a physician to monitor with the stress levels and make the user aware of the same throughout the day. As the gap between the availability of mental health professional and the cost of each therapy session keeps increasing, the demand for digitized healthcare solutions has increased steadfastly. Generally, people write to communicate with others. In addition to describing simple factual information, people also used to express their activities, and convey their feelings, mental states, hopes, and desires. This written information can be used to recognize the feeling of person that whether he is feeling stressful, angry, depressed or anxious etc. and at the same time help them too. This project overcomes all these problems by predicting exact feelings of user using natural language processing and provides respective solution like if user feels angry then recommender system will suggest him tips for anger management etc. [7] It saves user's time needed to visit the therapist by giving treatment within a second as well as saves money needed for therapy sessions.

3. Objectives

- To overcome the gap between mental health management system for users and cost of therapies required to diagnose these mental health problems.
- To build an application that can provide gateway to user to open with their problems.
- To provide costless therapy to user to overcome their problems.
- To reduce the time required to process the user's problems.

4. Methodology

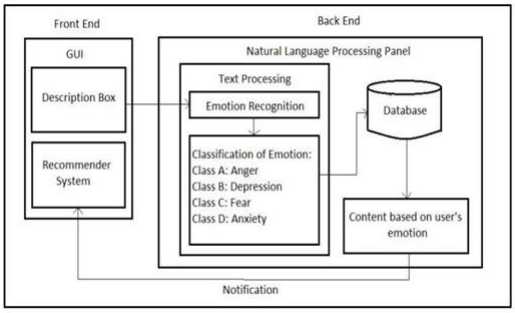

Fig. 1. System architecture

A. Modules:

- System consists of three modules: Front end (Application): Chatbot is used to take input from user. It provides two-way communications between user and system. And user's replies are supplied at the back end to train the system.

It includes two sub modules:

- User Conversation: In this sub module user's conversation is used to recognize the feeling that whether he is feeling stressful, angry, depressed or anxious etc.
- Recommender System: Recommender system is used to display the corresponding output. It works as therapist by showing the recommended quotes, images, audios or videos from database pertaining to particular class of emotion to assist user. For example, if user is feeling depressed then recommender system will show him motivational thoughts, blogs, etc.
- Back end: Natural Language Processing Panel: This panel contains pipelined model built through natural language processing & processes the text given by user. [2] It includes two sub modules

B. Recognition of Emotion

The user's description about his emotion is processed by using natural language processing (NLP).

C. Natural Language Processing

NLP uses machine learning to reveal the structure and mean of text. It enables you to analyse text, and also integrate it with your system. By using NLP system detects how user is feeling now, and uses this information for further classification. [7]

D. Classification of emotion

To provide exact recommendation to user, system classifies the emotions in four classes, i.e. Anger, fear, depression and anxiety. To classify the emotions, system uses a Collaborative filtering algorithm and Naive Bayes algorithm. [7]

E. Database (SQLite):

At the back end, database is present. After knowing the class of emotion, system will fire the query to database where all the quotes, images, blogs, audios, and videos are stored. According to class of emotion the data will be fetched from database. For example, if user is feeling angry then some jokes will be fetched or if user is feeling afraid, some brave stories will be fetched from database and this will be shown in the recommender system as an output.

5. Experimental Setup

A. Technology Used

1) Description of technology

- PyCharm IDE: PyCharm is one of the most widely used IDEs for Python programming language. It is used to build software applications with concise, clean, and readable code base. PyCharm also provides first class support for robust Python web framework like Django, Flask.
- Python: Python is used for developing desktop GUI applications, websites, and web applications. At the same time, Python also features a dynamic type system and automatic memory management. The goal is to use several open source Python frameworks, libraries, and development tools to increase development time without increasing development cost.

- HTML and CSS: HTML (Hypertext Mark-up Language) and CSS (Cascading Style Sheets) are two of the core technologies for building web pages. HTML provides the structure of the page; CSS provides the layout, for a variety of devices. HTML and CSS with Python is used to build a web app with a python backend. There are lots of frameworks available that allows you to do that, such as Django, Flask and Pyramid.
- Important classes, function & libraries: Web application using AI Therapist is created by PyCharm Community 2019.2 having a GUI which contain following packages
- Flask: Flask is a web framework. This means flask provides you with tools, libraries, and technologies that allow you to build a web application. This web application can be some web pages, a blog, a wiki, or go as big as a web-based calendar application or a commercial website.
- Chatterbot: Chatterbot is a machine-learning based conversational dialog engine build in Python which makes it possible to generate responses based on collections of known conversations. [4] The language independent design of Chatterbot allows it to be trained to speak any language.
- Chatterbot corpus: This is a corpus of dialog data that are included in the Chatterbot module. Corpus data is user contributed, but it is also not difficult to create one if you are familiar with the language. This is because each corpus is just a sample of various input statements, and their responses for the bot to train itself with.
- Jinja 2: It is Modern day templating language for Python developers. It was made after Django's template. It is used to create HTML, XML or other mark-up formats that are returned to the user via an HTTP request. [2]

B. Software Requirements:

- Operating System: Windows 10
- Tool: PyCharm Community 2019.2.3
- Hardware Requirements:
- Processor- i3 dual-core
- Hard disk-1TB
- Memory- 4GB

6. Result Analysis

Artificial Intelligence has drastically changed the way businesses interact with their customers. Chabot's are important to improve customer experience and deployed across business functions to improve performance. Chabots are immediately available and respond quickly. [1]

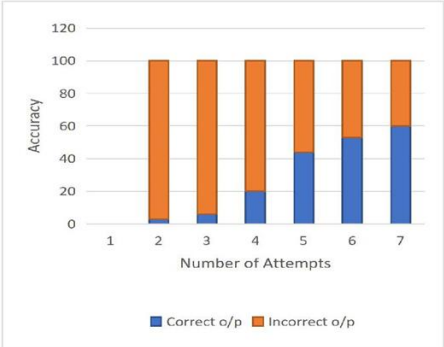

Fig. 2. Result analysis

Initially, the Chatbot was not responding because it was not trained. After training Chatbot was answering unfriendly. At the third stage, the Chatbot was responding well. At the fourth stage, it took less time to respond as compare to previous stages. At a later stage, Chatbot could understand user properly. After fifth stage, Chatbot know how to solve any issue. Now, the training is going on and Chatbot gives the average correct answers. [1]

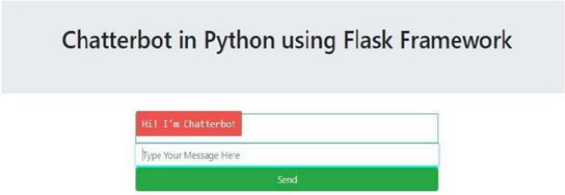

Fig. 3. GUI of chatbot

The figure shows the GUI of Chatbot. Here the conversation between user and Chatbot is done.

Fig. 4. Conversation between User and Chatbot

The figure shows general conversation between user and Chatbot. The text highlighted by red color is Chatbot conversation and the text highlighted by green color is user conversation. The Chatbot gives these general responses using auto responder. [3]

Fig. 5. Training of chatbot

These figures show the training of Chatbot. Initially Chatbot only knows the greetings. The training is given to the Chatbot such as how to reply when someone is sad, which are the ingredients used to make a cake, who is the Prime Minister of India. Chatbot saves the responses given by trainer. [3] When we enter the same text again, Chatbot compares the responses matching to that text. Then Chatbot responses to user with appropriate text. The training is done by using Back propagation method.

7. Conclusion

The web application AI Therapist will predict the emotions of user. It is designed for analysing the mental health issues faced by user and recommends user with respect to their problem. While interacting with a chatbot, user will as if he is talking with real person. Further work includes training of Chatbot to get accurate response. Training is going to be done using PyCharm for training the Chatbot, for emotion detection and for providing more accurate responses like images, audios, and videos for better therapy [8].

References

[1] Astim jan, Hongying Meng, YonaFalinie, A. Gaus, and Fan Zhang, "Artificial intelligence System for automatic Depression Level Analysis Through Visual and Vocal Expression", volume 10, issue 3, July 2017.
[2] Mandar Deshpande, Vignesh Rao, "Depression Detection using Emotion Artificial Intelligence", November 2017.
[3] Tatsuya Nomura, "Problems of Artificial Emotions in Mental Therapy", July 2003.
[4] Pietro Morasso, Maura Cassadio, PsicheGiannoni, Lorenzo Masia, Vittorio Sanguineti, Valntina Squeri, Elena Vergaro, "Desirable Features of 'Humanoid' Robot-Therapist", September 2009.
[5] Aisling Kelliher, Barbara Barry, "Designing Therapeutic Care Experiences with Artificial Intelligence in Mind", August 2017.
[6] A. Gelbukh, "Natural Language Processing", 5 February 1998.
[7] https://www.geeksforgeeks.org/project-idea-ai-therapist/
[8] https://www.ai-therapy.com/articles/computers-and-therapy/
[9] Steven Bird, Ewan Klien and Edward Loper, "Natural Language Processing with Python."
[10] Grant S. Ingersoll, Thomas S. Mortan and Andrew L. Farris, "Taming Text."