

## Mental Health Assistant using LSTM

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**Abstract** - Mental health is defined as a condition of well-being in which a person recognises his or her own skills, can manage with everyday challenges, can work effectively and can contribute to his or her network. As the number of people suffering from mental illnesses rises, it's difficult to slow or stop the rate of rise in the number. Our project will engage with the user, gather data, analyse emotion and provide a solution with the use of LSTM and NLP. We first begin conversation with the user then evaluate the voice or text provided by the user and study the emotion.

**Key Words:** Mental health, Voice Assistant, Machine Learning

### 1. INTRODUCTION

One of the most important and difficult fitness challenges in the actual world is the automatic identification of psychological disorders. People's behaviour, thinking and emotion are all influenced by their overall mental wellness, as they engage with the environment. Moreover mental illnesses are on the rise greatly contributing to the overall disease load in 2015, it is estimated that 44% of the people (more than 332 million people) have experienced symptoms of despair. The condition according to a WHO research is a prevalent mood disorder that affects a great amount of people of all ages. There are various barriers to depression diagnosis and therapy along with a paucity of specialists in the industry, societal shame and aside-from-the-point mentality.

#### 1.1 Motivation

Acquiring psychiatric help has been proven to be useful in the treatment of a variety of health problems particularly in remote places where mental health facilities are already scarce. While technological advancements in the field of mental health received its share of challenges, there were many who supported online mental health treatments. Online therapy may not be everyone's cup of tea but it has shown its effectiveness to the people who feel uncomfortable attending the traditional face-to-face support groups.

Some people show hesitation in sharing their personal sorrows or problems with other people because of the risk of other people judging them or them getting mocked by other people. So, in such cases online webpages or dialogue systems can be used to get the normal informative needs of the user by acting as a friend or a well-wisher.

### 1.2 Problem Statement

In the present world of AI and data science, everybody is searching for the kind of system which is interactive. Often within the health facility, there may be a loss of human assets to attend to the patients. So, by means of considering all these things we have decided our problem definition as follows: To create a friendly webpage and integrate it with a voice assistant.

### 2. RELATED WORK

A. "A Proposal for Virtual Mental Health Assistant"[1]-

Psychological health has been one of the most overlooked and yet most crucial components of our entire well-being in recent years. Due to cost, time, and space restrictions, as well as a scarcity of resources connected to in-person counselling, this study presents a system for a virtual mental wellbeing assistant.

Disturbed mental health is frequently the result of a snowball effect that develops over time and demands constant attention and purposeful attempts to improve. With the support of a virtual mental health assistant, this is achievable. A conversation function, psychological evaluation, an emotion recognition module, and a suggestion system for enhancing the user's mood will all be included in the proposed assistant. For sentiment analysis, we employed a Naive Bayes classifier and Neural Networks.

B. "UpBeat – Your Mental Health Assistant using Rasa NLU"[2]- In

Recent years Textual conversational agent or chatbots have gained tremendous attention. In today's world,

chatbots are widely used as an agent to communicate with a human being as a booking assistant or customer service support on e-commerce and educational websites. Our aim of this project is to develop a Cognitive behavioural therapy system or a Therapy Chatbot which will be able to assess the mood of the user and also the sentiment of the interaction that it will have with user. This system or bot will also devise techniques to provide mindfulness and provide self-help to the user so that he/she can take better care of their life. In this pandemic situation there are people having emotional breakdowns, some are facing anxiety, tension, some people even get panic attacks, depression and face sleep problems. As a result, we are turning to AI solutions to help these people improve or maintain their mental health. In a world full of stressful day-to-day activities no one is completely healthy because of daily hassles, whether it is employment tension or feeling of being overwhelmed by other personal factors. Therefore through this research an effort has been made to facilitate depressive symptoms or aggravation via a personal virtual psychotherapist.

C. "Mental Health Chatbot System by Using Machine Learning"[3]-

Mental health has become one of the most overlooked, yet crucial, aspects of our entire well-being in today's environment. In this work, we propose a system for a virtual mental health assistant due to cost, time, and space constraints, as well as a lack of resources associated with in-person counselling. Disrupted mental health is typically the consequence of a snowball effect that necessitates continual attention and deliberate efforts to remediate. This is made possible with the help of a virtual mental health chatbot. The recommended chatbot will have a chat feature, many language voice input options, and a recommendation tool to improve the user's mood. Neural networks were used to train data for this project, and Natural Language Processing techniques will be used to improve results.

2. METHODOLOGY

This model can be divided into three steps, the primary part extracts emotion out of text with the help of text content mining and LSTMs, the next part of the application identifies the key features of speech to recognize the emotion, in the third part according to the emotion recognized from the second part solutions are displayed. The input can be taken in two ways- speech or text. We have set a parameter, talk and can change the parameter however we need the input to be. We can set talk as 1 for speech input and talk as 0 for text input. If text is given as the input, text mining is used to extract the emotion from the input. When the input is in speech we use speech recognition library to convert speech to text, then using LSTM and NLP the emotion is recognized and given as the output.

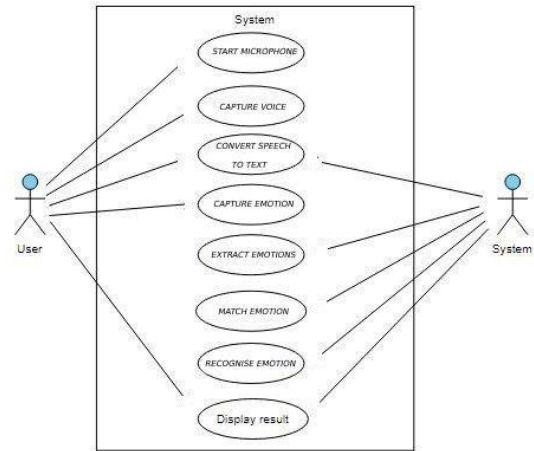


Fig -1: System Architecture

3. ALGORITHM LSTM Algorithm:

A mapped input example and its output should be present in the model for the classification procedure. There are a variety of classification approaches available with Logistic Regression, Nearest Neighbors, Naïve Bayes, Support Vector Machines, Decision Trees and Artificial Neural Networks, being the most commonly employed. The long short-term memory (LSTM), first established to resolve the challenges of short-term memory province and permit the network to consider longer dependencies. In addition to the RNN structure, LSTM have a cell state which carries data through LSTM cells with a simple record exchange as an outcome. The networks default actions is to take long-term memory needs into consideration. Furthermore the LSTM strategy has three gates (forget gate, update gate, output gate) that indicate the overall set of data that will be sent to one more cell. The forget gate identifies which facts ought to be erased. The update gate identifies which values must really be altered and the output gate identifies the cells output.

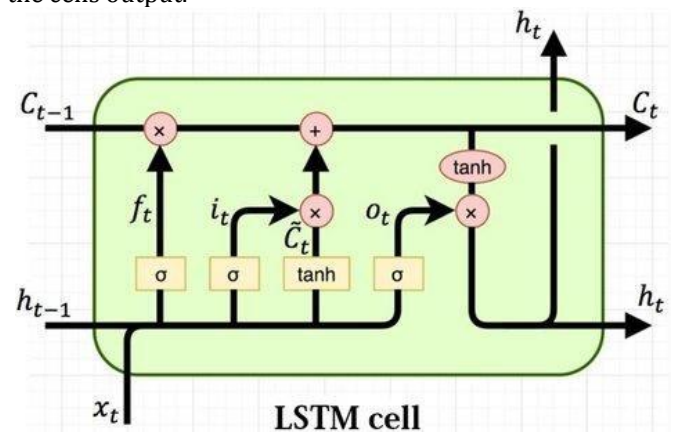


Fig -2: Long Short-Term Memory

$$\begin{aligned}
 i_t &= \sigma(x_t U^i + h_{t-1} W^i) \\
 f_t &= \sigma(x_t U^f + h_{t-1} W^f) \\
 o_t &= \sigma(x_t U^o + h_{t-1} W^o) \\
 \tilde{C}_t &= \tanh(x_t U^g + h_{t-1} W^g) \\
 C_t &= \sigma(f_t * C_{t-1} + i_t * \tilde{C}_t) \\
 h_t &= \tanh(C_t) * o_t
 \end{aligned}$$

**Fig -3: LSTM formulas**

## 5. IMPLEMENTATION

The project's development and deployment is when aspirations and plans can become actuality. Any software deployment is always preceded by critical decisions on the platform to be utilized, the language to be used and so on. Several variables have an influence on these choices including the real-world context in which the system operates the speed with which it must be implemented, concerns for safety and other implementation-specific aspects. It is in reality the programming deployment of a technical requirements or method as a programme software development or other computer systems for a particular standard there may be several implementations.

## 4. CONCLUSION

We have created a contextual voice responder which chats or responds to the user as per the person's mood. We have designed this voice responder in such a manner that it responds to a person if he is feeling stressful or lonely and while he or she is feeling happy. From this we do not want to give the message that a voice responder will replace an expert in psychiatric counselling, this voice responder will assist a person to construct a good mindset toward lifestyles and breaking down the recursive cycle of terrible thoughts.

## 5. FUTURE SCOPE

Our project will chat with a user and tries to understand his mood and accordingly help him lift up the mood with the use of LSTM and NLP. The future of this project depends upon the new developments in the NLP field which will help in maintaining a proper flow in conversation and all the dialogues would be automated. We can increase webpage accuracy by increasing epochs. Epochs are basically, the number of times your machine learning model will see each training example during the training. We can also upgrade the system by recommending the user to consult the psychiatrists directly through the system. Also, we can improve the data storage part by recording the user information and maintaining their records for future use.

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