# Mental Balance Chatbot: A Mental Health Chatbot

C.Yeshwanth Kumar[1], Chethan C[2], Sagar K R[3], Sarvajith S K[4], Narayan H M[5], Malatesh S H[6]
[1,2,3,4,5,6]*Computer Science Department, Vishveshvaraiah Technological University, M S Engineering College, Bangalore*

***Abstract*** **- Many students face mental illnesses such as depression, anxiety and stress. Due to lack of motivation and financial capacity, many students do not visit university counselors or seek professional help. The proposed system aims to solve this problem by providing students with chatbots that provide the same necessary support as counselors and therapists. Recent uses of technologies that support the recovery of mental health have proven to be very effective from a machine learning perspective.**

## INTRODUCTION

The implementation of chatbots eliminated the need for students to deal with problems and essentially removed one of the biggest hurdles these students face. Chatbots run on Transformer model [1] and are trained on the latest mental health datasets. This allows chatbots to create effective suggestions / conversations about user/student issues and questions. The suggested treatment is based on the PHQ-9 Mental Health Questionnaire and user input.

### A. Mental Health Questionnaire

Users fill out the PHQ-9 Mental Health Questionnaire, which objectively determines the severity of the first symptoms of depression, and the WHO-5, a questionnaire approved by WHO as a scale of 0 to 10. increase. Used to assess a person's mental health, 0 is mental health and 10 is mental health (severe) [2] [3].

### B. Conversation with chatbots

Chatbots ask students /users about problems they may be facing [4] [5]. The reason is that students get a sense of accomplishment by tackling the problems they find most problematic. This method works as well as aggressive strengthening and encourages the practitioner to continue working on his own. shape. FIG. 3 illustrates this process.

### C. Proposed Treatment

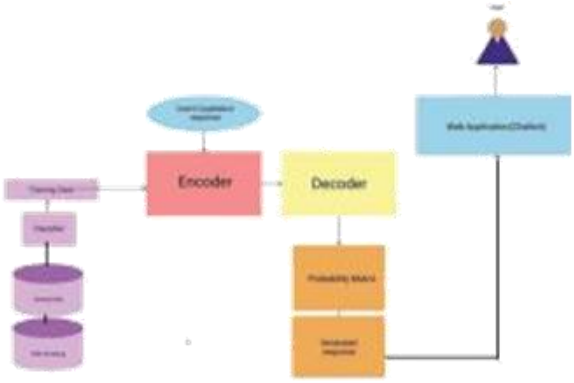
Users are offered some small tasks or micro-interventions that reflect the problem they want to address first [5]. These little suggestions include taking a few minutes to meditate, looking back on the good things in your life, taking a break from work and relaxing alone, meeting friends and family, changing landscapes, etc. It is included. I will steadily improve my mood. The method also includes not providing intervention when t
he subject is in a positive mood so as not to interfere with the good mood.

### D. Transformers Model

The Transformers model architecture chosen to train chatbots works entirely on the principle of self-awareness[1]. It takes precedence over recurrent and convolutional neural networks to provide superior quality results. Unlike RNNs, which scan specific inputs from left to right, they can accept the entire input at input information, and the last input field was set as an open text field. The pre-determined question was "List the causes of psychological stress / anxiety / depression you experience as a student and in your life." Therefore, this question was created to capture the psychological image of the student's mind and to compare the problems students face inside and outside the university wall. We used Tableau Public to visually analyze the response. The idea of providing a gender- neutral option was developed to measure the number of people who are uncomfortable with sharing part of their identity. This may indicate that these respondents are uncomfortable sharing their problems with acquaintances. A search for the term "depression" returned four occurrences. The age group that used this term in their answers was between the ages of 17 and 21. The term "depression" is most commonly associated with mental health problems, but has the lowest incidence compared to other searched terms. Depression itself is a fairly large generic term consisting of various types.

However, because depression is stigmatized in society, people refrain from using it to explain their mental state. The term "depression" is also used to describe the most serious forms of low spirit and purposelessness. This explains why it wasn't used so often. once. Another reason to choose this model is that regular shifts require sequential manipulation. When it comes to complexity, the self-awareness mechanism works well. Transformer's attention mechanism is interpreted as a way to calculate the relevance of a set of values (information) based on several keys and queries [1]. The output is calculated as a weighted sum of the values. The weight assigned to each value is calculated by the query compatibility function with the appropriate key. The attention function is to map a query and a set of key / value pairs to the output [9]. This architecture mainly consists of an encoder-decoder system like any other traditional system. The initial input to the encoder is the embedding of the input sequence, and the initial input to the decoder is the embedding of the output up to this point [1]. Transformers also achieve better BLEU scores compared to previous state-of-the-art models [1].

E. Topic Extraction A survey was conducted to better understand what constitutes a mental health problem and to gain better insight into what students are experiencing in their daily lives. The first three fields consisted of basic personal




SYSTEM ARCHITECTURE

## III. IMPLEMENTATION

Create a chatbox: The chatbot asks students / users about any issues they may be facing. This is because students get a sense of accomplishment by tackling what they consider to be the most problematic. This method works as well as aggressive strengthening and encourages the practitioner to continue working on his own. I'm building a chat box using the Python Flask framework. Dataset Collection: The current dataset used to fine-tune the Dialo GPT model consists of data taken from a lawyer's chat. This data consists of questions with tags related to the illness or problem for which the question is about / about. Each question has multiple answers obtained from multiple validated therapists. This helps diversify the answers to each question sent to the chatbot.

Preprocessing: NLP needs to be imported so that the program can understand the input text. I'm importing Nltk, an NLP library toolkit used to understand human languages. Lancaster Stemming is a word stuttering tool based on the Lancaster Stemming algorithm. Stemming is the process used to reduce words to root. shape. Training data is saved in a JSON file format that can be easily read by machine learning models. This document is used to train the model to learn how to classify the inputs and output the responses. The intent document contained patterns, tags, and answers. It is important to "clean" your training data. Some tools of the NLP are used in this step. First, we have to create a few empty lists for storing the individual words that used to do processing later. For example, a list named ignore is created to ignore all the punctuation marks and exclude the unwanted character in order to collect the actual content. The loop is used for doing the tokenization and ignores the unwanted words for the pattern words.

TOKENIZATION is to split the input data into individual units that have a value associated with it. After Tokenization, we save the pattern words into a list named words and the tags are saved into a list named classes. Then, we continue to do the stemming for the words list and sorted both lists. Stemming is a process that is used to reduce the words in order to make it into root form. TOPIC EXTRACTION: The first 3 fields consisted of basic information to be filled about the individual and the last field to be filled was set as an open-ended text field.

The question specified was “Please mention any and all sources of mental stress/anxiety/depression that you are facing as a student as well as in your life”. The question was thus framed in order to capture a psychological picture of the student’s mind and to

compare the problems and issues that a student faces both within the walls of their college and beyond. The response was visually analyzed using Tableau Public. The idea of providing a gender-free option was developed to count the number of people without an identity.

Building CNNs: The Transformer Model architecture chosen to train chatbots works entirely on the principle of self-awareness. It takes precedence over recurrent and convolutional neural networks to provide superior quality results. Unlike RNNs, which scan specific inputs from left to right, they can accept the entire input at once. Another reason to choose this model is that regular shifts require sequential manipulation. When it comes to complexity, the self-awareness mechanism works well. Transformer's attention mechanism is interpreted as a way to calculate the relevance of a set of values (information) based on several keys and queries. The output is calculated as a weighted sum of the values. The weight assigned to each value is calculated by the query compatibility function with the corresponding key. The attention function is to map a query and a set of key / value pairs to the output.

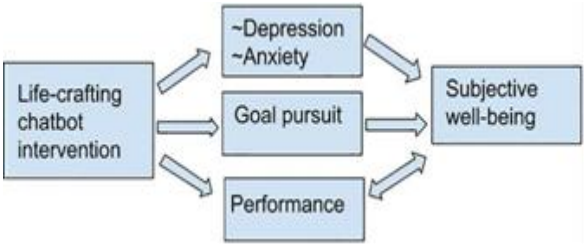
## IV. RESULTS

Evaluating a natural language generative model can be difficult, given that each generative task is contextual. It's difficult to find relevant metrics to evaluate these models, but there are ways to compare texts. This system uses perplexity to evaluate the models and show the performance of those models. Using this method, the model should ideally assign high probabilities to real-factual statements and low probabilities to syntactically incorrect sentences. Therefore, even the most powerful model should have the least confusion. DialoGPT's Transformer model shows higher complexity, followed by recurrent neural networks and long short-term memory networks. The pre-trained Dialo GPT model is complex and takes enough time to fine-tune, but the obvious parallelization in the transformer-based architecture gives better results.

| Model | Perplexity |
|---|---|
| LSTM | 43.5 |
| RNN | 34.2 |
| DialoGPT-small | 27.6 |
| DialoGPT-medium | 19.8 |

The response generated by each model was tested by human participants. participant is 100 college students, who Given a list of questions, each was followed by an answer and asked to compare the generated answers. About 63% of participants preferred the response generated by the Dialo GPT, followed by LSTMs at 22% and RNNs at 15%. Statements by these participants to validate their choices show that they preferred reactions that they felt were more human and those that showed a higher level of empathy.

From the above results, it was decided that the Dialo GPT model is the best model for this system. Advanced models of DialoGPT are available, but they consume quite a lot of resources and are not feasible. These high-level models are believed to provide more accurate results.




OPTIMIZING MENTAL HEALTH

## V. DISCUSSION

The reason why chatbots were chosen as the method of communication over other means such as online surveys, Google Forms, and face-to-face communication is the result of various research papers in which communication with chatbots produced more accurate results than other methods. It is derived from. [5] [6] [7] [8]. This tool has been idealized to fill the gaps identified in previous studies. Gap such as not being able to talk to the subject, not being able to get feedback on the subject's mood and being unable to force the subject to continue self-improvement or seek professional help.

This chatbot cannot be a true substitute for psychologists or psychologists. If you need professional help in a particular case, the tool will encourage that person to look for it. However, its purpose is to create a tool that provides a reasonable degree of closure and makes the user feel that the problem is being heard. Mental health often deteriorates significantly when there is no one to talk to Simply listening and responding can change a

student's attitude towards the problem and he feels empowered. In further versions, the implementation of the virtual therapist may allow you to dig deeper into the more complex deep learning aspects of the tool. Chatbots can be equipped with a text-to-speech converter that makes the process more realistic or humane, allowing users to talk to the bot with the help of a voice-to-speech converter instead of having a text conversation of the input. increase. Chatbot page.

## VI. CONCLUSION

The purpose of this project is to provide a solution to the growing mental health problems faced by high school students. To address this issue, it was necessary to collect raw materials from the students themselves via a survey form. Analysis of this data provided some important information about the various terms related to student mental health issues and the relationships between these terms. Consultations with practicing psychologists also provided important insights into which methods should be used to test users and how those methods should be evaluated. Further research into these methods has shown that they contain most of the parameters tested and lead to a medically approved questionnaire that is initially selected to analyze the user. Training a regular feedforward network with a simplified version of the dataset gave me a good idea of how the model works, but with all types of queries to choose from Transformer. It was also shown that it may not be processed. Model as a proposed architecture. This works well with the available datasets as it can handle more complex datasets.

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