

# Mental Health Chatbot System by Using Machine Learning

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**Abstract** - 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.

**Key Words:** Mental health, Mental healthcare, Machine Learning, Chatbot, Natural Language Processing, Conversational agent etc

## 1. INTRODUCTION

To begin, chatbots are software tools that aid in the replication of human-like conversations using voice commands, text-based chats, or both. Advances in modern technology have sparked a movement in healthcare toward digital health, in which computer-generated analytics and the use of electronic medical records can help with clinical and administrative tasks. Despite the fact that health professionals have been practicing for years, obtaining data from a large-scale database often requires specialized IT skills and infrastructure. As a result, health practitioners are usually limited by their own personal experiences or those of their peers in a shared practice. As a result, health practitioners may find a question-answering (QA) paradigm for information retrieval useful. Mental Health is a very common problem worldwide. Mental health includes our emotional, psychological, and social well-being. It affects how we think, feel, and act. It also helps determine how we handle stress, relate to others, and make choices. A person suffering from mental health isolates himself from society and rarely discloses problems with anyone. The person tends to ignore the illness. During hard times a person is more likely to get depressed when alone. To overcome this situation continuous attention towards mental health is needed. The objective of our project is to develop a conversational system that will be useful for anyone without any cost and

accessible at anytime and anywhere, and also provide mental health care solution in order to make the consultancy affordable and efficient.

## 2. MOTIVATION

Chatbots have the potential to change the way consumers interact with data and services in the future. There are currently no empirical studies examining why people utilise chatbots. This study adds to our understanding of the motivating elements that influence the use of conversational interfaces. Its findings may help lead future research on this area, providing fresh insights and guiding future chatbot design and development.

## 3. LITERATURE REVIEW

Ruyi Wang, Yuan Liao, Jinyu Wang, "Supervised Machine Learning Chatbots for Perinatal Mental Health care" [1] Perinatal mental health (PMH) issues are mood disorders that impact pregnant women, newborns, and family connections and develop throughout pregnancy and within the first 24 months after a child's birth. These issues might arise at any point during the pregnancy. Observation, self-reporting, and behavioral scale testing are the most common ways to diagnose PMH. Perinatal mental illness affects 20% of pregnant women in the United Kingdom. The author of this research applies SVM to perinatal women's sadness, anxiety, and hypomania. Human-robot interaction applications in mental health care have gotten a lot of press. In comparison to traditional methods, robot intervention in mental health care can help subjects overcome barriers to seeking help for mental health and collect more comprehensive and detailed data on patients, allowing users to recognize their own mental health level and clinicians to make more accurate and timely diagnoses.

Yash Jain, Atharva Burte, Hermish Gandhi, Aditya Vora "Mental and Physical Health Management System Using ML, Computer Vision and IoT Sensor Network" [2] Prior until now, healthcare management systems were primarily concerned with physical health and ignored mental health. This study illustrates a comprehensive healthcare management system that takes physical and mental health into account. A natural language processing chatbot was utilised to present a virtual doctor to the user and assist them in making a preliminary diagnosis.

According to the research, the smart healthcare market is predicted to rise by 21.4 percent between 2020 and 2025, necessitating the development of gadgets that monitor both physical and mental health.

Ariel Teles, Ivan Rodrigues, Davi Viana “Mobile Mental Health: A Review of Applications for Depression Assistance” [3] Depression is a mental disorder marked by persistent sorrow, a loss of interest, and a variety of behavioral abnormalities. Depression has a significant impact on the global population. Mental illnesses are intertwined and do not occur in isolation. This is a problem that usually occurs when another one is present. The purpose of this article is to build a larger number of mobile applications to help people who are depressed. The number of apps for chatbots, online therapy, educational tools, mood trackers, testing, and self-help has increased, according to the results of this survey.

Kyo-Joong Oh, Dong Kun Lee, Byung Soo Ko, Ho-Jin Choi “A Chatbot for Psychiatric Counseling in Mental Healthcare Service Based on Emotional Dialogue Analysis and Sentence Generation” [4] Several early projects used chatbots to provide psychological counselling to users. As a result of using a chatbot as an intervention approach, they have improved their drinking habits. In talks, continuing user monitoring, or ethical judgement in the intervention, the programmer does not take the user's psychological status into consideration. We believe that if emotion recognition is more accurate and consistent, consumers in need of mental health treatments will be more satisfied. Appropriate therapeutic psychological responses based on ethical responses are also essential. Based on high-level NLU and emotion recognition, we offer a multi-modal conversational service for psychiatric therapy. The technologies enable continuous monitoring of emotional changes. Furthermore, the ethical judgment-based case-based counselling response model is an appropriate response to clinical mental treatment.

Charith Silva, Mahsa Saraee “Data Science in Public Mental Health: A New Analytic Framework” [5] Understanding public mental health challenges and proposing solutions based on data science initiatives can be difficult using traditional data analysis investigations. To ensure that the data science process is carried out by trained and knowledgeable project colleagues, project management protocols must be in place. To those working in the mental health field, this study offers a new set of guidelines for using data science. There aren't many studies in the field of public mental health that consider the potential applications of data science. Healthcare data handling, evaluation, and exploitation have lately undergone a paradigm shift because to the advent of data science. Data science initiatives are distinct from standard data analysis because of their use of scientific methods. Developing a

new framework for managing mental health illnesses requires the use of data science. Clear guidelines and a robust framework for data analysis are usually necessary for a comprehensive investigation. Early in the process, it is helpful to estimate the time and resources needed to obtain a good knowledge of the situation at hand.

Kyoungyun Park, Min Jung Kim, Jungsook Kim, Oh Cheon Kwon. “Requirements and Design of Mental Health System for Stress Management of Knowledge Workers.” [6] A group of persons that suffer from chronic stress are known as knowledge workers. Due to the recent deterioration of the domestic economic situation, job stress has increased even more. As a result, efforts and strategies to relieve stress are required. In this paper, the authors describe how to effectively manage the stress of knowledge workers at work and introduce the mental health management system, with a focus on determining whether they are stressed and recommending stress-relief solutions that are tailored to them by collecting and analyzing physiological sensor data as well as other types of data such as environmental and task data.

Rahul Katarya, Saurav Maan. “Predicting Mental health disorders using Machine Learning for employees in technical and non-technical companies.” [7] Mental health has always been an important and challenging issue, especially in the case of working Professionals. The modernized (hectic) lifestyle and workload take a toll over people over time making them more prone to mental disorders like mood disorder and anxiety disorder. Thus, the risk mental health problems increase in working professionals. The author analyzing the increase in mental health problems in working professionals, and gives brief idea about how to improve the working conditions of employees and provide mental health care to them. In this research mental health classified into two types: 1. Mood Disorder 2. Anxiety Disorder. In this paper Logistic regression and Decision trees used to predict mental health disorders.

#### 4. SYSTEM ARCHITECTURE

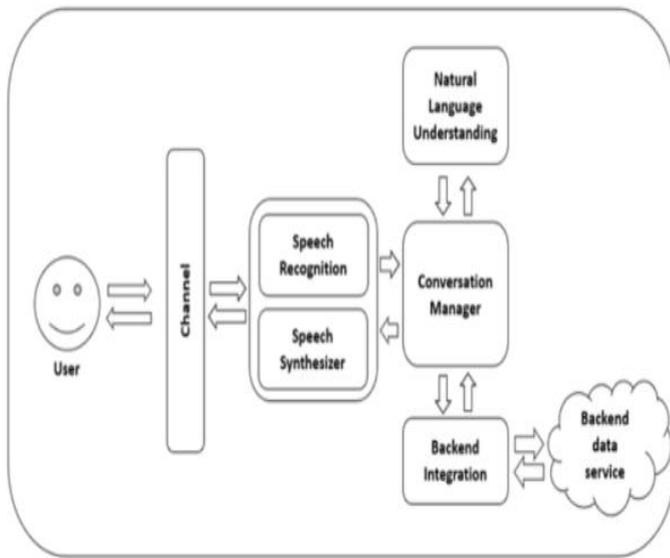


Fig: System Architecture Diagram

#### Working Module:

Step 1: Select the option (voice/text) for providing input to system.

Step 2: We need to give our question or query to system.

Step 3: System will recognize the speech/text.

Step 4: Recognize the query using Speech Recognition Module and convert to text using text Conversion.

Step 5: When voice input is given it Translate the query using translator.

Step 6: Match the query in database by using NLP

Step 7: Response to query by translating in quick way.

#### 5. ALGORITHM

##### 1. Natural Language Processing (NLP):

NLP is used to analyze text, allowing machines to understand how humans speak. This human-computer interaction enables real-world applications like automatic text summarization, sentiment analysis, topic extraction, named entity recognition, parts-of-speech tagging, relationship extraction, stemming, and more. NLP combines computational linguistics that is the rule-based modelling of the human spoken language with intelligent algorithms such as statistical, machine, and deep learning algorithms. These technologies together create the smart voice assistants and chatbots that you may be used in

everyday life. Our system using these following NLP operations:

A. Tokenization- It is a process of breaking a text document into small tokens consisting of phrases, symbols, or even a whole sentence.

B. Stemming- Stemming is basically removing the suffix from a word and reduce it to its root word.

C. Stop Word Removal- The words which are generally filtered out before processing a natural language are called stop words.

D. Bag of words- It is a collection of words to represent a sentence with word count and mostly disregarding the order in which they appear.

##### 2. Neural Network:

A neural network is a method in artificial intelligence that teaches computers to process data in a way that is inspired by the human brain. It is a type of machine learning process, called deep learning, that uses interconnected nodes or neurons in a layered structure that resembles the human brain. In this project Feed Forward Neural Network is used for training dataset and model building. A feedforward neural network is a type of artificial neural network in which nodes connections do not form a loop. The purpose of feedforward neural networks is to approximate functions.

A. Activation function: Activation function decides, whether a neuron should be activated or not by calculating weighted sum and further adding bias with it. The purpose of the activation function is to introduce non-linearity into the output of a neuron.

B. Adam Optimization: Optimization is the process of adjusting model parameters to reduce model error in each training step. The Adam optimization algorithm is an extension to stochastic gradient descent that has recently seen broader adoption for deep learning applications in computer vision and natural language processing.

C. Cross-entropy loss: It measures the performance of a classification model whose output is a probability value between 0 and 1.

#### 6. CONCLUSION

In today's world, poor mental health is a major concern, and it's difficult for everyone who has a mental disease to obtain care because it may be too expensive for some individuals. These people are unwilling to share their issues with others. When it comes to mental health, then, a large number of people will opt to seek care online. There

are weaknesses in existing systems. Most of them aren't very good, and they're also not free. Find out about it here in this study. Basically, it's a solution to some of the present system's shortcomings. We'd like to create a chatbot that can converse with users. When it comes to communication, it matters whether you're speaking or writing. When a user asks a question, the chatbot reacts in many ways. Positive and calming videos are added to the "recommendations" section, which makes users feel better. The address and phone number of a doctors also included in case the user's mental state has worsened and someone else needs to check it.

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