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Medilab+: -Depression Screening Test Based On PHQ9

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Abstract: A mental ailment that affects millions of individuals worldwide is depression. Improving results and averting long-term disability depend on early detection and treatment of depression. In this article, we present a machine learning-based method for detecting depression using two distinct approaches: sentiment analysis using Twitter data and a quiz based on the PHQ-9 questionnaire. For the quiz-based strategy, we employed a random forest algorithm; for the sentiment analysis technique, we utilized TF-IDF. Responses from people who completed the quiz and Twitter data from people who discussed depression were included in our dataset. According to our findings, the random forest model was the most accurate in predicting the depression phase from the quiz scores, with a 96.5 percent accuracy rate.

Keywords—Health, Disability, Diagnosis, Depression, Anxiety, Posy-Traumatic Stress, Mental Health.

I. INTRODUCTION

Millions of individuals worldwide suffer from depression, a mental health disorder. It has major effects on society, the economy, and health and is one of the main causes of disability. Prompt identification and management of depression are essential for enhancing results and averting chronic impairment. But because of several issues, such as stigma, lack of access to mental health treatment, and the disorder's complexity, depression is frequently underdiagnosed and undertreated. Machine learning is a technique that aims to construct systems that can improve through experience by using advanced statistical and probabilistic techniques. It is believed to be a significantly useful tool to help in predicting mental health. It is allowing many researchers to acquire important information from the data, provide personalized experiences, and develop automated intelligent systems. The widely used algorithms in the field of machine learning such as support vector machine, random forest, and artificial neural networks have been utilized to forecast and categorize the future events. The PHQ-9 is the nine-item depression scale of the patient health questionnaire. The nine items of the PHQ-9 are based directly on the nine diagnostic criteria for major depressive disorder in the DSM-IV. The PHQ-9 can function as a screening tool, an aid in diagnosis, and as a symptom tracking tool that can help track a patient's overall depression severity as well as track the improvement of specific symptoms with treatment. Our Additional Questions rather than PHQ-9 also covers disorder like Anxiety, Depression, Bipolar Disorder, Post-Traumatic Stress Disorder (PTSD), Schizophrenia.

II. LITERATURE SURVEY

A prevalent and crippling mental illness that affects millions of people worldwide is depression. The accuracy and accessibility of traditional approaches for diagnosing depression, like clinician interviews and self-report questionnaires, are limited. Consequently, scientists have looked at the possibilities of machine learning methods for diagnosing and detecting depression. Numerous researches have demonstrated encouraging outcomes when applying machine learning methods to identify depression. For instance, Bucci et al. (2018) employed audio and visual cues taken from a speech sample, along with machine learning algorithms, to predict the degree of depression. The research demonstrated that machine learning algorithms might predict depression severity more effectively than conventional self-report measures.

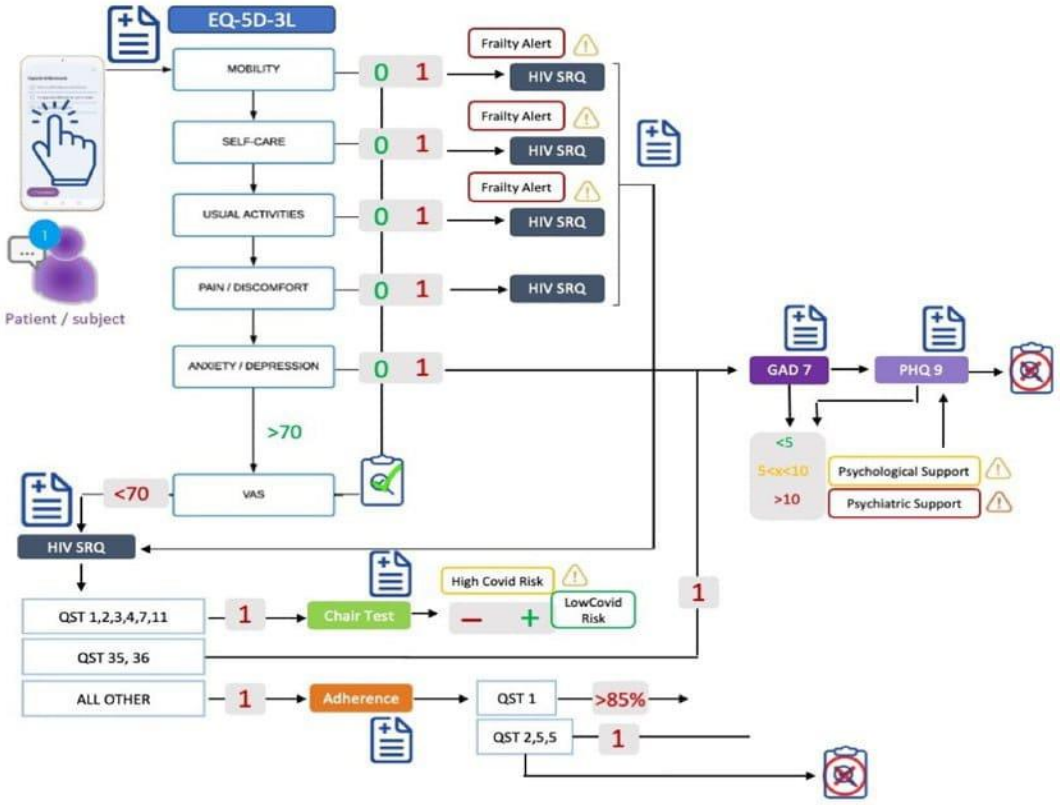
Existing Papers:

Among the most common and curable mental illnesses, depression is frequently diagnosed and treated by a variety of medical professionals, including primary care physicians, psychiatrists, and subspecialists in medicine and surgery. In primary care, there are several case-finding tools available that range in length from two to twenty-eight items and are used to identify depression.1, 2 These may usually be rated as continuous measures of depression severity, and they also have set cut points, above which there is a significant increase in the likelihood of major depression. It is not clear which of these measures is better than the others because scores on them all have a tendency to be highly correlated. The Patient Health Questionnaire (PHQ) is a novel tool for diagnosing depression and other mental illnesses using criteria. Therefore, the objective of this study is to evaluate the performance of machine learning techniques in depression detection using two different techniques: a quiz based on the PHQ-9 questionnaire and sentiment analysis using Twitter data. We also aim to assess the potential of mental health improvement tools, including songs, games, memes, and quotes, in promoting better mental health outcomes. By addressing these research questions, we hope to contribute to the development of more accessible and effective approaches to depression detection and treatment.

Predicting the Utilization of Mental Health Treatment with Various Machine Learning Algorithms [10] by Meera Sharma Sonak Mahapatra, Adeethyia Shankar mentioned that proper diagnosis and treatment for people with mental health disorders remains underdeveloped in modern day's society due to the widely ever-present public stigma attached to caring about mental health. Recently there have been attempts in the data science world to predict if a person is suicidal (and other diagnostic approaches) yet all face major setbacks. To begin, big data has many ethical issues related to privacy and reusability without permission—especially in regards to using feeds from social media. Additionally, people diagnosed with specific mental health conditions may not actually seek treatment, so data may be incorrect. In this research, we address both of these problems by using anonymous datasets to predict the answer to a different question— whether or not people are seeking mental health treatment. We also use a large variety of machine learning and deep learning classifiers and predictive models to predict with a high accuracy rate through statistical analysis. As a result, these individuals would be more productive, reducing social and economic costs in the tech work place.

III. SYSTEM ARCHITECTURE

A. Design



B.Requirement Analysis

In the software development lifecycle, demand analysis is one of the most important phases. It's used to identify and define the software. For any software design, there are different kinds of conditions to be fulfilled to insure the smooth handling of the processes. easily defined conditions are important labels on the road to a successful design.

Table 1. Requirements of Medilab+:- Depression Screening Test Based on PHQ9

Software Requirements	Hardware Requirements
Proxy Server Software	Windows 11 or latest version
Block chain Platform	8 GB RAM
Encrypting Software	Intel core processor i3
Database Management	Wi-Fi Router
Decentralized Identity	100GB free Hard Disk

C.Proposed System

In this project, a proxy system and a terminal for typing was developed to secure the communication process between User and public server. This makes the users to connect internet more securely along with data privacy

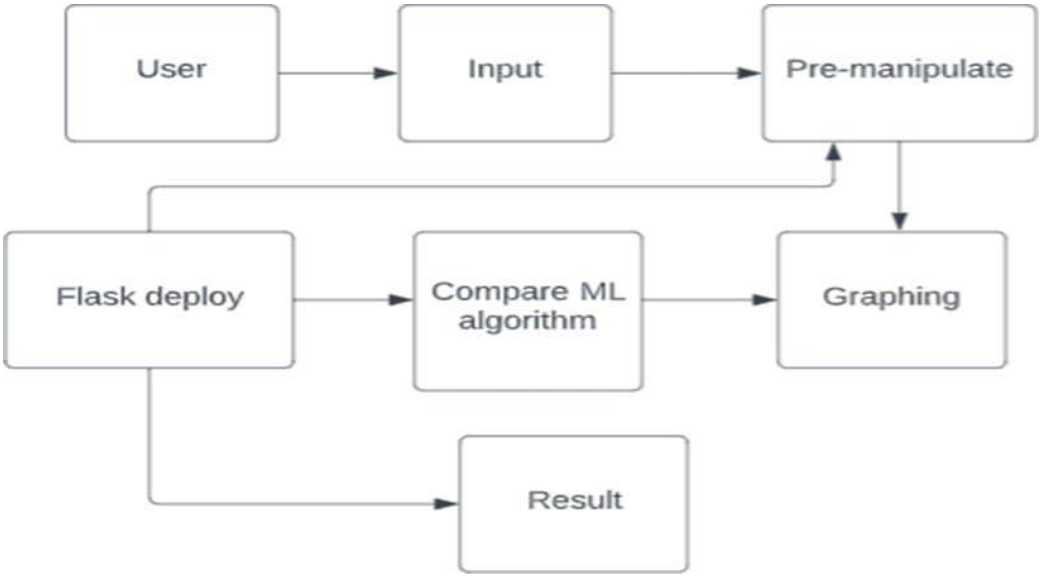


Fig 1. Proposed system of Medilab+:- Depression Screening Test Based on PHQ9

D. System Design

Framework plan is the method of arranging framework components such as design, modules and components, the different interfacing of these components, and the information passing through the framework. The objective of the system design handle is to supply adequate gritty data and information. data almost the framework and its framework components so that the implementation is consistent with the structural units characterized within the models and sees of the framework engineering.

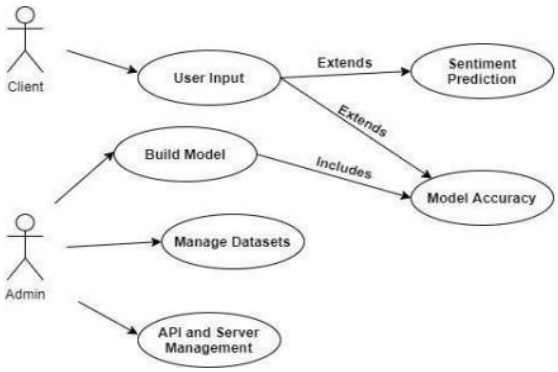


Fig 2. Use case of Medilab+:- Depression Screening Test Based on PHQ9

IV. RESULTS

Our study's findings imply that machine learning methods, in particular the random forest algorithm, have potential for precisely identifying and classifying depression. Promising outcomes were also obtained with the sentiment analysis approach, indicating that social media data could be utilized to predict depression. Furthermore, the instruments for improving mental health that are part of the suggested system might help to improve mental health outcomes. Nevertheless, additional investigation is required to thoroughly assess the efficacy of these methods. Future research may examine the possibilities of alternative machine learning algorithms and the application of sentiment analysis to alternative social media sites. Furthermore, additional research is required to properly assess how well mental health improvement tools work to promote improved mental health outcomes.

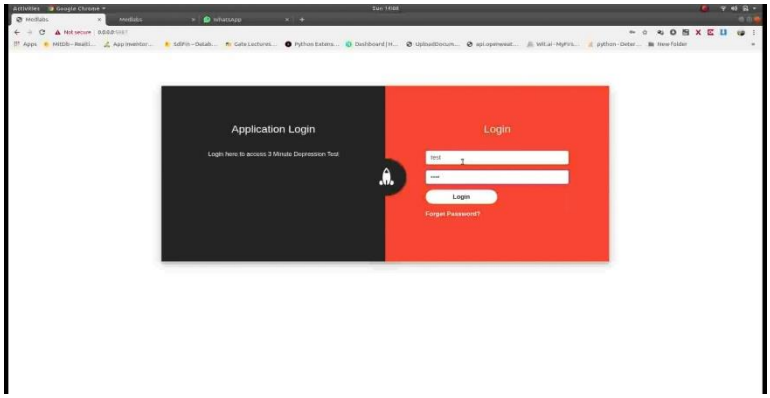


Fig 4. Login Panel of Medilab+:- Depression Screening Test

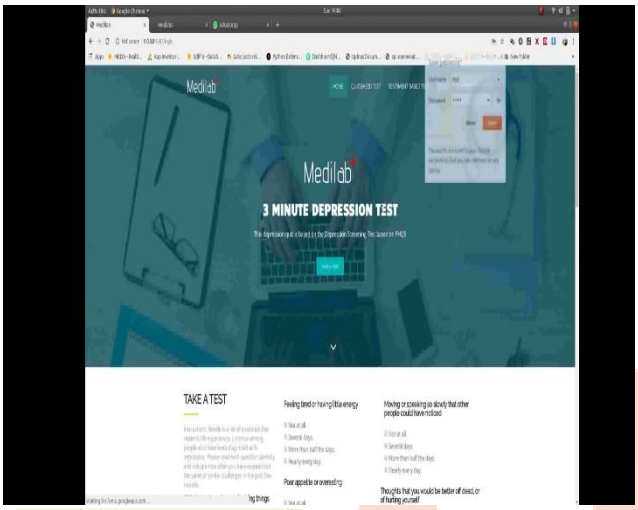


Fig 5. Activated Medilab+:- Depression Screening Test

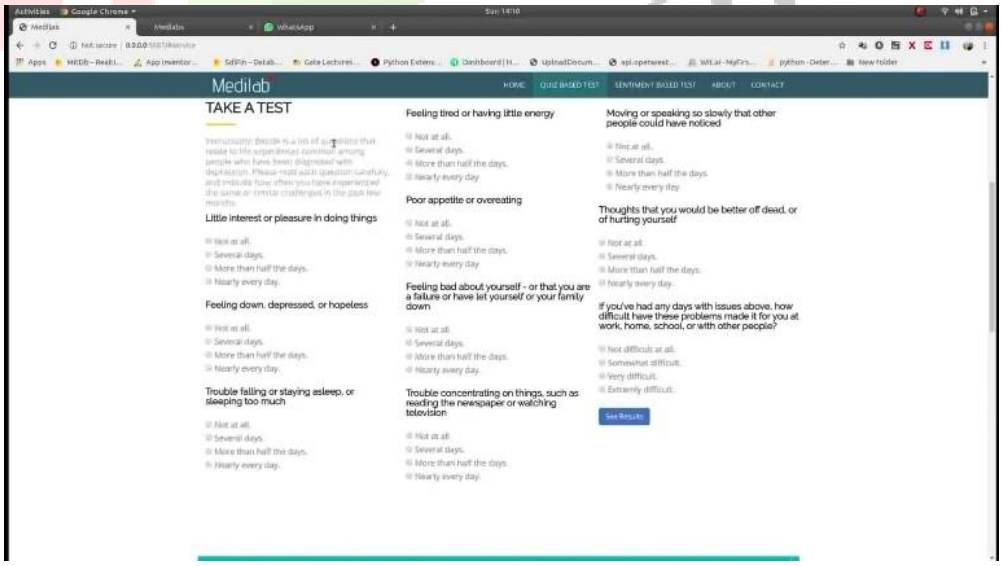


Fig 6. PHQ 9 test question of Medilab+: -Depression Screening test

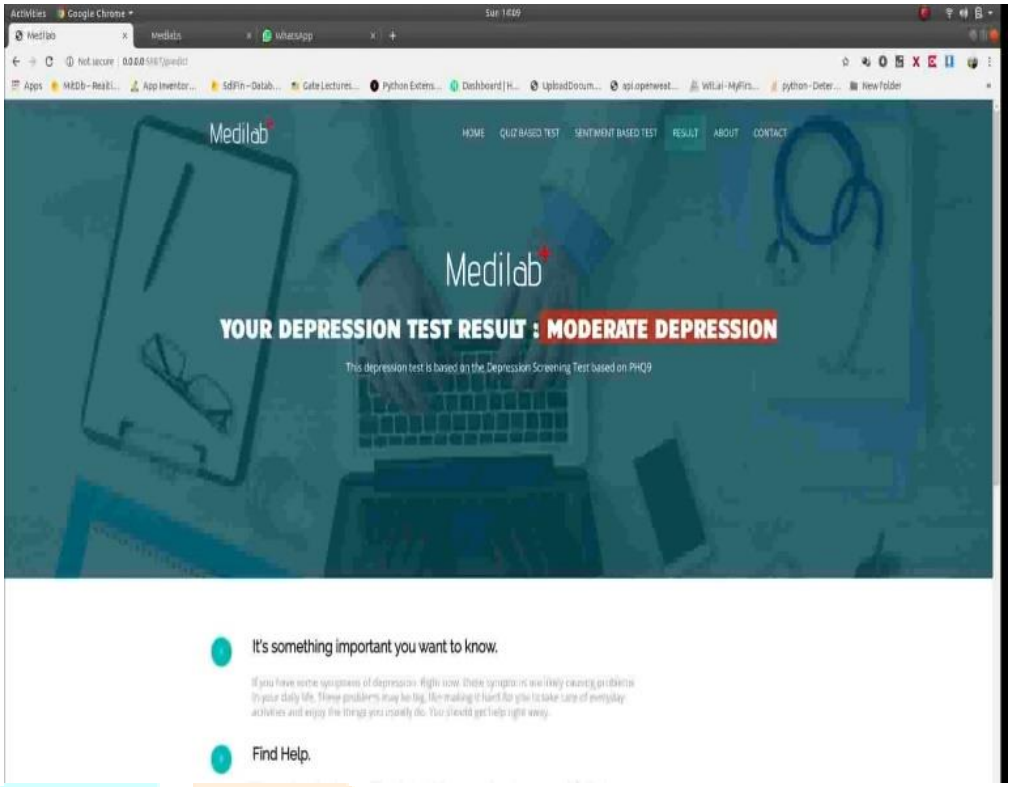


Fig 7 Test result based on PHQ 9 Medilab+: -Depression Screening test

V. CONCLUSION

In this study, we suggested a machine learning-based method for diagnosing and detecting depression utilizing Twitter data for sentiment analysis and a PHQ-9 questionnaire-based quiz. In order to encourage better mental health outcomes, we also incorporated resources for improving mental health, such as games, quotes, memes, and music. Our study's findings imply that machine learning methods, in particular the random forest algorithm, have potential for precisely identifying and classifying depression. Promising outcomes were also obtained with the sentiment analysis approach, indicating that social media data could be utilized to predict depression. Furthermore, the instruments for improving mental health that are part of the suggested system might help to improve mental health outcomes.

VI. ACKNOWLEDGMENT

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