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Mental Health Companion

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Abstract:Mental health is a growing concern worldwide, with an increasing number of individuals experiencing mental health issues. Technology has the potential to bridge the gap in mental health care, providing convenient and accessible solutions for those in need. Mental health problems detected at earlier stage helps the psychologist to medicate and enhance the patient's life. Depression is one of the leading causes of disability worldwide. Machine learning Techniques are presently applicable for evaluating medical data and treating the problem. The accuracy of all the algorithms are compared and the best algorithm with higher efficiency is been deployed. Proposed System to help people realize that they might be suffering from some kind of mental problem like depression, anxiety, etc. making them aware of their symptoms using Machine learning. To apply the machine learning algorithms, data was collected to form consisting of questions, which are often used by psychologists to understand their patient's problem in detail.

Keywords : Machine Learning, Mental Health, Random Forest Algorithm, Naive Bayes, Decision Tree.

I. Introduction

The Mental Health Companion, a revolutionary web-based application at the forefront of modern mental healthcare, leverages the power of machine learning (ML) to usher in a paradigm shift in the detection and management of mental health issues. With an unwavering commitment to early intervention and accuracy, the system aims to not only alleviate the personal burden of mental health challenges but also significantly reduce healthcare costs through timely and targeted treatments. Employing a proprietary dataset derived from a private source and utilizing questionnaires based on the clinically approved DAAS-42 Scale, the application ensures a robust and clinically validated approach to mental health assessment. Beyond its diagnostic prowess, the Mental Health Companion is dedicated to providing a real-time, cost-effective, and easily accessible experience, addressing the prevalent issues of healthcare accessibility and affordability. Its user-friendly interface, coupled with stringent privacy measures, underscores its commitment to delivering a secure and seamless web-based solution. As technology evolves and user needs change, the Mental Health Companion stands poised to adapt dynamically, making it a pivotal player in reshaping the landscape of mental healthcare applications.

II. Literature Survey

A. Comparative Analysis of different Algorithms to predict depression:

K. S. Sudhishna, C. Sanjay Kumar, B. S. Kishore and A. Arun[1] Information from social media platforms and wearable technology can offer useful insights into a person's behaviour and mental condition The study aims to compare the performance of three algorithms— Logistic Regression, Multinomial Na¨ıve Bayes and Support Vector Machine are the methods to detect depression. Any machine learning model's accuracy is highly dependent on the quality of the training data. Collecting trustworthy and representative data may be difficult when attempting to forecast depression. The models' performance may be impacted by the data's potential for being incomplete, erroneous, or biased. A variety of measures, such as precision, recall analysis and F1-score comparison, will be utilized in order to evaluate the effectiveness of the algorithms. By training these models on a similar dataset and comparing them based on accuracy and other criteria like sensitivity rates, it can determine which algorithm performs better at predicting depression. 2.3 Machine Learning Models based Mental

B. Mental Health Chatbot Delivering Cognitive Behaviour Therapy and Remote Health Monitoring Using NLP And AI:

Komal Rani, Harshit Vishnoi, Manas Mishran[2] Saarthi is a mental health interaction portal that offers a virtual solution to patients suffering from anxiety and depression. The platform is designed to provide comprehensive information on these conditions and their treatments and to connect patients with trained professionals who can provide support and guidance. At the heart of Saarthi is a chatbot, which uses advanced AI algorithms to provide personalized and empathetic support to patients. The chatbot is trained in various therapeutic techniques, and can help patients manage their symptoms, improve their wellbeing, and access the resources they need to live a fulfilling life. The website also provides access to a community of peers and medical professionals, allowing patients to connect with others who understand their struggles and offer support. With Saarthi, patients can access quality mental health care from the comfort of their own homes, making it a convenient and accessible solution for anyone struggling with anxiety and depression.

C. Neural Network Based Model for Predicting Psychological Conditions:

Guo, Y., Friston, K., Aldo, F., Hill, S., Peng, H.[3] Preventive care attempts to inform individuals and clinicians of potential complications or conditions a patient might encounter. With the recent interest on leveraging big data in the healthcare domain to better design data-driven models for preventive medicine and the increased awareness of the long-lasting effects of concussions, being able to predict psychological conditions post- concussion can have a paramount effect on mild traumatic brain injury patients. We present a neural network model that can predict the likelihood of developing psychological conditions such as anxiety, behavioural disorders, depression, and posttraumatic stress disorder. We analysed the effectiveness of our model against a dataset of 89,840 patients. Our results show that we can achieve accuracies ranging from 73% to 95% for each of the clinical conditions under consideration, with an overall accuracy of 82.35

D. A textual based featuring approach for depression detection using machine learning classifiers and social media texts

Chiong, Raymond and Budhi, Gregorius Satia and Dhakal, Sandeep and Chiong, Fabian.[4] Previous studies have found that messages posted by individuals with major depressive disorder on social media platforms can be analysed to predict if they are suffering, or likely to suffer, from depression. This study aims to determine whether machine learning could be effectively used to detect signs of depression in social media users by analysing their social media posts—especially when those messages do not explicitly contain specific keywords such as 'depression' or 'diagnosis'. To this end, we investigate several text preprocessing and textual-based featuring methods along with machine learning classifiers, including single and ensemble models, to propose a generalised approach for depression detection using social media texts. We first use two public, labelled Twitter datasets to train and test the machine learning models, and then another three non- Twitter depression-class only datasets (sourced from Facebook, Reddit, and an electronic diary) to test the performance of our trained models in other social media sources. Experimental results indicate that system is able to effectively detect depression via social media texts even when the training datasets do not contain specific keywords (such as 'depression' and 'diagnose'), as well as when unrelated datasets are used for testing.

E. Research on Depression Recognition Using Machine Learning from Speech

Recent studies have shown that speech is a good indicator of depression, giving us a motivation to perform depression diagnosis using speech to create an objective measure. This paper studies the use of state-of-the- art machine learning (ML) models including ensemble in predicting depression severity using audio features after optimizing the data. We collect the audio data from Northwest Normal University and the classic paradigm of psychological self-reference effect (SRE) is used. In the task of vocabulary reading, the SVM model achieved very good performance. In the task of image description, the DT model was better than other models. The results are better than other state-of-the-art models. In the future, we aim to further verify the model's correctness and create an autonomous agent that could help depressed patients.

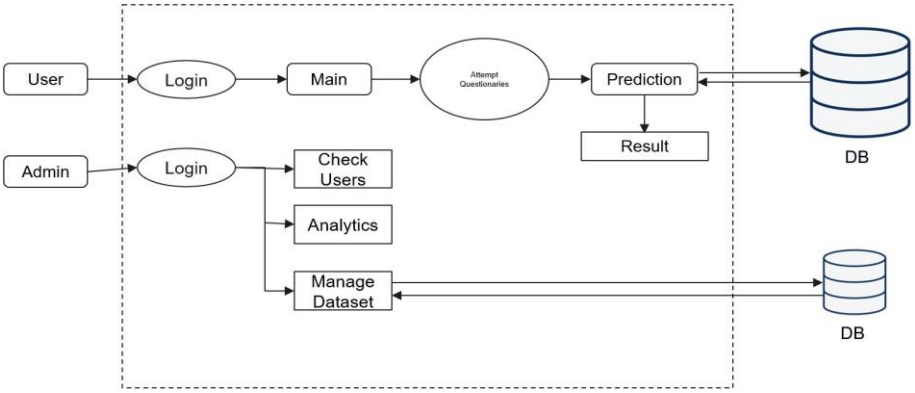

Figure 1 . Proposed System Architecture

Proposed System Architecture:

The system architecture defines the structure, behavior, and interactions within our web-based mental health assessment platform. It seamlessly integrates user interfaces, a secure server infrastructure, and a database to facilitate real-time communication and efficient data processing. The design ensures scalability, accessibility, and security for deploying machine learning algorithms like Random Forest, Naive Bayes, and Decision Tree. This architecture forms the foundation for accurate mental health predictions based on user responses, emphasizing the synergy between user interfaces, algorithms, and data management

Proposed System Modules:

The project's workflow is designed with simplicity and efficiency in mind, consisting of two main modules: the User Module and the Admin Module.

1. **User:** For users, the journey begins with a straightforward registration process, followed by secure login credentials. Users can then take the mental health assessment test, powered by Machine Learning algorithms, prominently featuring the best algorithm. After completing the test, users receive detailed results, not only indicating the presence of mental health concerns but also providing insights into the severity of detected issues. Actionable suggestions are also offered for Guidance.
2. **Admin:** On the administrative side, the Admin Module ensures smooth management of the system. Administrators have access to the dataset for overseeing data quality and integrity. They can monitor user interactions, track registrations, and view aggregated statistics through a comprehensive dashboard. This module empowers administrators to oversee the system efficiently, facilitating timely interventions. This clear and user-centric workflow guarantees a secure, accessible, and informative experience for users, while administrators can manage and enhance the system's functionality based on real-time insights.

Machine Learning Algorithms & Dataset:

This project embarks on a thorough exploration of machine learning capabilities by subjecting three prominent algorithms—Random Forest, Naive Bayes, and Decision Tree—to rigorous analysis. The objective is to ascertain their proficiency in discerning mental health conditions, utilizing user responses garnered from our meticulously curated questionnaires aligned with the DAAS-42 Scale, a clinically validated metric. This methodical approach allows us to gauge the algorithms' accuracy in predicting mental health outcomes, with the ultimate goal of selecting the algorithm that exhibits the highest precision. This meticulous process ensures the deployment of a robust and effective web-based mental health assessment system, underlining our commitment to delivering reliable and impactful results in the realm of mental health diagnostics.

III. Conclusion

In conclusion, the study highlights the impactful role of machine learning , in enhancing the accuracy of mental health detection. With remarkable accuracy rates for depression, anxiety, and stress detection, this research underscores the transformative potential of technology in revolutionizing mental healthcare. As we delve deeper into the capabilities of ML and DL algorithms, the promise of more accessible and precise mental health assessments becomes increasingly evident, paving the way for a future where technology plays a pivotal role in improving well-being.

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