Mental Health Assessment in Youth: Detection and Diagnosis

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Abstract— The COVID-19 pandemic had a significant impact on global mental health, causing new problems and exacerbating existing ones. Mental health is often overlooked due to societal norms and stigma, and resources were directed towards the pandemic. Therefore, a mental health detection system was developed using machine learning to focus on anxiety and depression. Several ML algorithms, including Random Forest, Logistic Regression, KNN, Naïve Bayes, and SVM, were reviewed for depression and anxiety detection. The system uses a questionnaire and a trained machine-learning model to detect early mental health issues. The web-based nature of the project allows it to reach a global audience, addressing mental health concerns on a broader scale. Early detection can lead to prompt treatment or procedures, potentially improving mental health.

Keywords—Machine Learning, mental health detection, Data Science, Anxiety, Depression

I. INTRODUCTION

Mental Health is an essential part of us, controlling our pattern to eat, sleep, reciprocate, and express to a major extent. Despite being so important, it is neglected by most of us, primarily scared by acceptance and societal norms. According to a statistic released by the World Health Organization (WHO) in January 2020, approximately 264 million people of all age groups are suffering from depression which is a leading cause of disability around the world. Most people neglect to think about their disorder which is caused by depression, and many times land in severe conditions upon being noticed. As a result, technologies for early detection of mental illness and successful treatment are needed. Keeping in mind the digital era that we live in, the detection of mental illness is a tad bit easier since everything is at our fingertips., we have created a system that will detect if a student is suffering from any mental illness or not by filling up a questionnaire giving basic details about themselves. That would fetch the result and return it to the concerned person taking the detection test. Our web interface is the point of control for request and response. Our object is the data that is collected via the questions asked once the concerned person lands on the website. It so happens that the list of questions aims to give a sketch of the student's basic traits that help identify if the concerned student is suffering from any mental illness or not. The mental health of a human being indicates the mental condition, and it is impacted by the external or internal environment. Machine learning has the power to detect the signals about the facts from the human brain, and these signals are

used to find out the mental health state. The signals are based on the response and nature of questions, and artificial intelligence assesses whether the respondent is typical or has mental health trouble. The machine learning implementation in mental health services is a game-changer due to the personalized services, better treatment plans, and suitable service delivery options. By assessing the mental health at the right time, the student's behavior can be changed through short-term treatment. Upon receiving predictions from the machine learning model, individuals can consult professionals like psychologists or psychiatrists. The earlier the detection, the sooner the individual can initiate treatment or procedures, leading to potential improvements in mental health.

II. RELATED WORK

The integrated mental health assessment system is a pioneering fusion of conventional screening tools and cutting-edge technologies, specifically tailored to early detection and support for anxiety and depression. Extending across diverse age groups, the system incorporates age-specific screenings that employ standardized questions to discern early signs of anxiety and depression. Severe cases identified through these screenings are promptly directed toward professional intervention. In tandem, a machine learning project utilizes predictive analysis to assess anxiety and depression in students, leveraging behavioral biomarkers and considering correlated features such as state, religion, age, gender, and marital status. Simultaneously, natural language processing methods are applied to detect anxiety and depression by analyzing varied text types, including social media messages, interview transcripts, and clinical notes. This not only facilitates proactive mental health care but also aids in the early diagnosis of anxiety and depression. The AI-based decision support system features a nuanced set of questions dedicated to efficiently diagnosing anxiety and depression, offering a tailored approach. The study delves into ethical considerations surrounding AI implementation in mental health care, providing guidelines for the ethical integration of these advanced tools. Additionally, a survey explores mental health detection in online social networks specifically targeting anxiety and depression, utilizing sentiment analysis and deep learning techniques. This comprehensive integration of approaches aims to redefine mental health care by seamlessly blending traditional and advanced methodologies, fostering a more nuanced understanding of anxiety and depression for improved diagnosis and support.

III. PROPOSED SYSTEM

The system discussed is designed to identify the level of anxiety and depression using various machine learning algorithms. The process of predicting anxiety and depression using machine learning (ML) involves several steps. Firstly, relevant data is collected, including lifestyle factors, and responses to mental health questionnaires. Next, pre-processing steps address missing values and outliers while feature manipulation may involve creating new variables indicative of mental health. The data is then labeled to define target outcomes for anxiety and depression. ML algorithms such as logistic regression, decision trees, or random forests are selected based on the nature of the problem. Subsequently, the model is trained on a portion of the dataset and evaluated on a separate test set. Our platform uses the DASS-21 questionnaire to make accurate predictions about mental health. We check and clean the data to ensure accuracy and use machine learning to obtain better insights into the results. The system is designed to be easy to understand and adaptable, and it keeps user information private for ongoing improvements in mental health assessments.

IV. METHODOLOGY

The research focused on detecting anxiety and depression using the Depression Anxiety Stress Scale (DASS21). The data was collected via google form and it was open to anyone in the 16-25 age group.
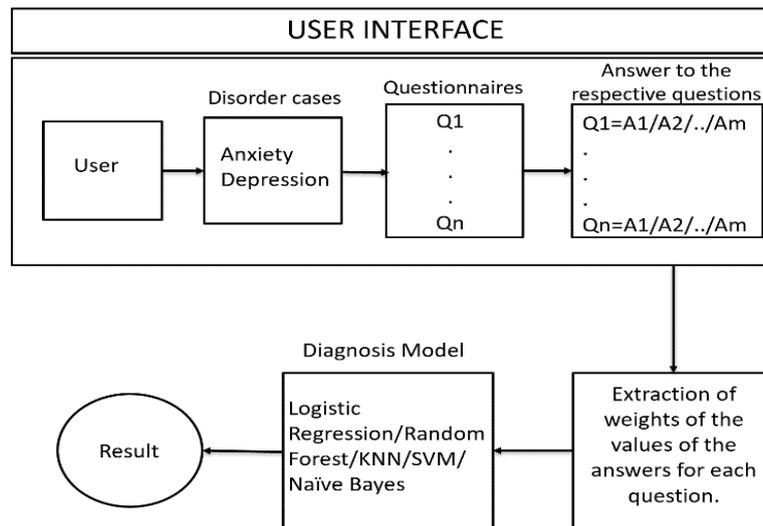

Fig 1: System Architecture

DASS-21 comprises 21 questions, with 7 questions allocated to each of the scales. The possible answers for each question which could be given in text or numeric form – are as follows:

0 did not apply to me

1 applied to me to some degree or some of the time.

2 applied to me to a considerable degree or a good part of the time.

3 applied to me very much or most of the time.

Following the data collection, the participant's responses were encoded using numeric values of 0 to 3, and the scores were then calculated by adding the values associated with each question and the below formula:

Score = sum of rating points of each class * 2

Once the final scores had been calculated, these were labeled according to severity – i.e. Normal, Mild, Moderate, Severe, and Extremely severe.

Streamlit was used to build interactive web applications effortlessly, seamlessly integrating machine learning models and data visualization tools into the application interface. Its intuitive framework supported rapid prototyping and deployment, enhancing productivity and user experience. Dynamic and responsive dashboards were created by leveraging Streamlit's simple syntax and rich ecosystem of components. Streamlit's flexibility and scalability efficiently showcased findings and insights, driving informed decision-making for users.

V. RESULTS

After applying different machine learning algorithms like logistic regression, KNN, Naïve Bayes, Random Forest, and Support Vector Classifier, the following accuracies were observed.
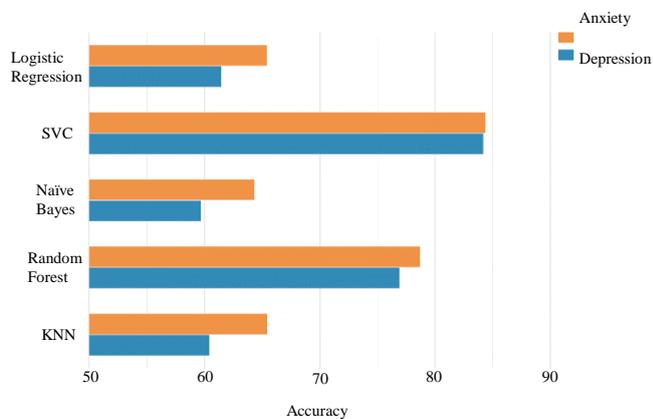

Fig 2: Comparison between ML models

After deploying the models, it was found that Support Vector Classifier, Random Forest, and Logistic Regression were found to provide the highest accuracies in that particular order.

After predicting their score, personalized suggestions are provided tailored to each individual's performance. These suggestions aim to guide them towards areas of improvement or reinforce their strengths, optimizing their outcomes. The system analyzes the performance data to identify specific areas where the individual may need additional practice, clarification, or support. This tailored approach ensures that users receive targeted recommendations to help them progress effectively in their learning journey.

VI. CONCLUSION

Utilizing this application alongside a trained machine learning model to detect mental health issues in students represents a groundbreaking approach to early intervention. As users provide information, the model's predictive capabilities become instrumental in swiftly identifying potential mental health conditions, enabling timely professional consultation and prompt treatment, ultimately leading to an enhancement in overall well-being. This innovative solution addresses the critical and widespread issue of mental health in today's society, highlighting the importance of proactive measures and technological advancements in the field. By seamlessly integrating user input and machine learning algorithms, the tool creates a user-friendly and accessible platform for students seeking support. The model's predictive accuracy enhances the precision of mental health condition detection, emphasizing the urgency of addressing these concerns early on, ultimately improving well-being. This addresses a critical and prevalent issue in today's society.

FUTURE WORK

The work could be expanded to include a user profile system, allowing individuals to create and maintain their profiles. This feature would enable users to establish personalized accounts within the platform, where they can securely store their score histories and performance records. Using this functionality, users can easily access and review their past assessments, track their progress over time, and identify areas for improvement.

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