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AI-Powered Mental Health Analyser and Personality Mapping System

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Abstract: *This Paper presents the development of an AI-powered mental health analyser that evaluates personality traits and general well-being by using machine learning algorithms. By analysing user-provided inputs and survey data, the system provides personalised feedback and recommendations to improve mental health. Experimental results demonstrate the model accuracy and potential benefits for user seeking better mental health awareness. Understanding personality traits is key to education, employment and mental health.*

Experimental results demonstrate the model accuracy. Traditional psychometric approaches take long time and require survey and lack scalable automation. Recent progress in NLP and ML has enabled behaviour patterns to be inferred from linguistic signals. The present study proposes an AI-driven, web-based personality assessment model using sentiment analysis and trait mapping based on OCEAN (Openness, Conscientiousness, Extraversion, Agreeableness, Neuroticism). Personality traits will be predicted from user-generated text with Python-based backend processing, including models such as Logistic Regression, Random Forest, and BERT.

Results have established the feasibility of automated personality analysis with easy deployment scalability for recruitment, adaptive learning, and self-awareness applications.

Keywords: *NLP, Sentiment Analysis, Personality Traits, Machine Learning, BERT, OCEAN Model.*

I. INTRODUCTION

In various fields, particularly those that rely on human behavior, AI has emerged as a key factor in decision-making. Several fields, including recruitment, adaptive learning, psychological intervention, and the prediction of social behavior, make use of personality assessment. The MBTI, Big Five Inventory, and 16-PF are typical tests that are administered through manual scoring, but some questionnaires may be subject to subjective bias.

The challenge now lies in NLP-based AI systems that use language usage patterns to deduce personality traits and perform automated assessments quickly. This is challenging. Language reflects the mental, emotional, and social conditions in an individual. Using the techniques of NLP, one can quantify these traits by considering sentiment polarity across different semantic domains and analyzing the structural features of user-generated text. We present a personality trait mapping system powered by AI that extracts user input, extracting linguistic characteristics, and using machine learning algorithms to predict scores related to OCEAN traits. Modules such as login, dashboard, questionnaire page and assessment engine are included in our proposed system along with history and result visualization framework. Python is used to host ML/NLP models on the backend, and React.js/Flutter/HTML-CSS is utilized for frontend development. The database will be MySQL/MongoDB for secure storage, retrieval and recording of historical assessment results.

This study contributes to:

- 1) Developing a functional personality assessment model.
- 2) Comparing NLP models for personality inferences.
- 3) Real-time web-based visualization.

II. METHODOLOGY

Mind Transformation Process

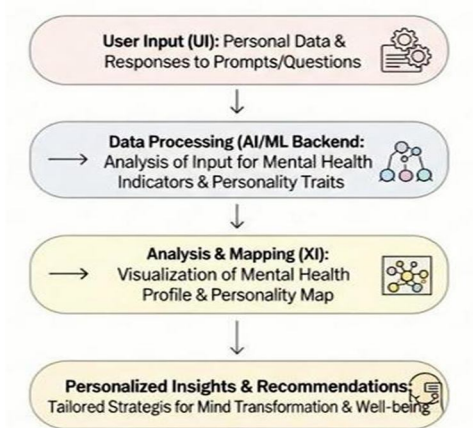


Fig. 1 Structure of system

Our main objective is to develop an artificial intelligence-based tool for assessing mental health status that takes into account data provided by users, including survey responses and behavioral metrics.

- To offer tailored mental health advice and feedback based on the user's anticipated mental state.
- To produce an intuitive interface that permits users to take tests and obtain instantaneous, measurable outcomes.'
- In order to establish the validity of the analyzer by examining common mental health datasets and user feedback.
- To explicate the ethical considerations and data protection strategies associated with sensitive mental health information in AI systems.
- To promptly offer personalized feedback to the user regarding their emotions.

A. Methods

- The acquisition of data involves the integration of text and speech responses with biometric data gathered by IoT sensors.
- The input for emotional and personality indications is processed using AI/ML backend, Python, NLP, and algorithms that map personalities. This includes Sentiment Analysis algorithms.
- The Big Five personality tests, including Openness, Conscientiousness and Extraversion, Agreeableness (with varying degrees of difficulty), Neuroticism, are used to assess personality traits through dynamic scoring using questionnaires.
- Dashboards offer a visual representation of mood trends, radar charts and feedback. Abnormal patterns are signaled through alerts.
- The use of local processing for data processing and user privacy are maintained, while also avoiding the possibility of cloud or external sharing.

III. RESULT AND DISCUSSION

- Accurate identification of stress, anxiety and depression by physiological data as well as language data.
 - Observing emotional patterns and providing tailored advice through actionable insights in real-time are possible.
 - Feedback from users indicates heightened awareness and satisfaction that are not present in static health assessments.
 - Affordable, scalable systems are suitable for healthcare, education, and personal use.
- The use of AI and NLP in Psyche Compass elevates the value of mental health apps to an all-encompassing, data-driven approach.
 - The challenges of achieving data diversity, improving algorithms, and addressing privacy concerns are still present.
 - Precent-time intervention abilities enhance health and reduce the repercussions of mental illnesses that are not being diagnosed.

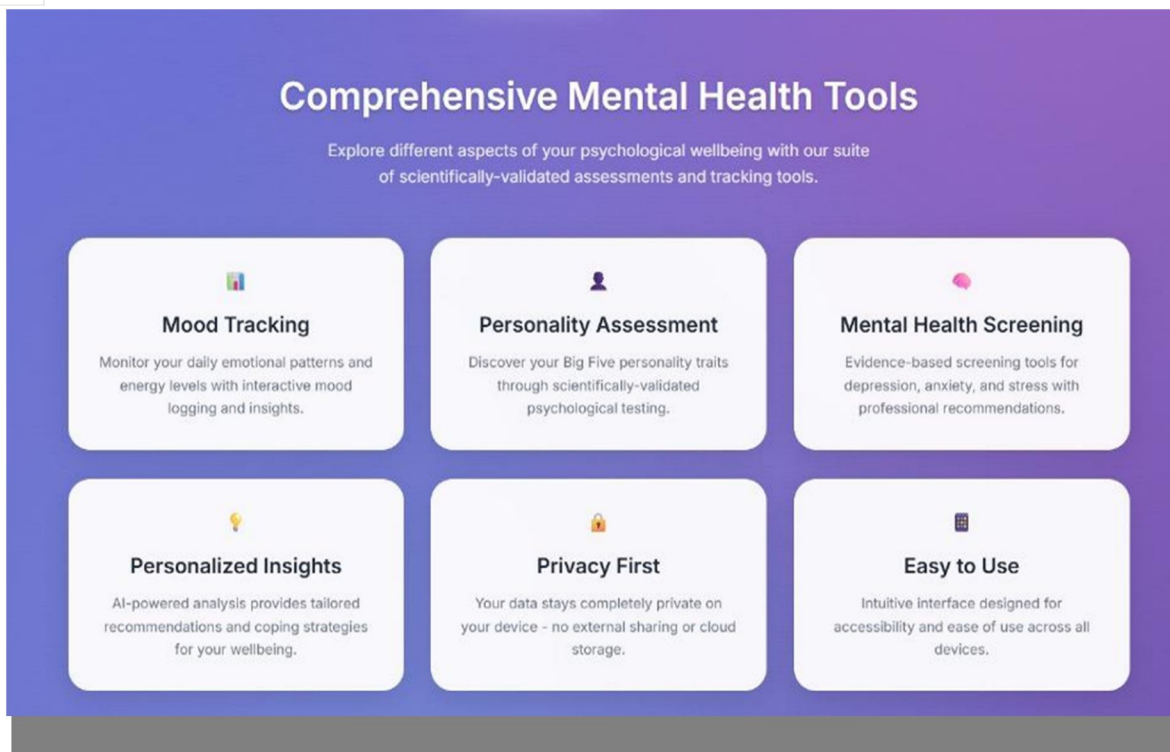


Fig. 2 Homepage

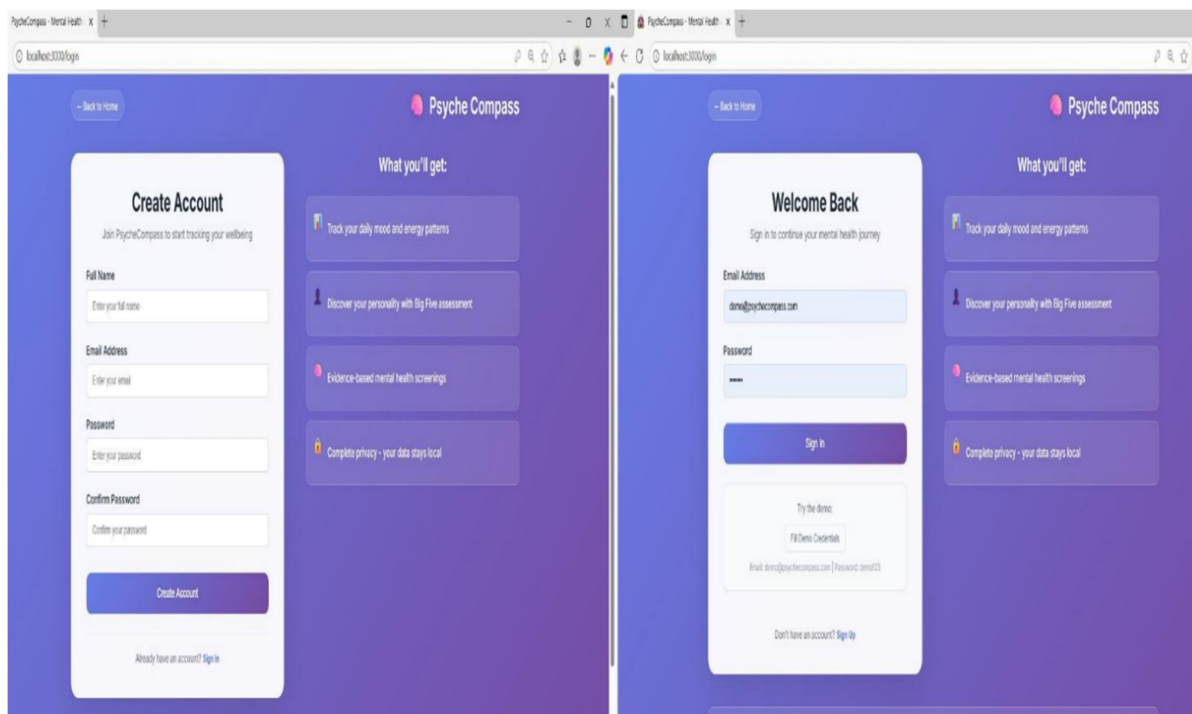


Fig. 3 Login/Sign in Page

Fig.(2) shows the dashboard of the website following with the Login/Sign in page of the website Fig.(3). The user can also use or test the website using a demo account.

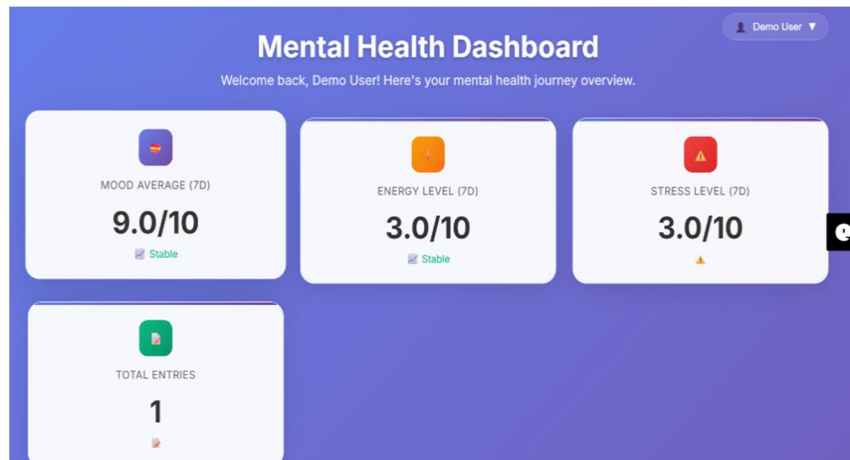
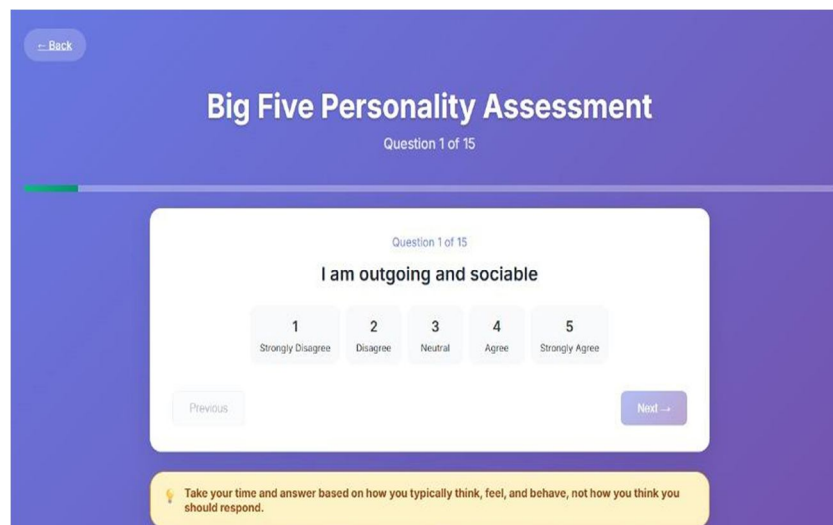


Fig. 4 Dashboard



The questionnaire page shows 'Question 1 of 15' with the statement: 'I am outgoing and sociable'. The response scale is as follows:

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

Navigation buttons: Previous, Next. A note at the bottom states: 'Take your time and answer based on how you typically think, feel, and behave, not how you think you should respond.'

Fig. 5 Questionnaire Page

The user needs to answer 15 questions in order to get his big five personality assessment result which includes five personality traits (Openness, Conscientiousness, Extraversion, Agreeableness, Neuroticism).

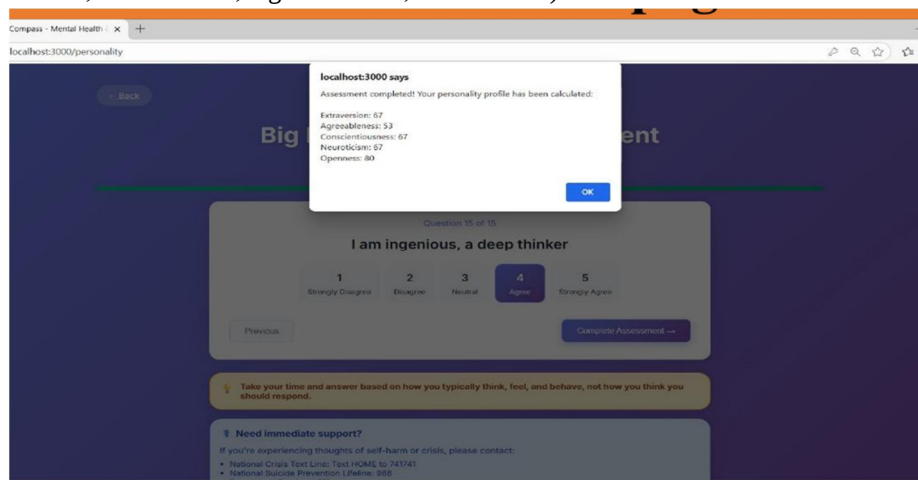


Fig. 6 Pop-up showing the scores of Big Five personality traits.

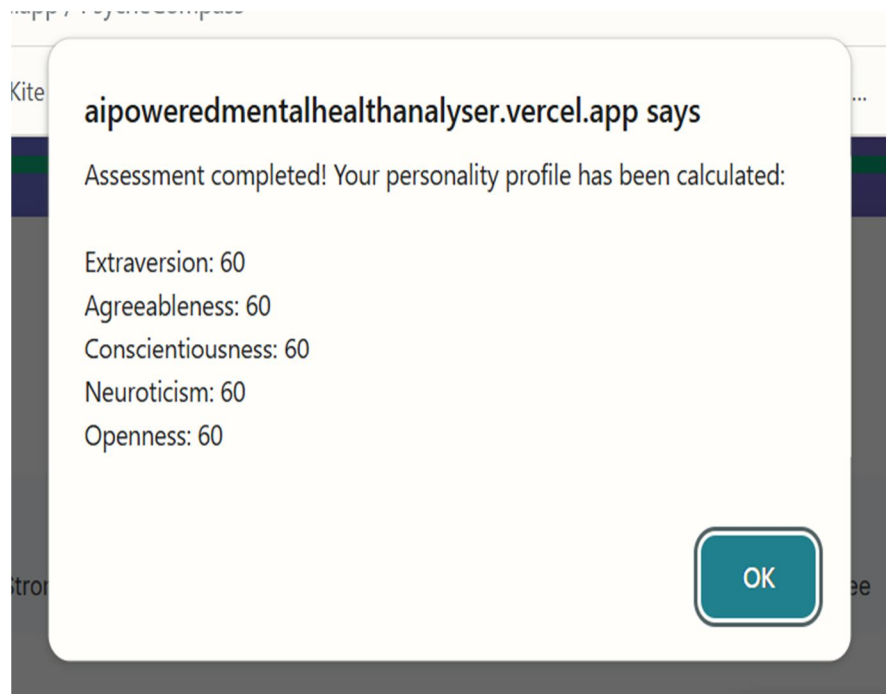


Fig. 7 Result score of the test

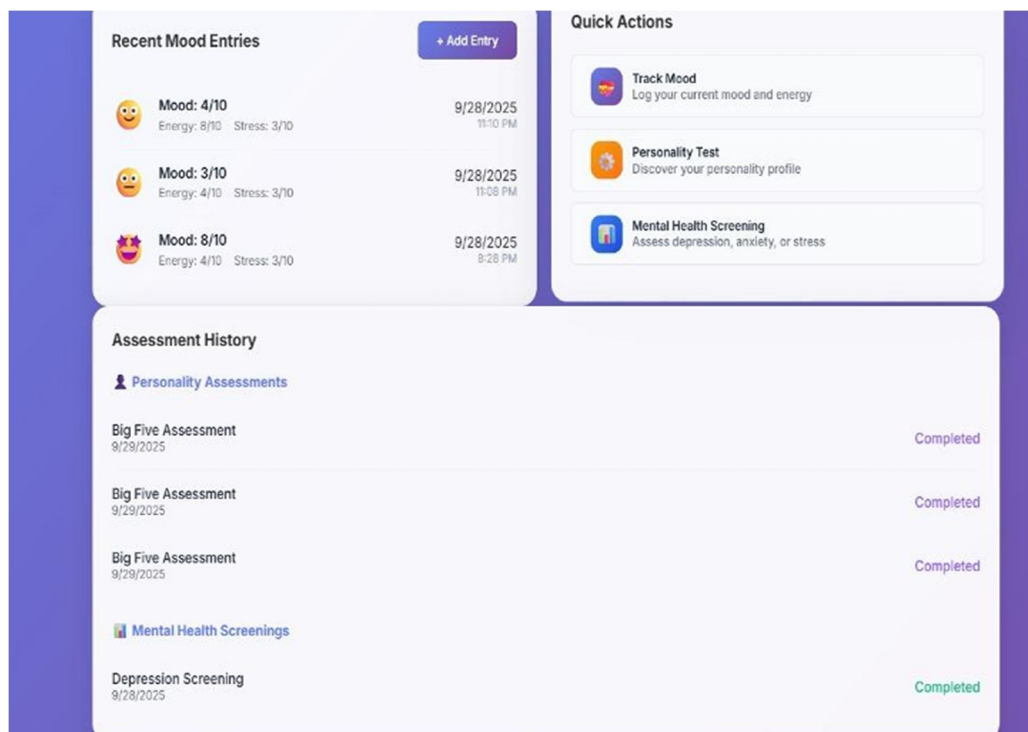


Fig. 8 Dashboard which shows the assessment history

The following screenshot consists of the mental health screening page, which has three different types of tests that focus on mental conditions like Depression, Anxiety, and Stress. Each assessment has 8-10 questions which tell us about user's current mental health conditions by assessment.

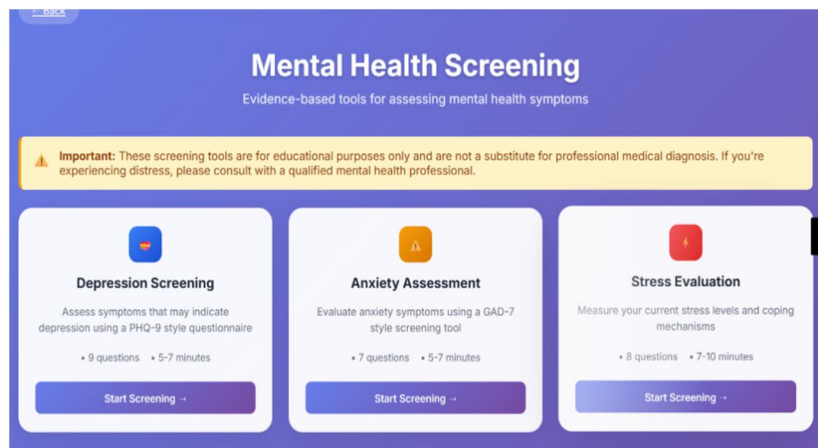


Fig. 9 Mental Health Screening Page

Fig.10 shows the sample question for the Depression screening assessment (PHQ-9), which is a 9-item questionnaire used to screen depression and its severity.

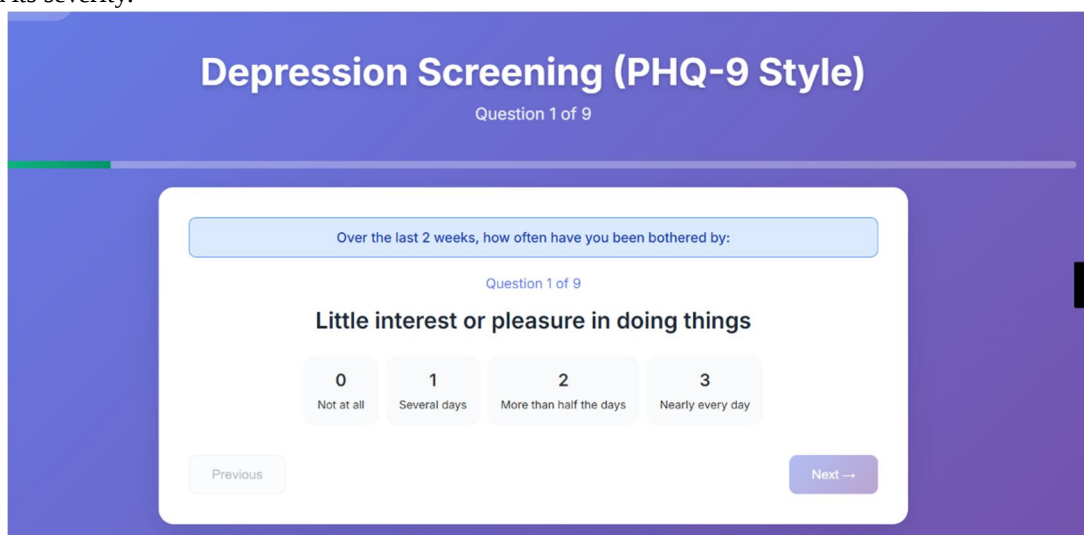


Fig. 10 Sample Question From the Depression Screening

After completing the assessment, the user gets his result, which in his depression screening result, which includes the total score and severity level. And a response which tells the user what steps he/she can take to improve the mental health Fig.11

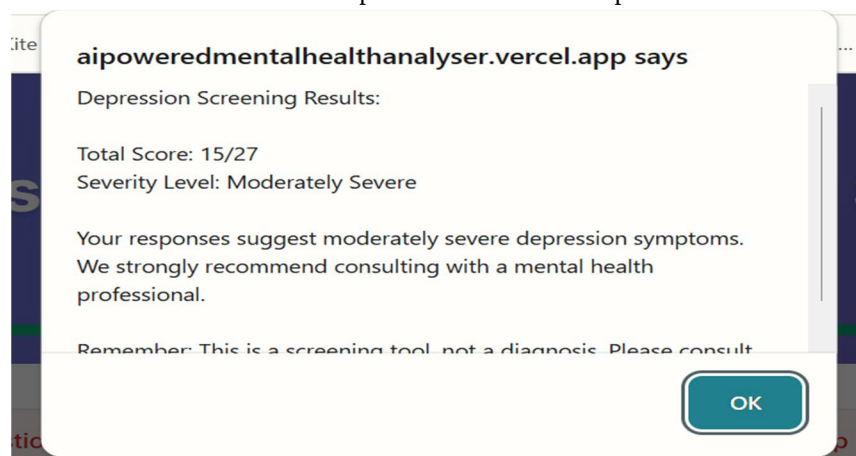


Fig. 11 Pop-Up Screen showing the result of the Assessment

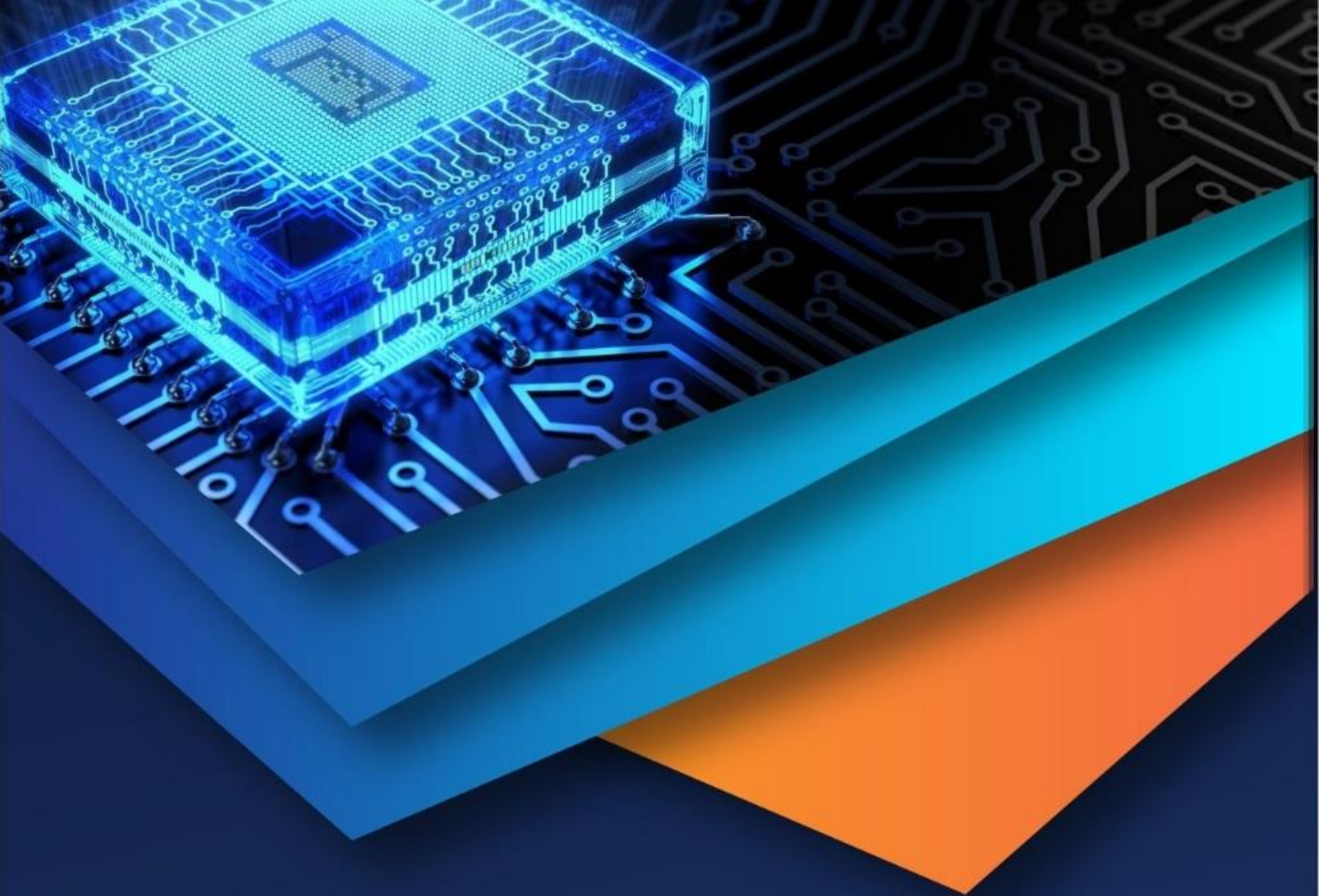


IV. CONCLUSION

The Psyche Compass project demonstrated how advanced AI combined with sensor technologies could be integrated into mental health systems to provide users with actionable feedback and provide real-time analyses. Additional research is necessary due to the availability of larger datasets, stronger features, and clinical validation.

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