

Mental Health and Well Being Surveillance Assessment and Tracking Solution Among the Children

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Abstract --The increasing prevalence of mental health issues among children (ages 6-12) highlights the need for early assessment and intervention to prevent long-term psychological challenges. This research introduces an AI-driven mental health surveillance and assessment system, designed to assist parents, educators, and healthcare professionals in evaluating children's emotional well-being. The system utilizes a structured 25-question assessment based on the Youth Beck Inventory for Children and Adolescents, covering key emotional parameters such as anxiety, fear, sadness, anger, and frustration. Machine learning algorithms analyze user responses to determine mental health risk levels and generate detailed reports. Additionally, the system offers therapeutic interventions such as laughter therapy, spiritual therapy, child therapy, yoga therapy, speech therapy, along with an option to consult mental health professionals for further support. By integrating AI-based assessment with real-time evaluation, this solution aims to enhance early detection, personalized support, and overall well-being in children.

Keywords: AI-driven mental health assessment, child psychology, sentiment analysis, early intervention, machine learning.

I. INTRODUCTION

Children's mental health is a crucial aspect of their emotional, cognitive, and social growth. Rising cases of stress, anxiety, and behavioral disorders negatively impact their academic and personal well-being. Existing assessment methods rely on manual observation and self-reported surveys, which are often inconsistent and subjective. To address this, a technology-driven, data-based system is required for continuous mental health monitoring. By leveraging Artificial Intelligence (AI) and Machine Learning (ML), the proposed system analyzes structured questionnaire responses, predicts mental health risk levels, and provides personalized therapeutic suggestions in real time. The primary objective is to detect early signs of mental health issues in children,

offer timely interventions, and assist parents, educators, and healthcare professionals in promoting holistic child development through efficient, scalable, and AI-powered solutions.

II. RELATED WORK DONE

S. Kataru, K. King, and L. Fernando explored the early detection of mental health concerns in children using machine learning-based approaches. Their research focused on predictive algorithms capable of identifying early signs of psychological distress, thereby enabling timely intervention and reducing the long-term effects of untreated mental health issues.

Z. Jiang and their team introduced Health Prism, a visual analytics system designed to provide a comprehensive view of children's physical and mental well-being by integrating multimodal data. Their system allowed for the identification of behavioral and emotional health patterns, contributing to effective early detection and decision-making for child mental health monitoring.

A. D. V. Malbog and colleagues developed a visual tracking model aimed at evaluating attentive behavior in children diagnosed with autism spectrum disorder (ASD). By leveraging eye-movement tracking technology, their model provided a non-invasive technique for real-time behavioral assessment, assisting clinicians in identifying early indicators of mental distress.

R. Meena and co-authors examined mental health risks among college students, focusing on academic stress and social isolation as contributing factors. Although their study targeted an older demographic, the identified parameters hold relevance in

understanding the psychological triggers that may also affect younger children in academic environments.

A. K., Y. V. S., and D. G. proposed a machine learning-based model for predicting the happiness index of school children. Their ensemble-based approach successfully demonstrated how AI could track children’s emotional well-being through structured indicators, promoting mental health awareness in educational settings.

S. Prabakar and their team designed an anxiety assessment system incorporating self-reported data and behavioral cues. Their system enabled children to express mental states in a stigma-free environment, using predictive analytics to evaluate anxiety levels and suggest appropriate coping interventions.

Loftness and colleagues investigated the potential of digital phenotypes and unsupervised machine learning models for monitoring early childhood mental health. Their research emphasized behavioral tracking to detect deviations from normal patterns, providing a data-driven foundation for proactive mental healthcare.

N. L. Gowda and team conducted a comparative study on various AI techniques for detecting mental health disorders in children. Their findings highlighted deep learning-based models, particularly deep neural networks, as highly effective in early diagnosis and risk prediction of mental health issues.

1. User Registration and Login

The process starts with the user (children/students) signing up on the platform by entering their personal details. Once the sign-up is complete, they log in to access their dashboard. The admin also has access to log in, which allows monitoring and managing of users and data.

2. Dashboard Features and Questionnaire

After logging in, users access a dashboard that includes multiple features. A primary component is the questionnaire section that captures responses related to emotions, physical stress, mental health status, and academic pressure. This information is essential for assessing the user’s psychological state.

3. Data Storage and Analysis

The information collected from the questionnaires is securely stored in a database. The system then processes this data to generate a mental health report for each user. This report helps identify whether the user is under mental pressure or emotionally stressed.

4. Report Outcome and Solutions

If the report indicates that the user is mentally healthy, a message saying “Congratulations, You’re Healthy” is displayed. However, if the system detects signs of pressure, it suggests suitable solutions which include self-care tips, coping strategies, and other supportive content.

5. Counseling Support

In critical cases, where stress indicators are severe, the system recommends professional counseling by a psychiatrist. This helps ensure that users who need more serious attention are guided appropriately.

6. Display and Feedback Loop

All generated reports and suggestions are clearly displayed for user reference. The dashboard also includes a feedback section where users can share their experiences, helping to improve the tool’s future versions.

7. Admin Monitoring and Support Features

The admin oversees the platform's data flow and can provide support through settings and hotline options. This ensures the system is continuously managed and optimized for effective mental health tracking.

III. METHODOLOGY

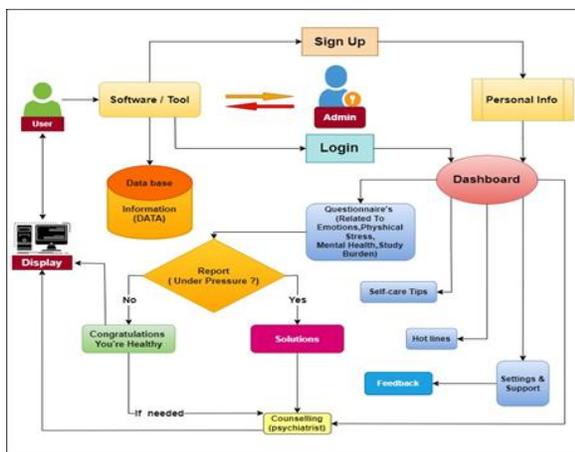


Fig. System Architecture

IV. PROPOSED SOLUTION

The proposed system, named मंत्र: Sadhana, follows a structured workflow to ensure accurate and efficient

mental health assessment.

1. User Input:

The process begins with users entering their responses in real-time through an interactive, web-based tool specifically designed to capture mental health-related data.

2. Data Processing:

The backend component of the system processes this input data, performing necessary cleaning, standardization, and formatting operations before feeding it to the integrated machine learning models.

3. Prediction and Analysis:

The trained machine learning models analyze the processed data and generate predictions, determining the user's mental health status based on identified patterns and risk indicators.

4. Visualization and Report Generation:

The results produced by the models are visually represented through interactive graphs, charts, and detailed reports, providing users with clear insights into their mental health trends and risk levels.

5. Recommendations:

Based on the outcomes generated, the system delivers personnel recommendations, suggesting possible solutions, mental health tips, lifestyle adjustments, and professional counselling.

1. Real-Time Data Collection:

The proposed system enables real-time mental health assessment through a web-based tool, allowing users to input dynamic responses. Unlike static, traditional methods, it ensures up-to-date, personalized evaluations by preprocessing collected data and analyzing it with machine learning models.

2. Feature Extraction and Processing:

Once users input data, the system extracts key mental health indicators by identifying behavioral patterns, processing categorical and numerical data, and normalizing inputs. The processed data is then fed into trained models to generate personalized mental health insights.

3. Machine Learning-Based Prediction Model:

To achieve accurate mental health assessments, the system integrates three machine learning algorithms:

Random Forest: Used for its robustness in handling complex data structures and ensuring high accuracy in

classification. XGBoost: Employed to improve prediction performance through gradient boosting and feature importance. Logistic Regression: Applied for binary classification tasks to determine mental health risk factors.

4. Report Generation and Visualization: The machine learning model outputs are displayed via an interactive data visualization dashboard featuring graphs and charts for clear mental health trends and risk factors, comparative analysis to track changes over time, and real-time insights with dynamic updates based on new user data.

5. Decision Support & Recommendations:

The system concludes by providing personalized recommendations, including risk level categorization (Low, Moderate, High, Critical), tailored suggestions for lifestyle changes, relaxation techniques, or professional help, and future enhancements planned for features like doctor consultations and automated assistance.

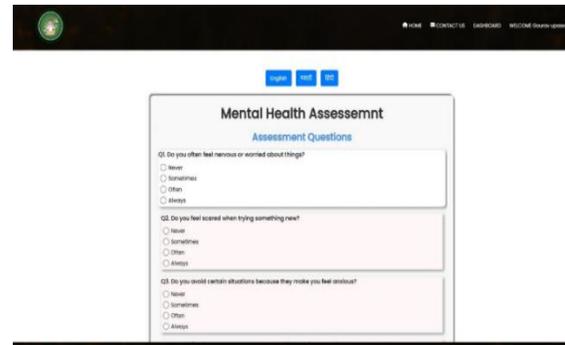


Fig. Questionnaire

V. RESULT



Fig. Risk Prediction using मऱः Sadhana

The मऱः Sadhana report contains:

The system classifies the mental health status of a child into four distinct risk levels based on the analysis of questionnaire response

Low Risk indicates that the child is in a state of good mental well-being with no apparent signs of stress or emotional imbalance. Children falling into this category are encouraged to continue healthy mental habits and maintain their current lifestyle and support systems.

Moderate Risk reflects the presence of mild concerns such as anxiety, stress, or fear, anger frustration that may require attention. While not critical, this level suggests that the child might benefit from additional care strategies such as regular mindfulness practices or therapies, open communication,

High Risk signals a more serious concern, where the child exhibits noticeable signs of mental health issues like persistent sadness, fear, or frustration. At this stage, it becomes essential to involve mental health professionals for deeper assessment and possible therapy sessions. Continuous monitoring and guided activities are recommended to prevent further escalation.

Critical Risk represents an alarming condition that requires immediate intervention. Children identified at this level may be undergoing severe emotional distress, anxiety attacks, or depressive symptoms. It is strongly advised to consult a child psychologist or psychiatrist immediately.

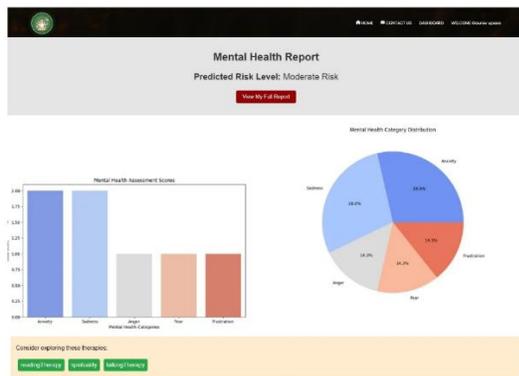


Fig. Report on the basis questionnaire response and predicted risk

VI. CONCLUSION

Mental Health and Well-being Surveillance, Assessment, and Solution for Children is a data-driven, web-based tool designed to help educators, parents, and doctors assess and improve children's mental health. This system provides an interactive,

real-time assessment based on scientifically validated parameters, such as anxiety, fear, sadness, anger, and frustration, ensuring a personalized and effective evaluation of a child's mental well-being.

The proposed system introduces several key contributions to children's mental health assessment and intervention by providing a user-friendly interface for seamless navigation by parents, educators, and healthcare professionals. It leverages real-time mental health assessment through a standardized 25-question questionnaire to efficiently evaluate children's emotional states. Using machine learning-driven predictions, including Random Forest, XGBoost, and Logistic Regression, the system accurately classifies risk levels, enhancing early detection capabilities.

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REFERENCE

- [1] S. Kataru, K. King, and L. Fernando, "Machine learning-based early detection and intervention for mental health issues in children," IEEE, Conference Paper, 2024.
- [2] Z. Jiang, H. Chen, R. Zhou, J. Deng, X. Zhang, and R. Zhao, "HealthPrism: A visual analytics system for exploring children's physical and mental health profiles with multimodal data," IEEE Transactions on Visualization and Computer Graphics, vol. 30, no. 1,

2024.

[3] A. D. V. Malbog, A. J. M. Irinco, R. J. L. Morales, L. T. Salas, R. A. Maaño, and R. C. Belleza, "Implementation of visual tracking model for assessing attentive behavior in children with autism spectrum disorder through eye-movement," 2024 IEEE International Conference on E-health Networking, Application & Services (HealthCom), IEEE, 2024.

[4] R. Meena, B. Gunasundari, J. Omana, N. Sripriya, G. Yamini, and K. Revathi, "Mental health and suicide risk among college students: A detailed exploration of contributing factors," 2024 15th International Conference on Computing Communication and Networking Technologies (ICCCNT), IEEE, 2024.

[5] A. K. Y. V. S, and D. G, "Prediction of happiness index for school children using an ensemble-based approach," 2024 4th International Conference on Pervasive Computing and Social Networking (ICPCSN), IEEE, 2024.

[6] S. Prabakar, A. S. N, J. S, and P. S, "Anxiety assessment system," 2024 2nd International Conference on Artificial Intelligence and Machine Learning Applications Theme: Healthcare and Internet of Things (AIMLA), IEEE, 2024.

[7] B. C. Loftness, D. M. Rizzo, J. Halvorson-Phelan, A. O'Leary, S. Prytherch, and C. Bradshaw, "Toward digital phenotypes of early childhood mental health via unsupervised and supervised machine learning," IEEE, Conference Paper, 2023.

[8] N. L. Gowda, N. Kumar, and N. S. L. Gowda, "A comparative study on various detection techniques to detect mental health disorders in children," IEEE, Conference Paper, 2023.

[9] S. Q. Abbas, A. Jalil, S. Sheel, S. N. Mahmood, and R. Khalid, "Predicting mental health problems in children at risk for psychological abuse and depression using deep belief networks," IEEE, Conference Paper, 2023.

[10] I. Ritharson. P, M. G, M. Kumar C, and T. Clifford B, "Study on mental health and obesity among children based on daily activities and effects using machine learning," IEEE, Conference Paper, 2023.

[11] M. A. Subu, M. Y. Alkhaldeh, F. R. Ahmed, N. Al-Yateem, J. M. Dias, and S. A. Rahman, "Smartphone addiction and mental health well-being among Indonesian adolescents," IEEE, Conference Paper, 2023.

[12] V. Kaur, A. Nandy, J. Choudhary, J. Fredrick, T. S. Zacharia, and T. K. Joseph, "Machine learning for early detection of child depression: A data-driven approach," IEEE, Conference Paper, 2023.

[13] C. Bhatt, S. Rawat, R. Chauhan, D. Kumar, M. Kumar, and S. A. Dhondiyal, "Child health tracking system using React," 2023 International Conference on Sustainable Emerging Innovations in Engineering and Technology (ICSEIET), IEEE, 2023.

[14] J. H. J. Ortega, K. M. David, J. P. Gaylican, M. E. U. Salcedo, G. A. D. Pelagio, and M.

B. Besa, "DoeWell: An interactive video and interactive workbook as behavioral and emotional assessment of early adolescents," 2023 IEEE 15th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM), IEEE, 2023.

[15] Y. Koh, C. Lee, Y. Ku, and U. Lee, "Data visualization for mental health monitoring in smart home environment: A case study," 2023 Workshop on Visual Analytics in Healthcare (VAHC), IEEE, 2023.

[16] S. Gautam, S. K. Malviya, and S. Mandloi, "Mental health and well-being surveillance system," International Research Journal of Modernization in Engineering Technology and Science, vol. 5, no. 4, pp. 36-42, April 2023.

[17] B. Kadirvelu, T. Bellido Bel, X. Wu, V. Burmester, S. Ananth, B. C. C. Branco, B. Girela-Serrano, J. Gledhill, M. Di Simplicio, D. Nicholls, and A. Faisal, "Mindcraft, a mobile mental health monitoring platform for children and young people: development and acceptability pilot study," JMIR Formative Research, vol. 7, no. 2, pp. 202-210, March 2023.

[18] X. Yuan, "Study on the correlation between growth environment and mental health of left-behind children," IEEE, Conference Paper, 2022.

[19] T. Yu, J. Xu, Y. Jiang, H. Hua, Y. Zhou, and X. Guo, "School educational models and child mental health among K-12 students: a scoping review," Biomedcentral, vol. 22, no. 1, pp. 80-89, Feb. 2022.

[20] H. A. Rahman and M. Kwicklis, "Machine learning-based prediction of mental well-being using health behavior data from students," MDPI, vol. 10, no. 5, pp. 575-580, May 2022.