

Machine Learning Based Mental Health Assessment for Students

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ABSTRACT

The Mental Health Assessment approach will help identify students with mental health issues such as stress, anxiety, and depression early on. Based on their academic standing, emotional scores, lifestyle, and behavioral preferences, kids are divided into groups such as Healthy At-Risk and Struggling using a variety of machine learning models. Furthermore, accuracy can also improve at the diagnosis stage, where the collected data is used to identify the condition of the system. In that case, there is less need to rely on subjective judgments about the learners' mental state, which is often inconsistent and, honestly, not very reliable. The system includes several features used to predict needs and distribute resources meant to support learners' mental well-being. More importantly, the model gives administrators a practical way to monitor users, analyse different forms of data, and adjust records related to the relaxation techniques carried out by the children. That part matters a lot, since static records are rarely useful in real settings. At the same time, the system is designed not only to gather information on counselling and relaxation activities. It also allows learners to log in, complete diagnosis tasks, and check the state of their own mental well-being. This makes the process more active for learners instead of leaving everything in the hands of school staff. The present paper mainly focuses on improving learners' experience through the use of machine learning algorithms. In this context, the idea of wellness is central, not secondary, in addressing mental wellness problems.

Keywords: Stress and Anxiety Detection, Random Forest, Logistic Regression, Support Vector Machine, K Nearest Neighbors, XGBoost, Educational Data Mining, Mental Wellness System.

I. INTRODUCTION

ML Based Mental Health Assessment for Students is intended to build an intelligent model that predicts mental health issues among students using key behavioral and academic features. The project looks at stress, anxiety, sleep habits, and activity levels, along with GPA and mood, to place students into Healthy, At-Risk, or Struggling groups. That kind of data-

based decision-making matters, because early warning signs are easy to miss when they are buried inside routine school records and everyday behavior.

Mental health concerns among students have been rising, and the reasons are hard to ignore. Emotional strain, shifting lifestyles, and constant academic pressure all play a part. Existing tools usually depend on self-reporting and human judgment, which can be slow and,

frankly, too subjective for something this serious. An automated approach is more practical here. It can scan growing digital information, detect possible risks earlier, and support timely intervention before problems deepen.

The project on Mental Health Evaluation using Machine Learning Models for Students aims to create an intelligent system based on supervised learning algorithms that predicts the mental state of learners. The main variables include age, GPA, stress level, anxiety, depression, sleeping hours, physical activity, and sentiment. These are not random choices.

They are the factors that often reveal whether a student is coping well or quietly falling behind. Several models are being considered, including Random Forest, Logistic Regression, SVM, K-NN, and possibly XG-Boost.

Their accuracy will be compared to identify the strongest one. This comparison is important because a model that looks good on paper is not enough; it has to perform consistently and make reliable distinctions.

Overall, such models can help educational institutions categorize students more effectively and spot those who may be healthy, at-risk, or vulnerable. That is a practical step, not a minor one, because once a student's mental state starts slipping, academic results usually follow soon

after.

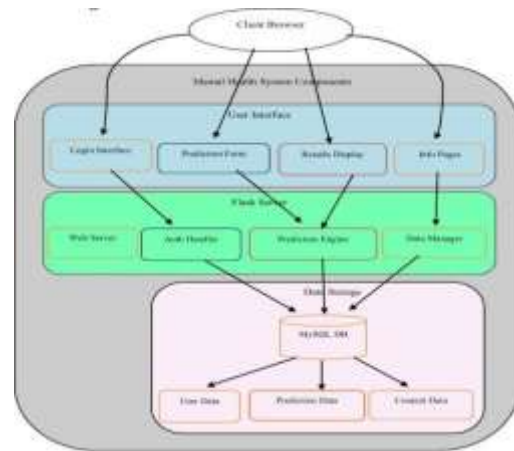


Figure: architecture diagram

Administrators can handle sensitive information, including counsellor details for students and mental relaxation recommendations for registered users, through a secure login feature. This matters a lot, since mental health systems should not expose private data carelessly. The same system also helps keep information reliable and current because administrators are able to update resources and monitor how users actually use them.

The platform is designed with fairly simple functions, which makes access to mental health services easier for students during registration and login. That part may seem basic, yet it is important. If a system is confusing, many students will stop using it almost immediately, even when they need help.

Using the machine learning algorithm, a user can estimate their mental health condition and judge whether they are fine, struggling, or more vulnerable. Along with that, the system provides

mental relaxation suggestions and counselling tools that students can reach without much difficulty.

Overall, this strategy addresses a real gap between technology and mental wellbeing in education. The automated approach can make mental health evaluation more effective and, in many cases, more valid. The main goal of this machine learning based technique is to give educational institutions practical insights that support student health, reduce stress, and encourage a healthier campus environment

II. LITERATURE REVIEW

L. Rahunathan et al., (2025), in their paper "Machine Learning Model for Student Stress Level Prediction," presented at the 4th OPJU International Technology Conference (OTCON), proposed a stress classification system using Naïve Bayes (NB) and K-Nearest Neighbors (KNN) algorithms. The study utilized questionnaire responses based on the Perceived Stress Scale (PSS) and the stress component of DASS-21 to identify stress-related symptoms among students. Model performance was evaluated using accuracy, precision, recall, and F1-score. The comparative analysis showed that Naïve Bayes outperformed KNN, achieving an accuracy of 90.0% compared to 77.08%. The research highlights the importance of early stress detection to enable institutions to provide timely support, thereby

improving students' well-being and academic performance.

L. Rahunathan, S. N. A, A. G, R. P, S. L. S and S. V. N, "Machine Learning Model for Student Stress Level Prediction," 2025 4th OPJU International Technology Conference (OTCON) on Smart Computing for Innovation and Advancement in Industry 5.0, Raigarh, India, 2025, pp. 1-7, doi: 10.1109/OTCON65728.2025.11070804.

Chowdhury, M. R., Xuan, W., Sen, S., Zhao, Y., and Ding, Y. (2025), in their paper "Predicting and Understanding College Student Mental Health with Interpretable Machine Learning," proposed I-HOPE, an Interpretable Hierarchical Model for personalized mental health prediction among college students. Addressing limitations such as lack of longitudinal data and black-box modeling, the study utilized the five-year College Experience Study mobile sensing dataset, covering both pre-pandemic and COVID-19 periods. The two-stage hierarchical model links behavioral features to mental health outcomes through defined behavioral categories, achieving a prediction accuracy of 91%, significantly outperforming baseline models (60–70%). The research emphasizes interpretability and individualized insights, enabling the development of tailored interventions and improved mental health support systems for students.

Chowdhury, M. R., Xuan, W., Sen, S., Zhao, Y., & Ding, Y. (2025). Predicting and Understanding College Student Mental Health with Interpretable Machine Learning. *arXiv* (Cornell University). <https://doi.org/10.48550/arxiv.2503.08002>.

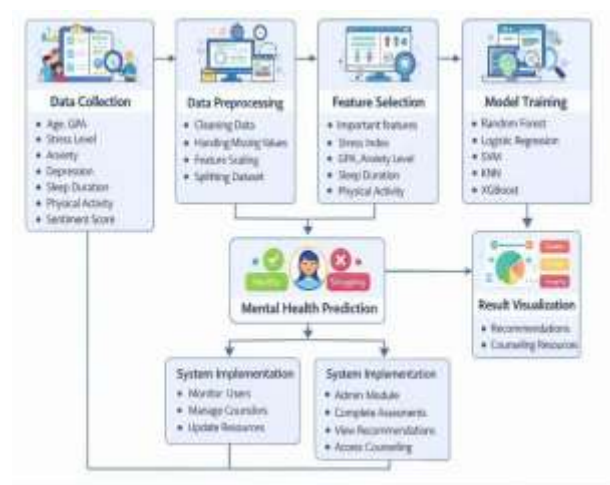
Saraswat, A., Shukla, M. et al., (2025), in their paper “A Predictive Model to Evaluate Stress in Students using Machine Learning,” presented at the 12th International Conference on Computing for Sustainable Global Development (INDIACom), developed a machine learning framework to predict stress levels that may lead to severe mental health conditions such as depression. The study compared multiple algorithms, including Linear Regression, Random Forest, Support Vector Machine, Gradient Boosting Classifier, and K-Nearest Neighbor. Among the regression models, the Random Forest Regressor achieved the best performance with the lowest MSE (0.1292), RMSE (0.3594), and highest R^2 (0.8065). The findings indicate that Random Forest is highly effective in predicting stress levels, while Gradient Boosting performs well in stress classification, highlighting the potential of machine learning for early mental health assessment and intervention.

Saraswat, A., Shukla, M., Goswami, D., & Chaturvedi, A. (2025). A Predictive Model to Evaluate Stress in Students using Machine

Learning. *2025 12th International Conference on Computing for Sustainable Global Development (INDIACom)*, 1-6. <https://doi.org/10.23919/indiacom66777.2025.11115356>.

III. METHODOLOGY

The methodology of the ML-Based Mental Health Assessment for Students system follows a structured process that includes data collection, preprocessing, model training, prediction, and system implementation. The objective is to accurately classify students into mental health categories such as Healthy, At-Risk, or Struggling using machine learning techniques.



1. Data Collection

The first step involves collecting relevant data related to students' mental health and lifestyle patterns. The dataset contains important attributes such as age, GPA, stress level, anxiety score, depression level, sleep duration, physical activity, and sentiment score. These factors help in understanding the emotional and behavioral

condition of students. The collected dataset •
forms the foundation for training machine •
learning models.

2. Data Preprocessing

Before training the models, the dataset undergoes preprocessing to improve data quality. This step includes removing missing values, handling inconsistent data, and normalizing numerical attributes. Feature scaling techniques such as Standardization are applied to ensure that all features contribute

equally to the learning process. The dataset is •
then divided into training and testing sets to evaluate the performance of the models effectively.

3. Feature Selection

In this stage, the most relevant features that influence mental health prediction are identified. Attributes such as stress index, anxiety level, sleep duration, academic performance (GPA), and physical activity are selected as key indicators. Selecting important features helps in improving model accuracy and reducing computational complexity.

4. Model Training

Multiple supervised machine learning algorithms are used to train the model and determine the best-performing classifier. The algorithms used in this system include:

- Logistic Regression
- Random Forest Classifier

Support Vector Machine (SVM)

K-Nearest Neighbors (KNN)

- XGBoost (optional for improved accuracy)

Each model is trained using the training dataset to learn patterns between the input features and the corresponding mental health categories.

5. Model Evaluation

After training, the models are tested using the testing dataset. Their performance is evaluated using metrics such as:

Accuracy

- Precision
- Recall
- F1-Score

The model that achieves the highest accuracy and balanced performance across all metrics is selected as the final prediction model.

6. Mental Health Prediction

Once the best model is selected, it is integrated into the system. When a student enters their information (stress level, sleep hours, activity level, etc.), the trained model processes the input data and predicts the student's mental health category as Healthy, At-Risk, or Struggling.

7. System Implementation

The system is implemented with two main modules:

Admin Module: The administrator manages registered users, monitors counselor

information, and updates mental relaxation guidelines.

Student Module: Students can register, log in, complete mental health assessments, view prediction results, and access relaxation and counselling resources.

8. Result Visualization

The predicted results are displayed in a clear and user-friendly format, enabling students and administrators to understand the mental health status easily. The system also provides recommendations for mental relaxation and counselling support for students identified as at risk or struggling

V. RESULTS



Figure 1: Student Mental Health Assessment Page

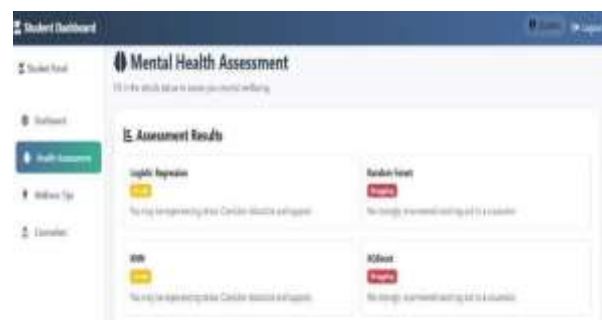


Figure 2: Mental Health Assessment Results Page

VI. CONCLUSION

The Machine Learning-Based Mental Health Assessment System for Students is indeed a remarkable system that enables the determination of whether students display symptoms of mental illness such as stress, anxiety, and depression. This is because, due to the incorporation of different machine learning algorithms and the evaluation of numerous behavioral, academic, and emotional attributes, classification of students according to their mental health condition has become possible; hence, it enables the grouping of students as either Healthy, At-Risk, or Struggling. In other words, there are no shortcomings associated with the system when contrasted with the manual assessment systems. Finally, with the help of the system, students will be able to access the website and determine their mental health status alongside receiving advice on how to alleviate their mental states through relaxation techniques and seeking counseling services.

Furthermore, the system will afford the possibility to administer information related to users, counselors, and mental wellness resources.

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