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Projective exploration on individual stress levels using machine learning

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Abstract - *Students are facing so many mental health problems such as depression, pressure, stress, interpersonal sensitivity, fear, nervousness etc.. Though many industries and corporate provide mental health related schemes and try to ease the workplace atmosphere, the issue is far from control. Stress Prediction in college students is one of the major and challenging tasks in the current education sector. Stress is regarded as a major thing that is used to create an imbalance in the life of every character and it is additionally regarded as a major issue for psychological adjustments and trauma reduction. Numerous studies work on stress management in school students. The students who are pursuing their secondary and tertiary education are widely facing the on-going stress level issues. It can be many times decided as day to day movements for a hassle-free mind to pay attention to lecturers. To decrease the individual stress rate, human societies have been in a position to boost a complete stage of progress in monitoring the stress stage of students and make them score well in academics.*

Lack of stress administration can result in some drastic injury which can sometimes affect the education completely and can even cause extreme injury to the fitness of the students at a variety of stages.

***Key Words*: Microcontroller, Cloud Server, IOT, Sunlight intensity detection, LED.**

1. INTRODUCTION

Mental health problems, such as depression, pressure, stress, interpersonal sensitivity, fear, and nervousness, are increasingly prevalent among college students worldwide. These problems can be caused by a range of factors, including academic pressures, social isolation, financial stress, and personal relationships. The negative effects of these issues can be far-reaching, impacting academic performance, physical health, and overall quality of life. While many industries and corporations provide mental health support and try to ease the workplace atmosphere, the problem of mental health among college students remains far from being controlled.

One of the major and challenging tasks in the current education sector is predicting stress levels in college students. Stress prediction is essential to identify students who are at risk of developing stress-related problems and to provide timely interventions. However, the existing system for stress prediction in college students is a manual process that involves collecting data through surveys or interviews, which can be time-consuming and prone to errors. Furthermore, the subjective nature of self-report data can make it difficult to accurately identify students who are experiencing stress.

To address these challenges, there is a need for an automated system that can accurately predict stress levels in college students based on their profiles and behaviors. Such a system can help to identify and mitigate stress-related problems, which can have far-reaching benefits for the health and wellbeing of college students. In recent years, there has been growing interest in developing machine learning models that can predict stress levels in college students. However, many of these models are limited in their scope and accuracy, and there is a need for further research to develop more robust and reliable models.

2. LITERATURE REVIEW

Saskia Koldijk, Mark The paper "Detecting work stress in offices by combining unobtrusive sensors" proposes a system for detecting work stress in office environments using unobtrusive sensors, which collect data on physiological and behavioral indicators of stress. The data is then analyzed using machine learning algorithms to predict the level of work stress experienced by employees. A pilot study conducted in a real-world office environment demonstrates the feasibility and effectiveness of the proposed system, suggesting that unobtrusive sensing can be an effective approach for detecting work stress. The proposed system can help employers and employees take proactive steps to manage and reduce workplace stress.

Christina S. Malfa the paper "Psychological distress and Health-Related Quality of Life in public sector personnel" investigates the relationship between psychological distress and health-related quality of life (HRQoL) in public sector employees. The study found that higher levels of psychological distress were associated with poorer HRQoL, and certain sociodemographic factors, such as gender, age, and education level, were also associated with both psychological distress and HRQoL. The findings suggest that interventions aimed at reducing psychological distress may have positive effects on the HRQoL of public sector

personnel. This study provides important insights into the impact of psychological distress on HRQoL in public sector employees, which can inform the development of effective interventions to improve their wellbeing. better performance compared to the existing systems.

Jacqueline Wijsman, Bernard Grundlehner, Hao Liu, Hermie Hermens, and Julien PendersWearable
The paper "Towards Mental Stress Detection Using Physiological Sensors" presents a study on detecting mental stress using wearable physiological sensors. The study used a dataset collected from 14 participants who performed a stress-inducing task while wearing sensors, and analyzed the data using machine learning algorithms. The proposed system achieved an accuracy of 89.7% in detecting stress periods, with electrodermal activity sensors having a higher accuracy than electrocardiogram sensors. The findings suggest that wearable physiological sensors can be an effective approach for detecting mental stress, with potential applications in stress monitoring and management. This study provides valuable insights into the potential use of wearable physiological sensors for mental stress detection, which can inform the development of effective stress management tools.

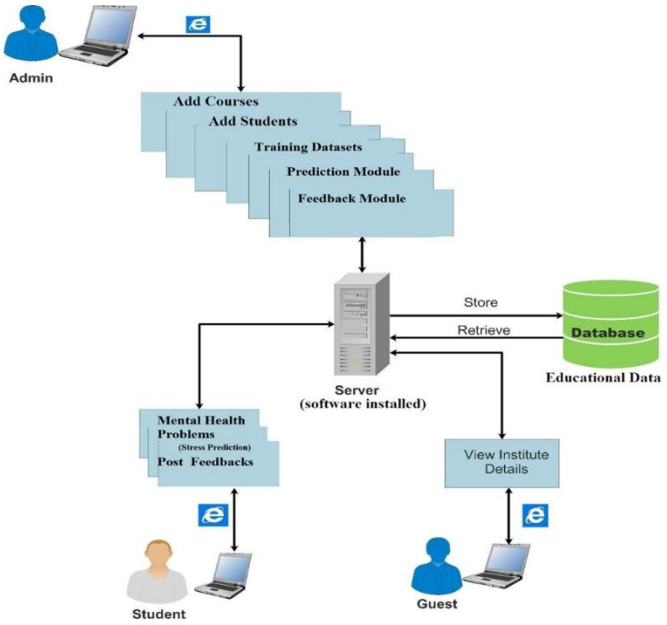
Disha Sharma This IEEE paper " Stress Prediction of students using machine learning "explores the use of machine learning algorithms for predicting stress levels in students. The study collects data from students using wearable physiological sensors and evaluates the performance of various machine learning algorithms in predicting stress levels. The findings of the study can provide insights into the feasibility of using machine learning algorithms for stress prediction in students and inform the development of effective stress management tools. This research contributes to the field of stress management and can provide a basis for future research in this area.

3.THE OBJECTIVE OF PROJECT

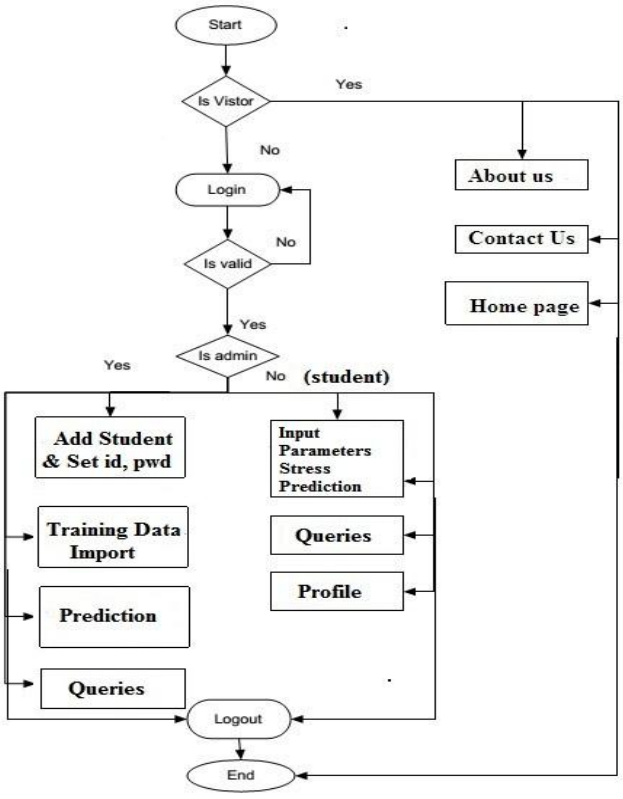
The specific objective of this project was

1. Proposed system is an real time application.
2. The model classifies the students into Stress and Stress Free.
3. Proposed system gives better decision and also improvise the business.
4. Proposed system makes use of data science technique "classification rules" for predicting stress in college students.
5. Proposed system is meant for stress prediction.

4. ARCHITECTURE DIAGRAM



5.FLOWCHART



6.WORKING

The proposed web application has three types of users: admin, student, and guest. The admin is responsible for managing the system and has a unique login credential

provided by the management. They are authorized to add student details, such as their mail id and unique student number (USN), as well as add any new courses introduced by the institution. The admin plays a critical role in providing personalized solutions to the students who require more attention.

The student, on the other hand, logs into the system using the credentials provided by the admin or by changing them later. Once logged in, they answer a set of questions which are used to predict their stress levels. Based on the answers given by the student, the system provides a solution that can be implemented to sort out their problems. In case the student requires additional assistance or a different solution, they can raise a query to the admin, who provides accurate answers.

The third type of user is the guest, who has limited access to the system and can only view information about the institution. All the data, including student details and stress level predictions, are stored in a database that can be modified or retrieved at any time. The admin is responsible for managing and updating the database when necessary. Overall, this system aims to provide a platform for students to manage their stress levels and seek personalized solutions, ultimately improving their mental well-being.

7.ALGORITHM

7.1 K-NEAREST NEIGHBOR

K-Nearest Neighbor (KNN) is a supervised machine learning algorithm used for classification and regression tasks. It is a non-parametric algorithm that makes predictions based on the similarity between data points. The basic idea behind KNN is to find the k-nearest data points to a given test point and use their labels to predict the label of the test point.

In KNN classification, the label of a test point is determined by a majority vote among its k-nearest neighbors. In KNN regression, the predicted value for a test point is the average of the values of its k-nearest neighbors.

The choice of k is an significant stricture in KNN. A smaller value of k means the algorithm is more susceptible to noise, while a larger value of k makes the algorithm more robust but may cause over-generalization.

KNN is a simple and easy-to-understand algorithm that can be used for both classification and regression tasks. However, its performance can be sensitive to the choice of distance metric and the curse of dimensionality, where the algorithm may become computationally expensive for high-dimensional data.

7.2 Naïve Bayesian Algorithm

Naive Bayesian algorithm is a probabilistic algorithm used for classification tasks. It is based on Bayes' theorem and assumes that the features in a dataset are conditionally independent of each other given the class label. This is known as the naive Bayes assumption, which is often violated in practice, but the algorithm can still perform well in many real-world applications.

The algorithm works by first calculating the prior probability of each class label based on the frequency of occurrence in the training data. Then, for a given test data point, the algorithm calculates the likelihood of each feature value given the class label using probability distributions such as Gaussian, multinomial, or Bernoulli. These probabilities are then combined using Bayes' theorem to calculate the posterior probability of each class label for the given test data point. The class label with the highest posterior probability is then assigned to the test data point.

Naive Bayesian algorithm is a simple and efficient algorithm that can work well with high-dimensional datasets. It is also less prone to overfitting than other machine learning algorithms. However, it assumes independence between features, which may not hold true in many real-world applications. Nevertheless, it is widely used in various applications such as spam filtering, sentiment analysis, and text classification.

7.3 Linear Discriminant Analysis

Linear Discriminant Analysis (LDA) is a supervised learning algorithm used for classification tasks. It works by projecting the original high-dimensional feature space onto a lower-dimensional space while maximizing the separation between the classes. The projection is done by finding a linear combination of the features that maximizes the between-class distance and minimizes the within-class distance.

The algorithm assumes that the data for each class is normally distributed with the same covariance matrix, and the decision boundary between the classes is a hyperplane. This means that the algorithm is sensitive to the distributional assumptions and may not work well if the assumptions are violated. LDA is often used for dimensionality reduction before applying other classification algorithms such as logistic regression or support vector machines. It can also be used for feature extraction, where the projection coefficients can be used as new features for other algorithms.

LDA is a simple and computationally efficient algorithm that works well for linearly separable classes. However, it may not perform well if the classes are not well-separated or if the covariance matrices for the classes are not equal. In such cases, other algorithms such as Quadratic Discriminant Analysis (QDA) or non-linear classifiers may be more appropriate.

8.ADVANTAGES

- Early detection and prevention of mental health issues: The proposed system can detect early signs of mental health issues such as depression, anxiety, and substance misuse, and provide personalized solutions to prevent these issues from escalating. This can help students to maintain good mental health and well-being.

- Improved academic performance: The system can help students to improve their academic performance by providing personalized solutions to manage stress and anxiety. When students are less stressed and anxious, they are more likely to focus better on their studies and perform better.

- Increased participation in college activities: The system can create a low-stress environment that makes students more comfortable in coming to college and participating in various activities. This can lead to a more engaged student body, which can enhance the college experience for everyone.

- Reduced healthcare costs: By reducing the burden of chronic illnesses caused by stress, the proposed system can help to reduce healthcare costs. When students are healthier, they are less likely to need medical attention for stress-related illnesses, which can save on healthcare resources and costs.

- Promotes a proactive approach to mental health: The proposed system promotes a proactive approach to mental health, which is crucial in preventing mental health issues from developing. By providing students with tools and resources to manage stress and anxiety, the system can empower them to take control of their mental health and prevent issues from arising.

- Personalized solutions: The proposed system provides personalized solutions to manage stress and anxiety based on each student's individual needs. This ensures that students receive tailored support that addresses their unique challenges and concerns.

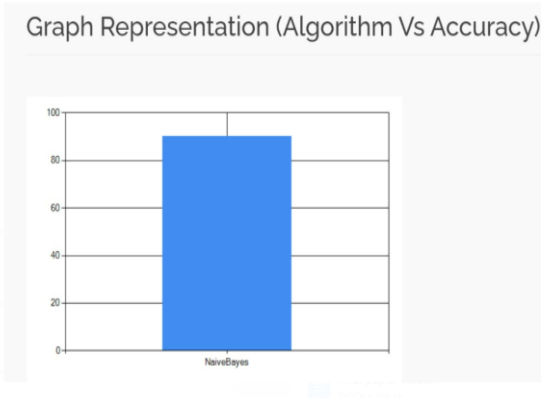
- Increased awareness about mental health: The proposed system can help to increase awareness about mental health and well-being among students. By providing students with information and resources to manage stress and anxiety, the system can help to destigmatize mental health issues and promote a culture of openness and support.

- Easy access to support: The proposed system provides easy access to support for students who may not be comfortable seeking help in person. This can be especially helpful for students who may be hesitant to reach out for support due to stigma or other barriers.

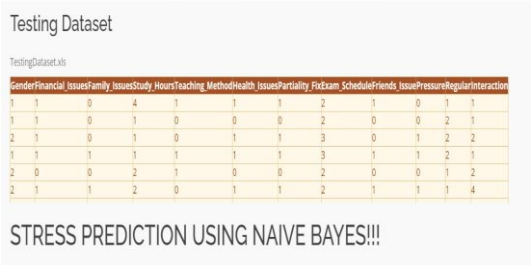
- Improved retention rates: The proposed system can help to improve retention rates by reducing the number of students who drop out of college due to mental health issues. When students are able to manage stress and anxiety effectively, they are more likely to stay in college and complete their studies.

- Long-term benefits: The proposed system can provide long-term benefits for students by promoting good mental health and well-being. When students are able to manage stress and anxiety effectively, they are more likely to develop healthy coping mechanisms that they can carry with them throughout their lives.

9. PERFORMANCE METRICS



A stress predicting machine's performance can be assessed using a variety of criteria. Here are a few potential choices: Accuracy: The most typical metric for evaluating the effectiveness of a machine learning model is accuracy. It calculates the model's accuracy rate for predictions. By comparing the anticipated stress level with the actual stress level, it is possible to determine the accuracy of a stress prediction machine. Precision and recall are two metrics that are employed in binary classification issues. Precision measures the proportion of positive instances (i.e., high-stress events) that the model properly predicts out of all the positive instances that it predicts. This project gives an accuracy up to 93% accuracy for the dataset used



10.RESULT

The project is a website that analyzes the stress levels of the individuals logged in to the system and predicts the type and cause of stress caused along with the course of action that needs to be taken to avoid it.

Figure-Hardware of Project

It can be many times decided as day to day movements for a hassle-free mind to pay attention to lecturers. To decrease the individual stress rate, human societies have been in a position to boost a complete stage of progress in monitoring the stress stage of students and make them score well in academics.

Lack of stress administration can result in some drastic injury which can sometimes affect the education completely and can even cause extreme injury to the fitness of the students at a variety of stages

11. CONCLUSION AND FUTURE ENHANCEMENT

College students are at a high risk of developing mental health problems due to a range of factors such as academic pressure, social isolation, and financial stress.

These problems can have a significant impact on their well-being, academic performance, and overall quality of life. In order to address these challenges, the proposed system utilizes machine learning techniques to predict student stress levels and provide personalized solutions to manage stress and anxiety. The system works by analyzing past data on student stress levels and identifying patterns and trends. This data can be gathered through surveys or other assessments that measure various factors related to mental health, such as anxiety, depression, and perceived stress. By applying machine learning algorithms to this data, the system can identify the most important predictors of stress and develop a model for predicting future stress levels. Once the model is developed, the system can provide personalized solutions to manage stress and anxiety based on each student's individual needs. These solutions may include recommendations for stress-management techniques, self-care strategies, and other resources to support mental health and well-being. By providing personalized support, the system can help students to develop healthy coping mechanisms and prevent the development of more serious mental health conditions. In addition to utilizing machine learning techniques like the Naive Bayes classifier, the proposed system can be further enhanced by implementing deep learning techniques like CNNs. These techniques can help to improve the accuracy and effectiveness of the model by enabling it to learn from more complex and nuanced data. Overall, the proposed system has the potential to make a significant impact on the mental health and well-being of college students. By utilizing machine learning techniques to predict and manage stress levels, the system can help to create a more supportive and positive learning environment and reduce the negative effects of mental health conditions.

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