

PREDICTIVE ANALYSIS OF STUDENT STRESS LEVEL USING MACHINE LEARNING

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ABSTRACT

College students are struggling with a lot of mental health issues, including stress, somatization, obsession, interpersonal sensitivity, depression anxiety, hostility, fear, paranoia, and psychopathy, which might have bad effects on them. The mental health problems of college students not just directly impact their development, but also affect the stability of campus. Most colleges pay more attention to students' crisis monitoring and prevention. All colleges just analyze whether students have mental health problems or what problems they are having. Some lectures doing manual counselling sitting with students and trying to identify mental health disorders for low academic performance. These systems cannot find hidden relationships in psychological data. We need a system to handle student mental health issues; here, we mainly emphasize student stress prediction. Many factors connected to stress like age, gender, workload, assignments, family issues, friend's problems, attendance, teaching, etc.... Machine learning is a discipline that predicts the future based on past data. By using machine learning techniques, we predict student stress and levels, and the proposed system would offer recommendations based on students' stress levels. In this proposal system, we are developing automation for the education sector to predict student stress and levels. The proposed system is a browser-based application for colleges using Microsoft technologies such as Visual Studio, C#, and SQL Server!

Keyword: - somatization, interpersonal sensitivity, psychopathy, counselling

1. INTRODUCTION

The current system is a manual process where it is difficult to identify stress in college students. There is no automation. Students are facing a plethora of mental health issues similar to pressure, stress, interpersonal sensitivities, fear, nervousness, etc. Despite many industries and corporations providing mental health-adjacent schemes and trying to ease the workplace atmosphere, the issue is far from being controlled. Stress is considered a major thing that is used to make awkwardness in the life of every human being, and it is also seen as a major issue for psychological adjustment. Studies on managing stress in schools are many. Students in their second and third educational stages often confront persistent stress problems. It's like routine actions for a peaceful mind to focus on classes. To decrease individual stress rates, human societies are in a position to boost complete stages of progress by monitoring the stress levels of students and making them score well in academics. The need for stress in organizations can result in some exceptional wounds, which can sometimes influence instruction completely and can indeed cause extraordinary wounds to the fitness of understudies at a mixture of stages. Individual family backgrounds can be conceptualized as major plays that take paths from our childhood. Children who are residing in rural or urban areas are consistently perusing exclusive environments. Low-caste students are normally expected to

have low grades because of financial and family issues. Fulfilment of faculties and students should be primarily structured on both faculties instruction and learning at home. The current systems are manual processing, where it is difficult to identify stress in college students. Automation for predicting students' stress is absent. for predicting students' stress is absent.

2. LITERATURE SURVEY

2.1. IEEE Paper Title: Classification algorithms based mental health prediction using data mining

Year: 2020

Description: The passionate, mental, and social welfare of an individual is uncovered by their mental well-being. It impacts how a person will think, feel, or handle a circumstance. Various components contribute to mental well-being issues that lead to mental ailments like stress, social uneasiness, sadness, over-the-top compulsive clutter, medication enslavement, work environment issues, and identity disarray.

Disadvantages

- *Small datasets are used which leads to less accurate results.*
- *Data mining techniques used for mental health prediction.*
- *Huge data is required.*

2.2 IEEE Paper Title: Machine learning techniques for stress prediction in working employees

Year: 2020

Description: Stress clusters are a common issue among working IT experts in the industry nowadays. With changing ways of life and work societies, there is an increment in the chance of stress among the representatives. In this paper, we have applied machine learning procedures to analyze stress designs in working grown-ups and to contract down the variables that clearly decide stress levels.

Disadvantages

- *Fewer parameters used for stress prediction*
- *Boosting algorithm is not suitable for real-time application.*
- *Ready Tools used for stress prediction.*

2.3. Predictive analysis of student stress level using naïve Bayesian classification algorithm

Year: 2020

Description: Generally, scholastic execution and social compulsion have made a pressurized mental state for students. As often as possible expressed stress components ought to be diminished to offer assistance to the students to exceed expectations in their scholastic execution and actuate the social exercises, subsequently diminishing personal well-being issues like headaches cerebral pains, display wearing, and so on..

Disadvantages

- *This concept predicts the stress of only college students.*
- *Only ML model built, not suitable for real-time.*
- *The algorithms used here take more time to process.*
- *Less efficient results.*

2.4. Research on the College Students' Psychological Health Management based on Data Mining and Cloud Platform

Year: 2016

Description: In later a long time, college students' mental issues have become more and more conspicuous, and due to the need for high-quality assets in mental well-being instruction, it is troublesome to meet the needs of students. In this paper, the creator examines the college students' mental well-being administration based on information mining and cloud stage.

Disadvantages

- *Applicable for the education sector not for the real world.*
- *Fewer parameters were used in the project.*
- *Less efficient results.*

3. ANALYSIS OF LITERATURE SURVEY

The literature review of the existing systems published as per the IEEE papers are not implemented in real time, only the surveys are being conducted. There is no record of dynamic data being used in the existing systems. Only the static data is being used. The existing systems which are being published are done using other technologies. Microsoft technologies are not being used in the existing systems which is being implemented in the proposed system. The existing systems uses less parameters and ready tools for stress prediction. The existing systems take more time to process the data. To overcome all these limitations the proposed system is being implemented which thus improves the idea of the existing system

4. PROPOSED WORK

Proposed system meant for education sector. Systems finds factors that strongly determine the stress levels. Stress were identified based on gender, family history and availability of health benefits in the education sector. By identifying the stress of students, we can come up with some approaches to reduce stress and create a much comfortable learning place for students. System uses many parameters such as gender, age, family history, provided health benefits, share about illness, tech company, tech role, acquiring leave etc.. System uses machine learning algorithms or AI algorithms to find stress of an student. System can be developed as an real time application which is useful for colleges. As *Visual Studio* and *SQL Server* is more supportive with real time application, we use these technologies for application development. Finding the risk factors which affects the student's mental health is the major objective of the system. System also gives suggestions for the students based on the student stress levels. System aims at identifying the factors and predicting the student stress levels and to come up with solutions to reduce the stress level so as to improvise the students performances.

5. ARCHITECTURE DIAGRAM

An architecture diagram is a graphical representation of a set of concepts, that are part of an architecture, including their principles, elements and components. An architecture diagram describes what you're building, how stakeholders interact with it, and where constraints lie. The main purpose of architectural diagrams should be to facilitate collaboration, to increase communication, and to provide vision and guidance.

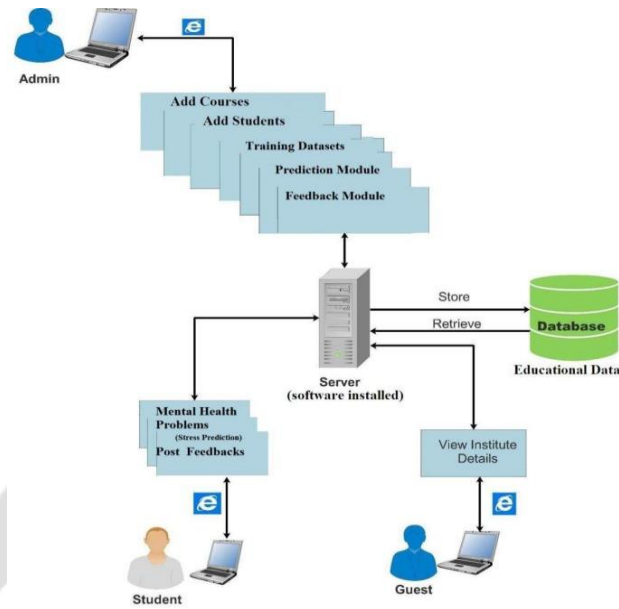


fig. Architecture diagram

6. PROPOSED METHODOLOGY

ML concerns with construction and study of system that can learn from data. For example, ML can be used in E-mail message to learn how to distinguish between spam and inbox messages.

There are three types of Machine learning (ML), they are

- i. Supervised Machine Learning
- ii. Unsupervised Machine Learning
- iii. Semi-Supervised Machine Learning

In the project we use supervised learning techniques to process training dataset. We use **Naive Bayes Algorithm** to predict student stress level.

Reasons for selecting Naive Bayes.

1. Most of the previous medical research papers uses this algorithm.
2. Survey says efficient algorithm to process medical data.
3. takes less time for data processing.
4. Works fine for n number of parameters. Number of parameters need not to be fixed.

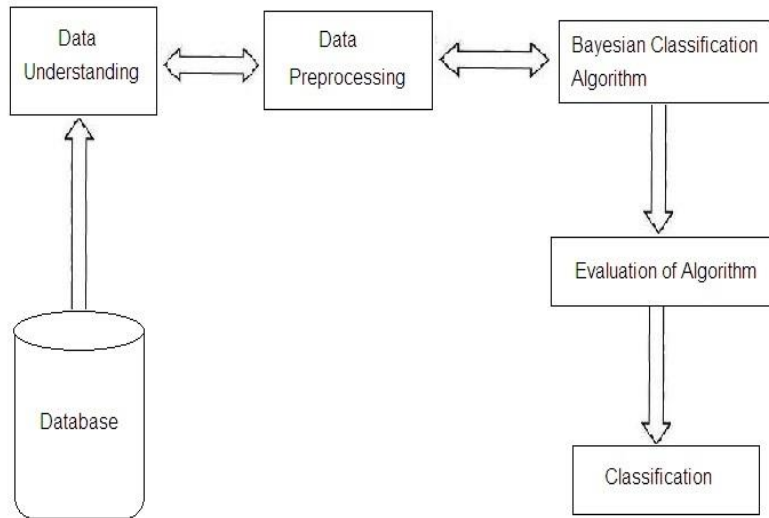


fig. Methodology

7. DATA SET DESCRIPTION

Predicting the student stress at early stages is a challenging task in the current medical sector. The prediction of student prone to stress can help doctors in their decision making regarding their treatments. Stress prediction has become a global health issue and is an area of concern. Student Stress needs to be recognized at early stages and current system takes more time for diagnosis and treatments. Proposed system is an automation for student stress prediction using supervised learning techniques. As we use machine learning algorithms for stress prediction, we will get more accurate and efficient results. System useful for educational sector and doctors to take faster and better decisions. All these parameter are more relevant for stress prediction and we are using around 5000 records to get better results.

8. PARAMETERS LIST

| | | |
|------------------|---|---|
| Gender | - | 1-Male,2-Female |
| Financial_Issues | - | 0-No,1-Yes |
| Family_Issues | - | 0-No,1-Yes |
| Study_Hours | - | numeric (in hrs) |
| Teaching_Method | - | 1-Fair,2-Not Good |
| Health_Issues | - | 1-Spectacles wearer, 2-Migraine Headache |
| Partiality_Fix | - | 0-marks, 1- knowledge |
| Exam_Schedule | - | 1-Monthly, 2-Half ,3-yearly , 4-Annual, 5-Slip Test |
| Friends Issue | - | 0-No,1-Yes |

| | | |
|-------------|---|--|
| Pressure | - | 0-No,1-Yes |
| Regular | - | 1-Regular,2-Irregular |
| Interaction | - | 1-Poor,2-Good, 3-Better, 4- Best |
| Result | - | 0-Stress Free, 1- 25% Under Stress, 2-50% under Stress,3-100% Stress |

9. EXPERIMENTAL ANALYSIS

9.1 Student Stress Prediction using NB Algorithm Results

Here we build a real time application useful for the society. This project build using Microsoft technologies. Stress Training datasets trained using Naive Bayes algorithm and we got very good results. Naive Bayes algorithm is programmed in such a way that, it works for dynamic datasets. Naive Bayes algorithm logic is written and it's our own library. We are getting around 95% of accurate results and it takes around 1000 milli seconds for prediction

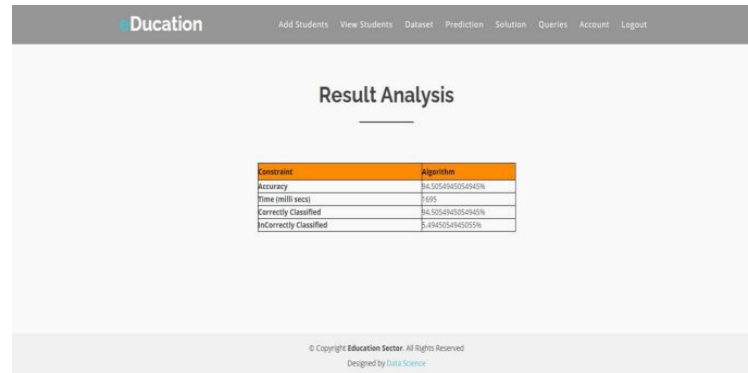
| Constraint | Naive Bayes Algorithm |
|----------------------------------|-----------------------|
| Accuracy | 95 % |
| Time (milli secs) | 1006 |
| Correctly Classified (precision) | 95 % |
| InCorrectly Classified (Recall) | 5 % |

9.2 Student Stress Prediction using KNN Algorithm Results

Stress datasets trained using KNN algorithm and we got very good results. KNN algorithm is programmed in such a way that, it works for dynamic datasets. KNN algorithm logic is written and it's our own library. We are getting around 85.2% of accurate results and it takes around 1500 milli seconds for prediction.

| Constraint | KNN Algorithm |
|----------------------------------|---------------|
| Accuracy | 85.18 % |
| Time (milli secs) | 1606 |
| Correctly Classified (precision) | 85.18 % |
| InCorrectly Classified (Recall) | 14.82 % |

10. RESULT



| Constant | Algorithm |
|------------------------|-----------------|
| Accuracy | 84.55484924940% |
| Time (milli secs) | 7.685 |
| Correctly Classified | 84.55484924940% |
| Incorrectly Classified | 15.44515075060% |

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11. CONCLUSION

College students are suffering from many mental health problems including mental stress, somatization, obsessive, interpersonal sensitivity, depression, anxiety, hostility, fear, paranoia and psychosis, which can bring a lot of negative effects to them. Machine learning is a subject to predict future based on the past data. Using machine learning techniques, we predict student stress level and also proposed system will give suggestions based on the stress levels of student.

12. FUTURE ENHANCEMENTS

Additional methods like the Naive Bayes classifier can be used to test the efficiency of the model. One can implement deep learning techniques like CNN (Convolutud Neural Networks) and verify how the model performs for the given datasets. A much more specific and vast datasets can be used as a training model since the number of responses is limited in our case.

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