MENTAL STRESS DETECTION OF UNIVERSITY STUDENTS IN BANGLADESH USING MACHINE LEARNING

BY

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This Report Presented in Partial Fulfilment of the Requirements for the Degree of Bachelor of Science in Computer Science and Engineering.

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APPROVAL

This project titled **"Mental Stress Detection of University Student's in Bangladesh Using Machine Learning"**, submitted by Mehedi Firoz, Id: 191-15-2475 to the Department of Computer Science and Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfilment of the requirements for the degree of B.Sc. in Computer Science and Engineering (BSc) and approved as to its style and contents. The presentation has been held on 30 January, 2023.

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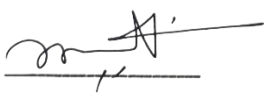

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I hereby declare that this project has been done by me under the supervision of **Mohammad Monirul Islam, Assistant Professor, Department of CSE** Daffodil International University. I also declare that neither this project nor any part of this project has been submitted elsewhere for the award of any degree or diploma.

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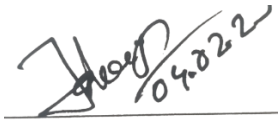

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ABSTRACT

These days, there is a huge problem with mental stress, and the problem is particularly widespread among students at educational institutions of higher learning. According to the views that are prevalent now, the historical era that was formerly thought to be the one with the least level of stress is now deemed to be the most difficult time period. Depression, suicide, heart attacks, and strokes are just some of the current health issues that have been linked to the rising levels of mental stress that individuals are exposed to in today's culture. Because of this, we largely extracted the mental stress ratings of university students by using six distinct machine learning algorithms for this study. These examples of machine learning algorithms are as follows: Decision Tree Classifier, Random, Forest Classifier, SVC, KNN Classifier, Multinomial NB, and K-Nearest Neighbors Regressor. The major objective of this inquiry is to determine the number of students who are experiencing difficulties in managing with their emotional stress. The dataset was put together by hand with paper and manual information obtained from a survey. Out of the six different classification strategies, the Decision Tree Classifier and the Random Forest Classifier both had the highest test result of 0.99.

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CHAPTER 1
INTRODUCTION

1.1 Introduction

When we feel pressured or threatened, we respond by becoming stressed. It often occurs when we are in a precarious position that we don't feel we have any control over. The health of the workforce is being significantly impacted by an increase in workload across many organizations and the resulting rise in occupational stress. Due to the subjectivity of self-reporting and individual variation, measuring stress and other human psychological dynamics is challenging.

Stress is a phrase that is usually used as a euphemism for unpleasant life events or experiences. Different perspectives on the subject are presented through logical study on pressure and unease. Stress is a natural element of human existence, according to the rushed and concentrated lifestyles that are becoming more common. A guy exhibits conduct resistances as he is adapting to pressure. One's psychological processes and impassioned scene alter as a result of this.

One kind of mental suffering is stress [1]. It also plays a part in reactions to and inspirations from nature. Due to pressure levels, there might be significant damage [2]. Other health problems including obesity, heart attacks, diabetes, asthma, etc. might occur as a result of stress. In various parts of the nation, a student commits suicide every per hour. According to a Lancet investigation, a significant number of young people in our nation between the ages of fifteen and twenty-nine have committed suicide (2012). With the aid of this method, we can examine stress at its very beginning. We can assist pupils in healing in the short or long term if we can determine their degree of stress. The total number of student suicides in 2015 was 8,934. A total of 39,775 students committed suicide between 2010 and 2015. The rise in suicide rates throughout the country served as our motivation for this essay. Every year, 800,000 people commit suicide worldwide, an average of 92 people every day. 135000 of them (or 17%) are citizens of India. The scope is enormous. According to the research, psychological problems are the primary cause of suicide [3]. Suicides are an impulsive response to stress, which might include problems with money, many problems with a person's relationship or partner, or even bullying. When someone gave it some thought, a variety

of tactics, including weapons, drugs, and toxins, sprang to mind. One strategy for reducing the suicide rate in the next year is the treatment of mental clutter. We will use their mind wave flag, which is acquired from the PSS dataset, to conduct an inquiry into how these factors affect these people's psyches. Many people have made attempts in this area, but the PSS test and the harm it does the person under study are the major emphasis. To prevent any such situations or possible financial losses, we are considering making an effort to carry out these studies in a sequential manner. The first being PSS, which analyzes a person's psychological condition to some degree and helps decide whether to go forward or not.

Nowadays, youth are more affected by mental stress. Throughout their life, college students encounter many types of mental stress. the effects of test anxiety or recruitment anxiety on the student, which may sometimes go unrecognized. The impact of these elements on a student's mental state and the relationship between stress and online time were examined [4] in detail. Stress is a heightened psycho-physiological condition of the body that occurs in response to a demanding circumstance or difficult event. Stressors are defined as environmental factors. Extended exposure to several stressors acting at once may have a negative impact on a person's physical and mental health, which can further lead to chronic health issues. Continuous monitoring is the only method to spot stress-related issues in the very early stages. monitoring your stress, one may track their own stress levels thanks to wearable technology's ongoing and real-time data collecting. To detect stress, they are merging wearable sensors and machine learning algorithms. The techniques for detecting stress are based on sensory equipment such as wearable sensors, Electroencephalograms (EEG) [5], Electrocardiograms (ECG) [6], and Photoplethysmography (PPG), as well as in various contexts such as those found when learning, operating a motor vehicle, and working [7]. Stress detection is one of the key areas of research in biomedical engineering. The ECG, which uses a different sensor system called the EDR to measure breathing, also contains information on the respiratory signal (ECG Derived Respiration). This is crucial because prompt stress detection might prevent numerous psychological and physiological problems, such arrhythmia or an irregular heartbeat [6]. Numerous researches have already examined physiological signals as ongoing, quantifiable stress indicators. Recent years

have seen a shift in the field's focus from the laboratory to the ambulatory environment. Identifying the optimal machine learning approaches, whose selection is based on the application context [8], as well as the physiological sensing priority, such as electrocardiogram [6], skin conductance, and electromyogram.

1.2 Motivation

On the other hand, my experience has been that a lot of my exceptional friends who were university students left school due to financial difficulties, bad relationships, or subpar grades. In addition, I have seen several of my friends commit suicide for emotional and romantic reasons. His poor performance led to despondency, a loss of confidence in his future prospects, and the onset of drug abuse. I choose to focus my research on the mental stress that students encounter since they may have to cope with a number of stresses while in college.

1.3 Rationale of the Study

On BD news24 report (Published: 8 Oct 2022, 05:36 PM, Updated: 8 Oct 2022, 05:36 PM), according to a poll, academic pressure in the post-COVID-19 periods affects the mental health of more than 75% of students at public and private institutions in Bangladesh. According to a report by the Alcohol Foundation released on Saturday, the main causes of mental health disorders are session congestion, academic challenges, and sadness over test results. At a virtual media briefing, the group's survey findings on the "Impact of Academic Pressure on University Students and Their Suicidal Tendencies" were revealed. According to Dr. Abdul Wohab, a researcher and assistant professor at North South University, 1,640 students from 38 public institutions, 47 private universities, madrasas, and national universities participated in the poll. At least 40 of them, or 2.44 percent of the participants overall, managed to avoid suicide. 4.76 percent of them had plans to kill themselves but ultimately refrained from doing so. According to the Alcohol Foundation, at least 34.15 percent of them had suicide thoughts. A little more than 579.9% of the students experienced anxiety and worry related to their bodily and mental health. Around 80.79 percent of pupils' academic performance was impacted by depression and bipolar illness. For 70.73 percent of

students, using mobile devices, laptops, and desktop computers excessively had a detrimental influence on their academic performance. According to the Alcohol Foundation, there were 71.71 percent of pupils who had sleeping problems. 47.50 percent of students also experienced a change in personality features, which is regarded as the beginning stage of a mental health disorder. 55.43 percent of pupils have been influenced by parental expectations and pressure. They believe that the stress brought on by these problems is making their everyday lives worse. University students are now required to study more for examinations and finish the curriculum faster in the post-COVID-19 environment. This study found that 77.01 percent of pupils' academic lives had been significantly impacted. The mental health of 67.13 percent of students was severely affected by the despair brought on by the short interval between tests. In the meanwhile, revisions made to the curriculum after a lengthy break due to the epidemic have caused the confidence level of 73. 84 percent of pupils to decline.

1.4 Research Questions

1. "Are you unhappy with the money you get per month from your family?" The reason for this question is that some families are unable to provide the amount of money required by a student each month. That is why he or she feels betrayed when he or she sees a batchmate living a much better life than them. It will cause the student mental stress. In this question, 549 students give a "yes" answer, which is almost 26% of the total data, and 1567 students give a "no" answer, which is almost 74% of the total data.

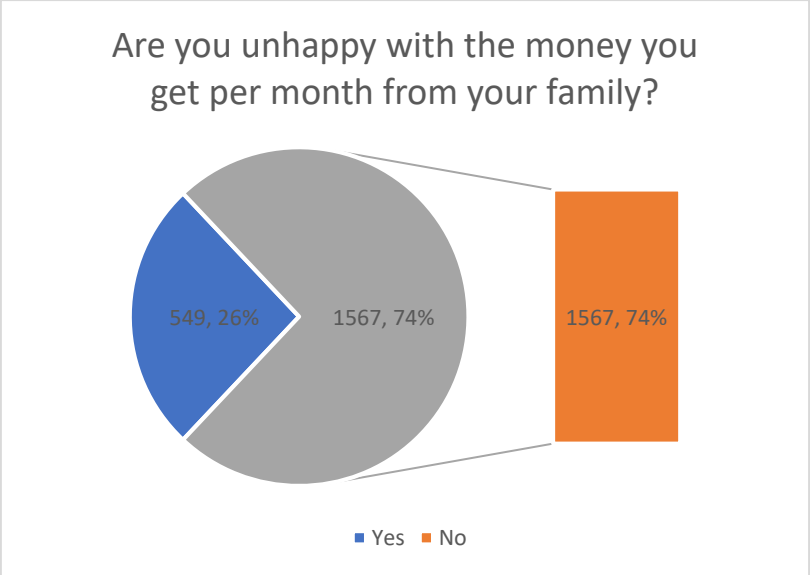

Figure 1.4.1: Pie chart of Survey Question one.

2. "Do you try to recover if you are short of money at the end of the month?" If some families are unable to fully cover a student's monthly expenses, the student will attempt to compensate in various ways. In this question, 1837 students give "yes" answers, which is almost 87%, and 279 students answer "no," which is almost 13%, which is quite interesting.

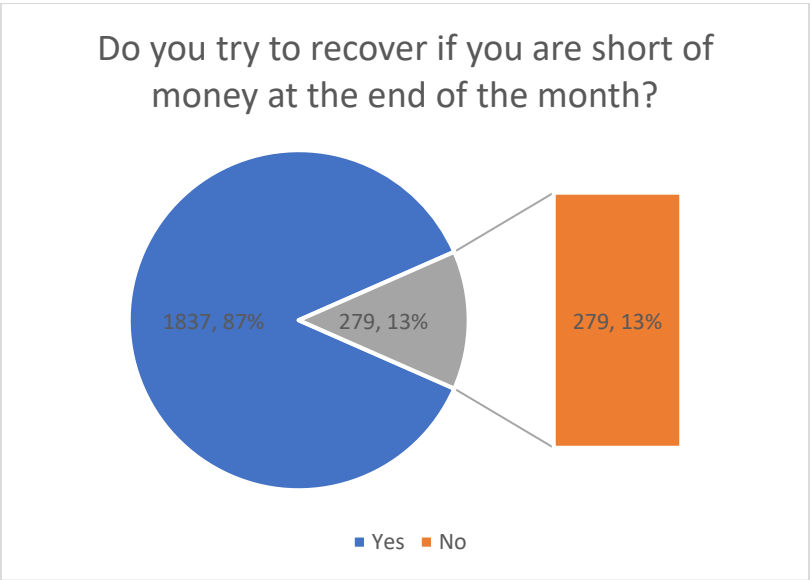

Figure 1.4.2: Pie chart of Survey Question two.

3. In question number three, "Are you unhappy with your CGPA?" We are all aware that if our exam results are poor, we will feel uneasy and stressed. 1197 (56.57%) of the 2116 students respond "yes," while 919 (43.43%) respond "no."

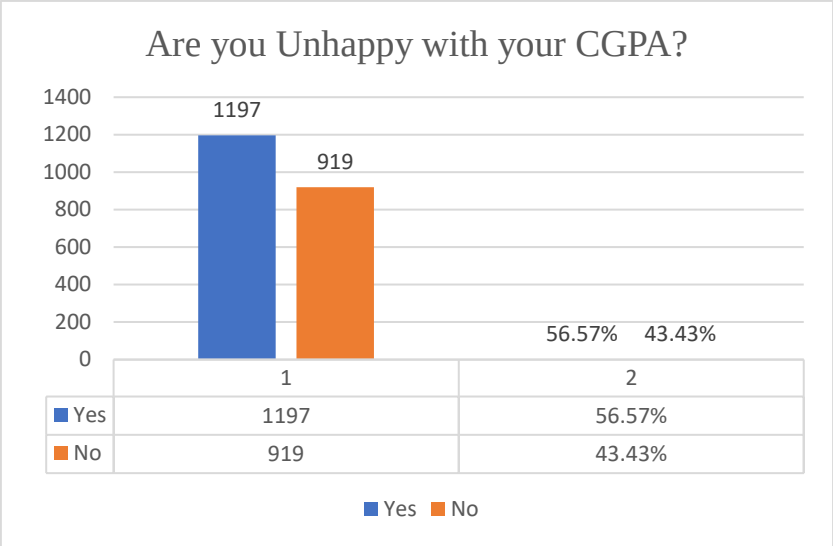

Figure 1.4.3: Pie chart of Survey Question three.

4. It's a universal truth: we always love our friends, but when our results aren't as good as theirs, we get angry and depressed. So, I put this question: "If your friends' results are better than yours, does that cause you concern?" It's very interesting that 941 (44.47%) students say "yes" and 1175 (55.53%) students say "no" out of 2116 students.

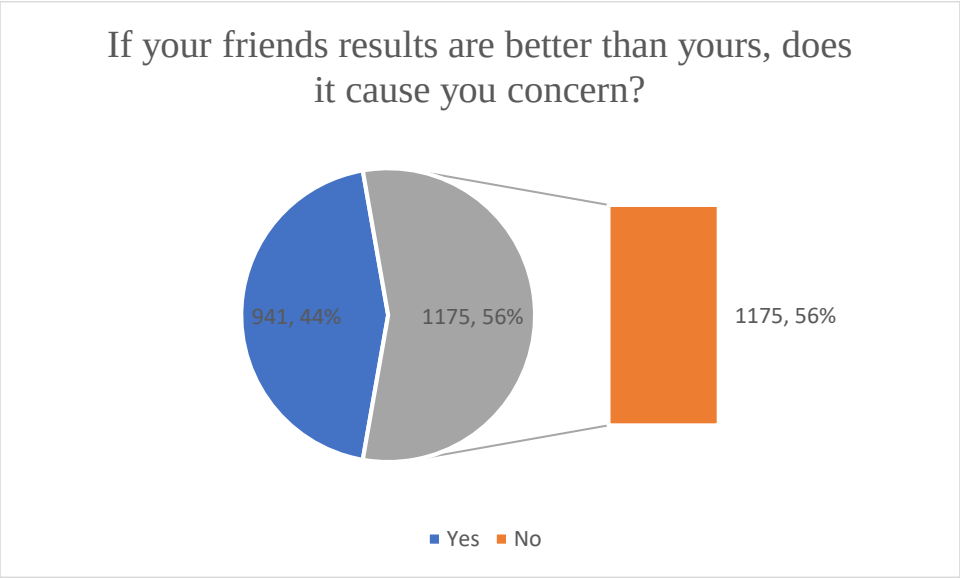

Figure 1.4.4: Pie chart of Survey Question four.

5. We experience some pressure to complete tasks while we are working on them. I posed this query: "When you start a task, do you worry about it until you finish it?" in light of the stress level calculation. The most amazing thing here is that

approximately 1734 (81.95%) students answer "yes" and 382 (18.05%) students answer "no."

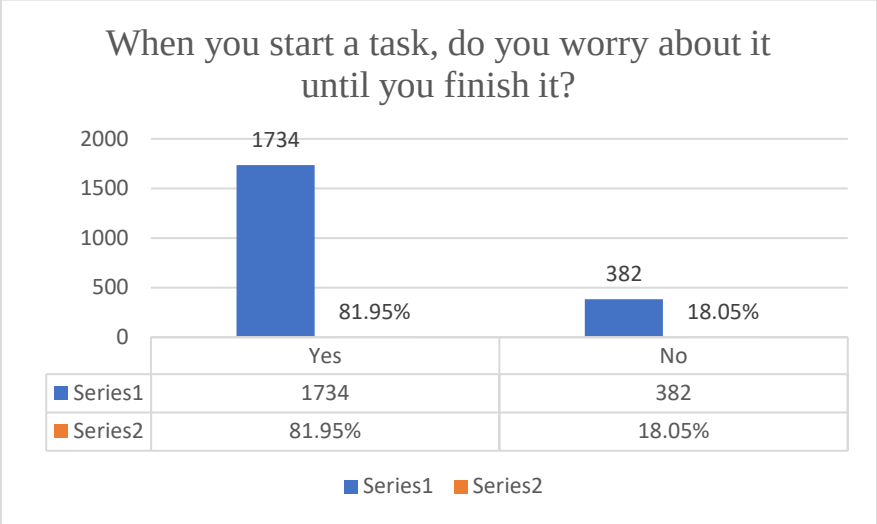

Figure 1.4.5: Pie chart of Survey Question five.

6. If a student is suffering from mental stress or thinking about anything, he or she is not sleeping at night properly. The answer to this question: "Despite wanting to, are you unable to sleep properly at night?" is 1273 (60.16%) saying "yes" and 843 (39.84%) saying "no."

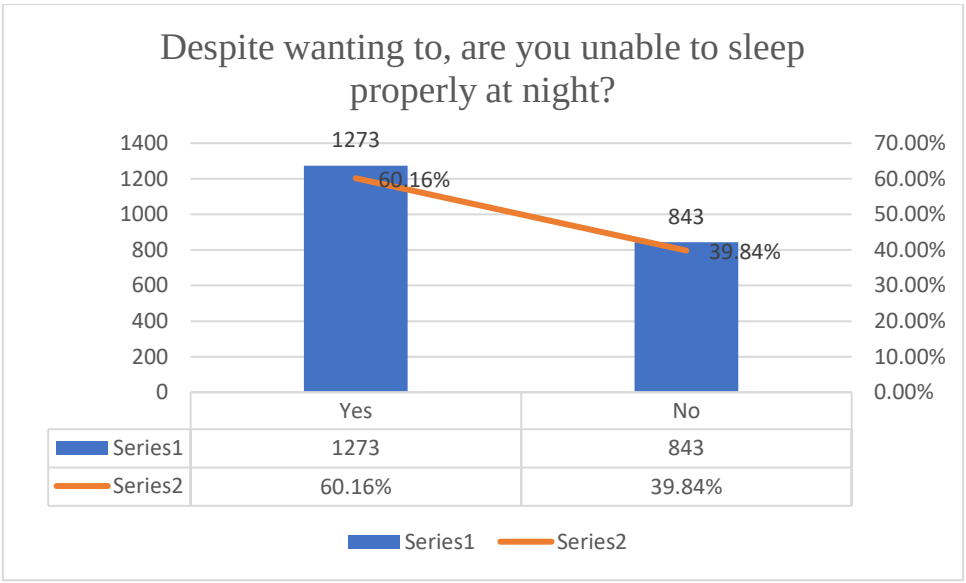

Figure 1.4.6: Pie chart of Survey Question six.

7. Most of the time, university students are struggling with broken relationships. A student's heart is broken, and he feels depressed and lonely as a result. For

this reason, some students make suicide attempts. That's why I ask, "Have you had any issues or breakups with your loved one in the last three weeks?" It's absurd that 897 students, or 42.39%, respond "yes" to this question.

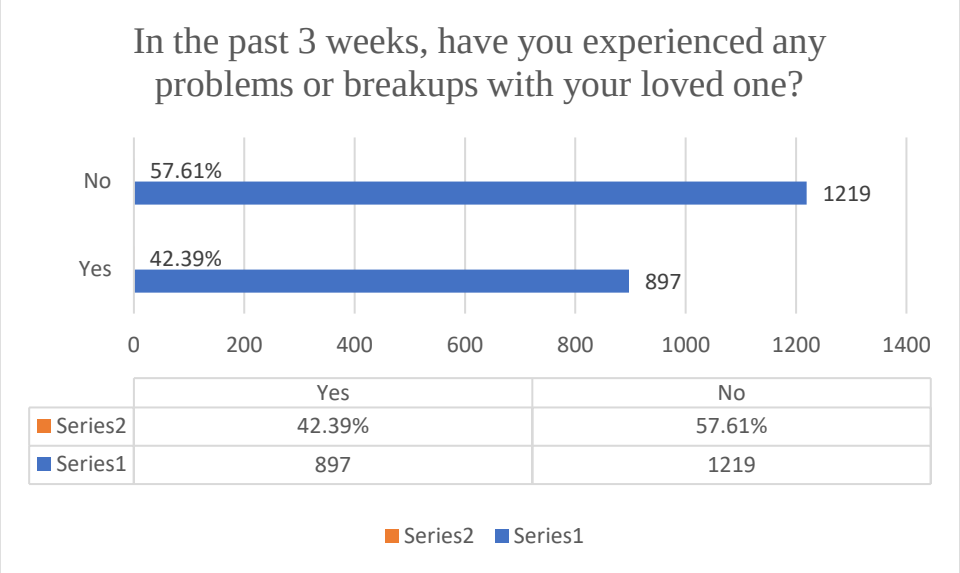

Figure 1.4.7: Pie chart of Survey Question seven.

8. "Does your loved one fear leaving you?" This topic was introduced since it hurts a lot for students when someone we love attempts to leave us. Results in student education are affected, among other factors. 598 (28.26%) of the 2116 (100%) students respond "yes" to this question.

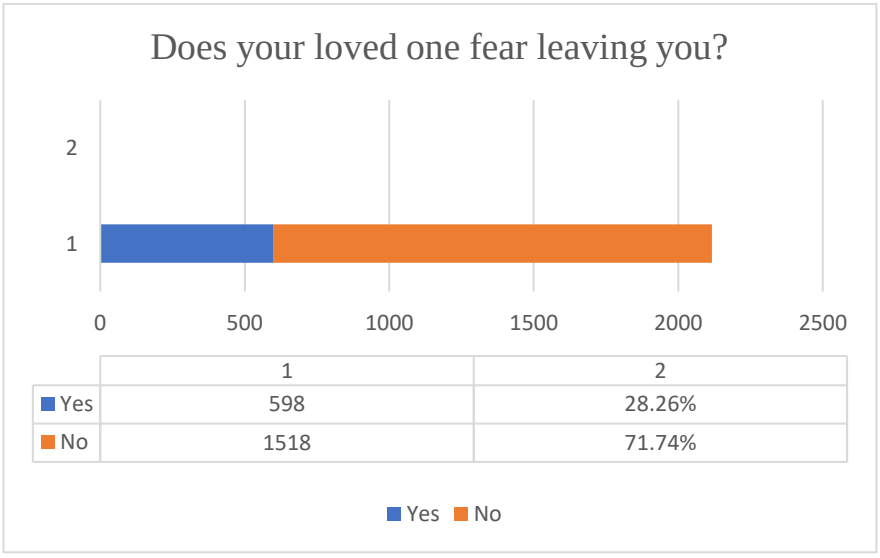

Figure 1.4.8: Pie chart of Survey Question eight.

9. When a student is depressed, he or she is not concerned with himself or herself. Another reason to ask this question is: "Have you had any negative thoughts about yourself or your future in the last three weeks?" When a student's grades continue to deteriorate, he loses confidence in himself. As a result, 480 (22.68%) students say "yes."

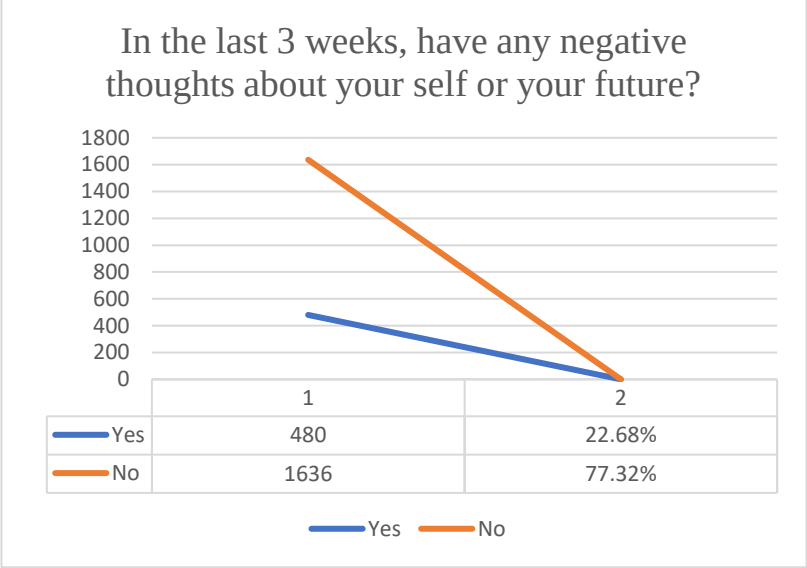

Figure 1.4.9: Pie chart of Survey Question nine.

10. There are different types of reactions to food, like stress, worrying about something, depression, etc. The answer to the question "Lately, do you have any food aversions?" is 1074 (51%) and 1042 (49%) say "no."

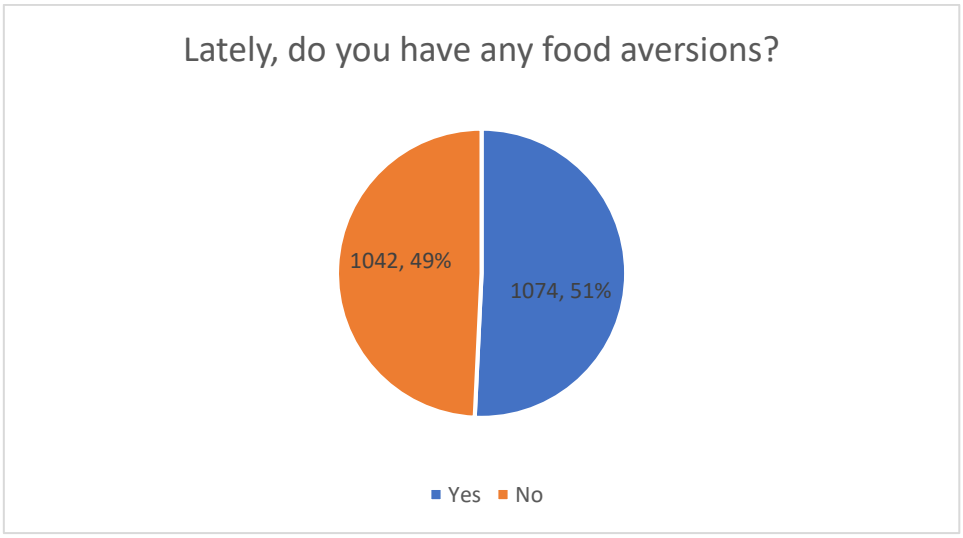

Figure 1.4.10: Pie chart of Survey Question ten.

11. Varsity students become addicted to drugs for various reasons. The most common of these are relationship breakups or bad friendships. That's why I added this question: "Are you addicted to any drug or smoke frequently?" In this question, 480 (22.68%) students answered "yes."

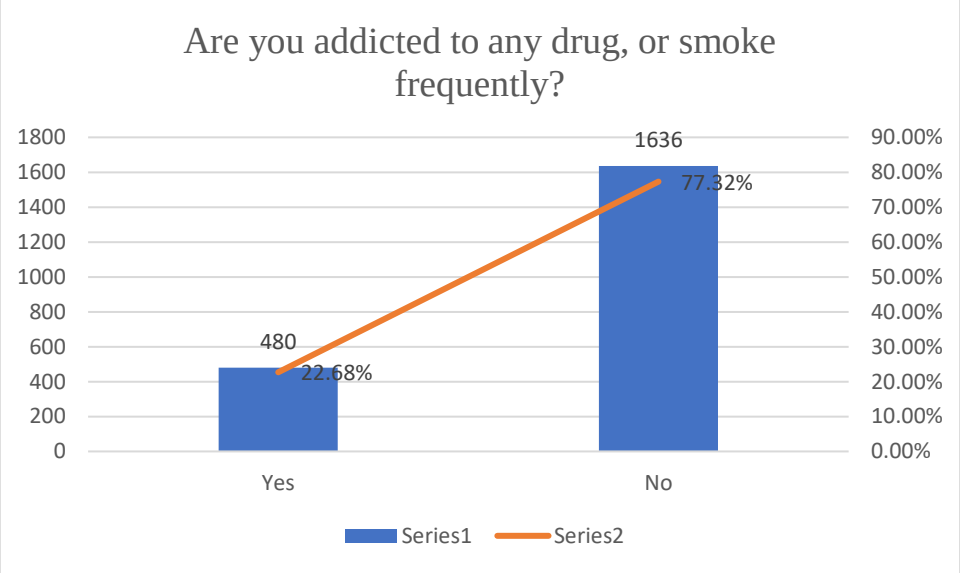

Figure 1.4.11: Pie chart of Survey Question eleven

1.5 Expected Output

When we gather our data, we find that a significant number of pupils provide satisfactory responses to the questions that we ask. Because our inquiry is mostly critical, a favourable response from them indicates that they are of the same opinion. The results of our manual study led us to believe that the score produced by our algorithm will be pretty satisfactory.

1.6 Project Management and Finance

We conducted a survey to find out the number of university student mental stress. To do this I had to print some forms to increase the data collection. Some money was spent and nothing else has been spent so far. But in the future, we may have to spend a little more to develop our project. We have always wanted to work on mental stress. Because its use is increasing day by day in the present.

1.7 Report Layout

This report consists of 5 chapters. These are:

- Introduction:
    - Introduction
    - Motivation
    - Rationale of the Study
    - Research Questions
    - Expected Output
    - Project Management and Finance
    - Report Layout

- Background:
    - Preliminaries/Terminologies
    - Related Works
    - Comparative Analysis and Summary
    - Scope of the Problem
    - Challenges

- Research Methodology:
    - Research Subject and Instrumentation
    - Data Collection Procedure/Dataset Utilized
    - Statistical Analysis
    - Proposed Methodology/Applied Mechanism
    - Implementation Requirements

- Experimental Results and Discussion:
    - Experimental Setup
    - Experimental Results & Analysis
    - Discussion

- Impact on Society, Environment and Sustainability

- Impact on Society
- Impact on Environment
- Ethical Aspects
- Sustainability Plan

➢ Summary, Conclusion, Recommendation and Implication for Future Research

- Summary of the Study
- Conclusions
- Implication for Further Study

CHAPTER 2
BACKGROUND

2.1 Preliminaries/Terminologies

We know that education is the backbone of a nation. However, students may experience stress while pursuing this education. This stress falls on a student in various ways. But it is relatively higher in Bangladesh as compared to other countries because Bangladesh is a lower middle-income country and most of the families in this country earn a small living, so they struggle to provide the student with the money they need for higher education. As a result, a brilliant but poor student struggle to continue his university life and becomes mentally broken. A student may also experience relational, financial, or other stressors that impede their progress. And when the amount of stress becomes too much, a student has no hesitation in committing various harmful acts, including suicide. And this kind of activity is increasing day by day in the case of students in Bangladesh. We have made the decision to work on "Mental stress detection of university students" despite everything. We attempted to assess students' mental stress levels in this circumstance by gathering data from university students' replies through a survey form and manually. We have made an effort to comprehend the current level of stress among university students by personally compiling data from survey replies and student survey responses. To complete this task, some money was spent on printing the form for data collection, and no more expenses were made. After connecting the data obtained from the survey and manually, pre-processing the data, and labelling it, we apply the machine learning algorithm to calculate the number of students who experience mental stress. This has finished all of the tasks we had to do.

2.2 Related Works

In paper [9], the authors calculated stress using heart rate, EMG, GSR hand and foot data, respiration and concluded that respiration is a critical parameter in stress. In the paper [10], the authors used ECG (Electrocardiogram) signals to predict stress. In paper [11], the authors calculated stress using signals like EEG, GSR, EMG, and SpO2. Various pattern recognition algorithms are being used for automated stress detection. The data received from all sensors are checked against the index value which is used

for detecting the stress. In paper [2], authors applied the J48 algorithm, SMO, Bayesian Network algorithm for predicting stress on the data collected from 16 peoples under four different stressful conditions. The paper [12] used HRV features and EEG signals to predict the stress level. Various features like HRV, heart rate, ECG are used to predict the stress level. In paper [13], authors used a decision tree algorithm applied on a dataset collected from two tests completed that made these tests to be unsatisfactory. Students stress level is calculated in the starting of the semester and in the last of the semester. The study found that stress in the start was less and higher in the last [14]. The researchers conducted before were mainly concerned about how to give a standard measurement for stress like by reading the brain signals or by conducting a survey about different ways of living of people in rural or urban areas but nothing provided for a preliminary detection. These research papers mention a lot about what all can be done to make these brain measurements more accurate by conducting some tests and recording brain signals or by measuring these brain signals in different situations.

We provide a conceptual approach to creative design in this study [15]. This theoretical model is founded on two assumptions: 1) design thinking is a nonlinear, possibly chaotic dynamic; and 2) there is an inverse U-shaped relationship between a designer's mental stress and creativity. The roles of sketching in design are interpreted to show how this theoretical model might be utilized to explore design phenomena. The EBD Descriptive design model was utilized in this work. One of the most important components of the next generation of CAD systems in engineering design is regarded to be creative design support. The goal of this research [16] was to see whether decreasing stress-induced hypercoagulability with pharmacological and behavioral interventions may decrease the incidence of thrombotic events in high-risk populations. Acute mental stress may have a role in the pathophysiology of acute thrombotic events, and the purpose of this research is to provide a succinct synopsis of current understanding of hemostatic abnormalities in response to acute mental stress. Under severe psychological stress, thrombotic response modulators Prospective studies are required to understand how effectively the acute prothrombotic stress response predicts the chance of a thrombotic event in both healthy persons and patients with pre-existing vascular disease. This work employs [17] canonical correlation analysis as well as a

FNIRS-EEG investigation. We propose utilizing canonical correlation analysis (CCA) to determine how mental stress impacts prefrontal brain activity in this investigation. The CCA is a statistical approach for discovering a linear link between two sets of data by computing inter-subject covariances. The results of the experiment showed that the sub regional character of the mental stress experienced by this set of subjects was restricted to the right ventrolateral PFC subregion. These findings suggest the right ventrolateral PFC as a viable option for the extraction of biomarkers as indicators of the success of neurofeedback training in teaching stress management. This method is recommended because it can both discover discriminative sets of features and reduce duplicate information from within the features.

University students play a crucial part in the development of a country's educational backbone. In such a situation, Bangladeshi students would undoubtedly contribute to the country's prosperity. However, for university students, mental stress has become a significant source of injury. They are developing a horrible sickness called stress as a consequence of family, friends, relationships, exam results, and a variety of other personal causes. And because of this tension, students need assistance in concentrating on their schoolwork. As a result, Bangladesh's education sector would confront severe challenges. Students at universities are more anxious for a variety of reasons. As a result, I conducted a poll on university students' mental stress. Then, using a survey form, I will gather data on university students' mental stress. The primary goal of my study is to identify mental stress in university students using a machine learning algorithm.

2.3 Comparative Analysis and Summary

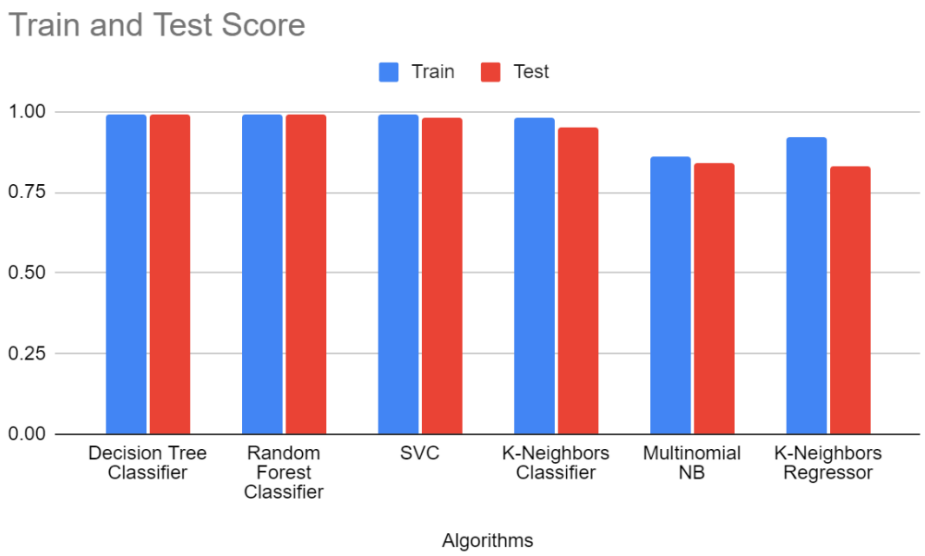

Figure 2.3.1: Graph of comparative algorithm analysis.

2.4 Scope of the Problem

Students may experience the following warning symptoms of stress:

- Angry outbursts or crying fits.
- Trouble eating.
- Getting bored with routine tasks.
- Increasing signs of physical distress, such as headaches or gastrointestinal discomfort.
- Fatigue.
- Feeling guilty, powerless, or despairing.
- Avoiding loved ones and friends.

2.5 Challenges

- Topic Discovery
- Data Collection
- Data Preparation
- Data Analysis

CHAPTER 3
RESEARCH METHODOLOGY

3.1 Research Subject and Instrumentation

Our study subject is "Mental Stress Detection in Bangladeshi University Students Using Machine Learning." The primary purpose of this study is to analyze the stress levels of university students. Nowadays, there is a big problem with mental stress, particularly among young people. The time period that was formerly thought to be the most carefree is now under a lot of stress. These days, stress is more prevalent, which leads to a number of problems including depression, suicide, heart attacks, and stroke. In this study, we estimate students' mental stress one week before the test and while they are using the internet. Examining stress in college students at different phases of their life is our focus. Students may have undetected effects from stress related to exams or recruiting. We'll examine the psychological effects of these elements on students and examine the relationship between stress and online time.

Mainly our target is to detect stress levels. So, by analyzing stress levels we can come to a result that students are actually how much mental stress they are and that's the subject of our research.

Instrumentations:

- Google form for survey
- MS-Word
- Excel for data collection
- Coding for Google Collaboratory

After data collection (use survey form) we used 6 machine learning algorithms as an instrument for student stress detection. Six machine learning algorithms is given below:

- Decision Tree Classifier
- Random Forest Classifier
- SVC
- K-Neighbors Classifier
- Multinomial NB

- K-Neighbors Regressor

3.2 Data Collection Procedure/Dataset Utilized

The practice of acquiring or measuring relevant data in a variety of methods is known as data collection. In addition, there are numbers that enlighten us about our study. Therefore, gathering data is the first step in beginning any research project. Research will not begin if the data gathering process is not flawless. You must gather data for the task in a variety of methods, including via surveys, data acquired online, historical data, previously recorded data, etc. We gather data for our research using both online and offline questionnaires. Our major objective is to gather information from university students.

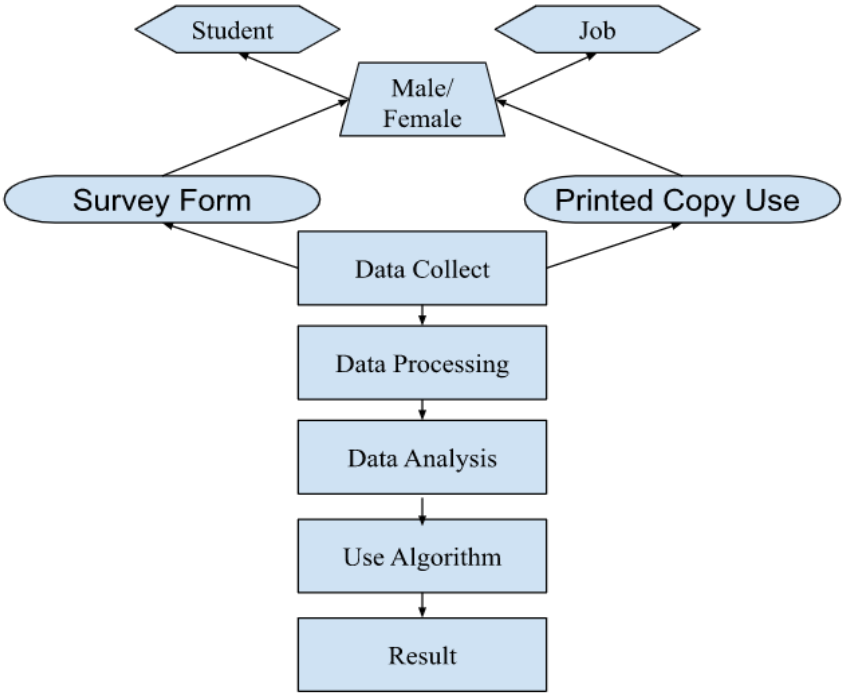

Figure 3.2.1: Flowchart of data collection procedure.

3.3 Statistical Analysis

Table 3.3.1: Table of statistical analysis of survey question

Survey Question	Responses (%)		Compare	Maximum Result
	Yes	No		
Are you unhappy with the money you get per month from your family?	25.95	74.05	Yes<No	Not Depressed
Do you try to recover if you are short of money at the end of the month?	86.81	13.19	Yes>No	Depressed
Are you unhappy with your CGPA?	56.57	43.43	Yes>No	Depressed
If your friend's results are better than yours, does it cause you concern?	44.47	55.53	Yes<No	Not Depressed
When you start a task, do you worry about it until you finish it?	81.95	18.05	Yes>No	Depressed
Despite wanting to, are you unable to sleep properly at night?	60.16	39.84	Yes>No	Depressed
In the past 3 weeks, have you experienced any problems or breakups with your loved one?	42.39	67.61	Yes<No	Not Depressed
Does your loved one fear leaving you?	28.26	71.84	Yes<No	Not Depressed
In the last 3 weeks, have any negative thoughts about yourself or your future?	23.49	76.51	Yes<No	Not Depressed
Lately, do you have any food aversions?	40.76	49.28	Yes<No	Depressed
Are you addicted to any drug, or smoke frequently?	22.68	77.32	Yes<No	Not Depressed

3.4 Proposed Methodology/Applied Mechanism

One of the most personal and effective methods to gain a respondent's trust and cooperation is to conduct an interview while gathering data from a survey. In general, an online survey technique is one of the most used forms of survey methods. We chose this approach because students may more readily interact with online techniques while discussing themes connected to mental stress, and we get quicker replies. While we came close to receiving 1632 responses, we did get a lot of interest in our survey and information sharing that aided our efforts. Finally, our dataset uses the six most widely used classifiers: Decision Tree Classifier, Random Forest Classifier, SVC, K-Nearest

Neighbors Classifier, Multinomial NB, and K-Neighbors Regressor. Finding Mental Stress Detection is the study's main objective.

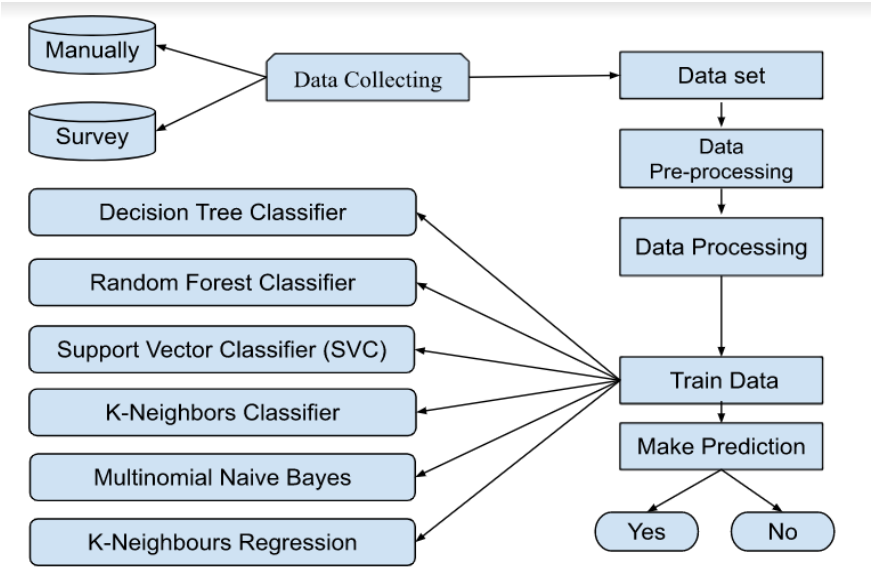

Figure 3.4.1: Flowchart of data processing.

We have tried to understand using five algorithms that can detect more stress students. Using Six algorithms are given below: Decision Tree Classifier, Random Forest Classifier, SVC, K-Nearest Neighbors Classifier, and Multinomial NB.

3.5 Implementation Requirements

i. Decision Tree Classifier- A non-parametric supervised learning approach known as a decision tree may be used for classification and regression tasks alike. Decision trees can be used for these kinds of problems. It is organized in a hierarchical tree fashion, with the root node serving as the starting point for the branches, internal nodes, and leaf nodes.

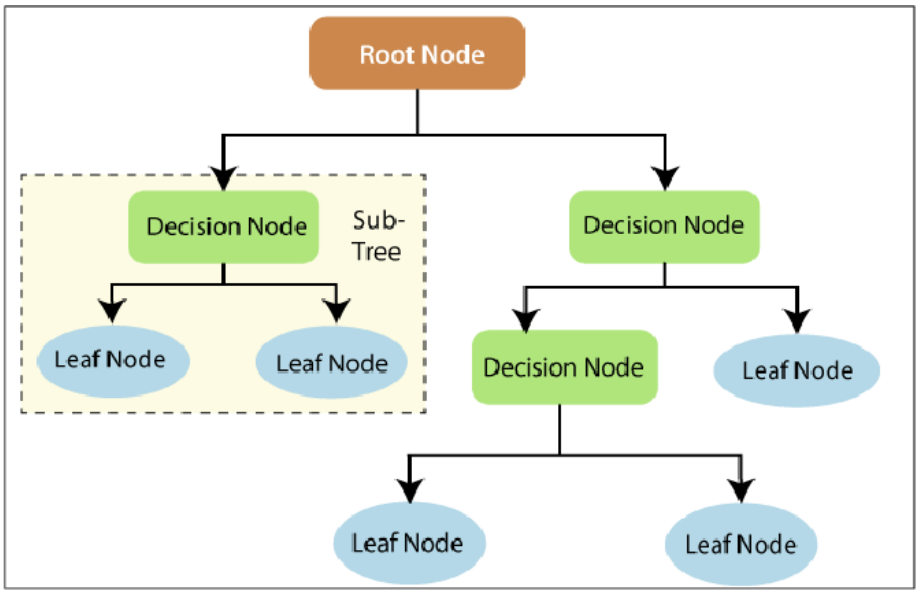

Figure 3.5.1: Decision tree classifier.

ii. Random Forest Classifier- Random forest is a popular supervised machine learning algorithm for classification and regression. It generates decision trees on distinct samples and uses their majority vote for classification and average for regression.

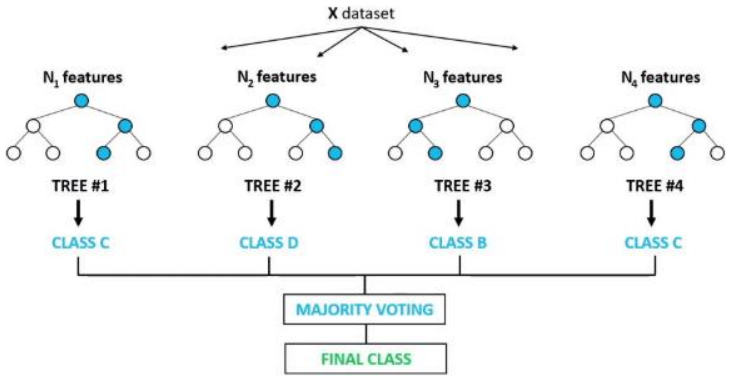

Figure 3.5.2: Random Forest Classifier.

iii. SVC- A common use of the supervised machine learning method known as the Support Vector Classifier (SVC) is in the realm of classification. The way SVC works is by projecting the data points into a high-dimensional space and then locating the best hyperplane to use as a boundary between the two groups. C-support vector classification using libsvm as the underlying library. Sklearn is

the module used by scikit-learn. Linear SVCs (Support Vector Classifiers) are designed to provide a "best fit" hyperplane that classifies your data based on the input you supply. Once you have the hyperplane, you may input it through a classifier to find out which class is "predicted."

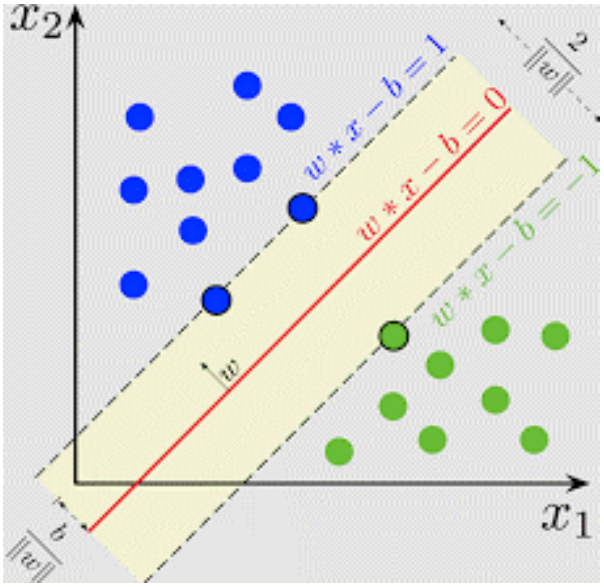

Figure 3.5.3: SVC.

iv. K-Neighbors Classifier- The K-Nearest Neighbors (K-NN) algorithm remembers all the previous information and assigns a label to a new piece of information depending on K-Nearest Neighbors (KNN) is a common ML method used for missing value imputation as well as for classification and regression applications. K-Nearest Neighbors (KNN) is a data mining technique that uses the average label or the most common label from a classification to determine a query's classification or label (in the case of regression).

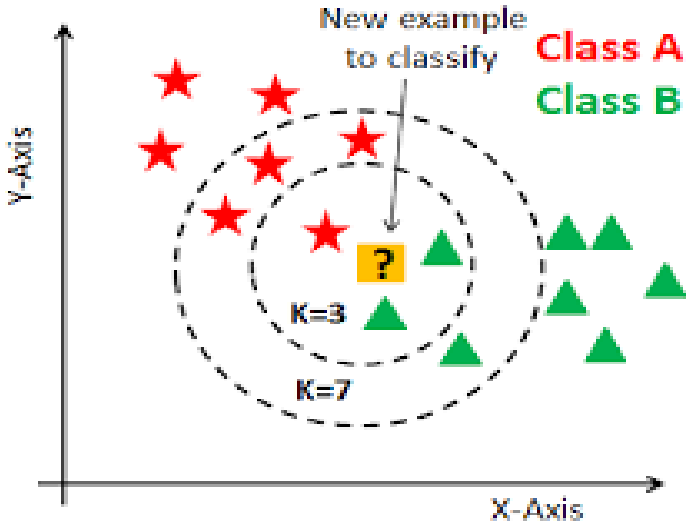

Figure 3.5.4.: K-Neighbors Classifier.

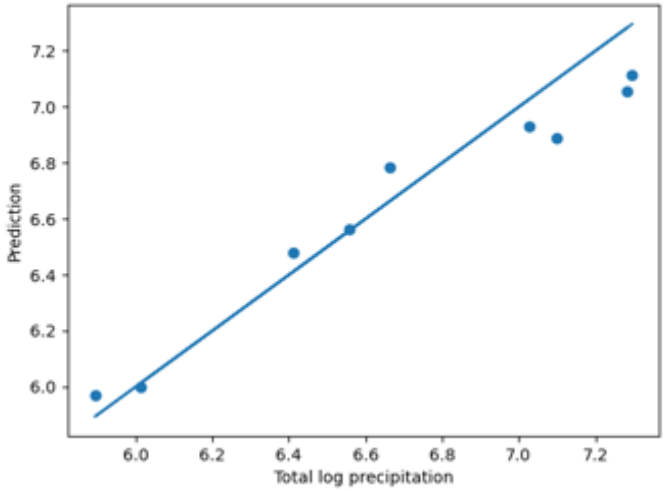

Figure 3.5.4.1: K-Neighbors Classifier.

v. MultinomialNB-

$$P\left(\frac{B}{A}\right) = \left(\frac{P(A \cap B)}{P(A)}\right)$$

The multinomial Naive Bayes classifier is appropriate with distinct options. The multinomial distribution ordinarily needs number feature counts. The following,

however, may work with partial counts like tf-idf. Alpha float parameters, the default value is 1.

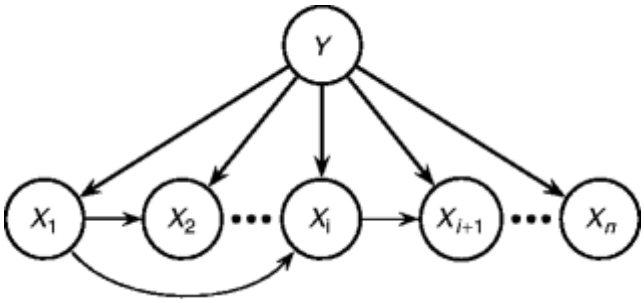

Figure 3.5.5: Multinomial NB.

vi. K-Neighbours Regressor- Non-parametric KNN regression uses an intuitive average of nearby data to estimate the relationship between independent variables and the continuous result. In the last section, we showed that the KNN method may be used for both classification and regression issues. A key component of the KNN method is "feature similarity," which is used to make predictions about unobserved data points. What this implies is that the value of the new point is determined by its degree of similarity to the points in the training set.

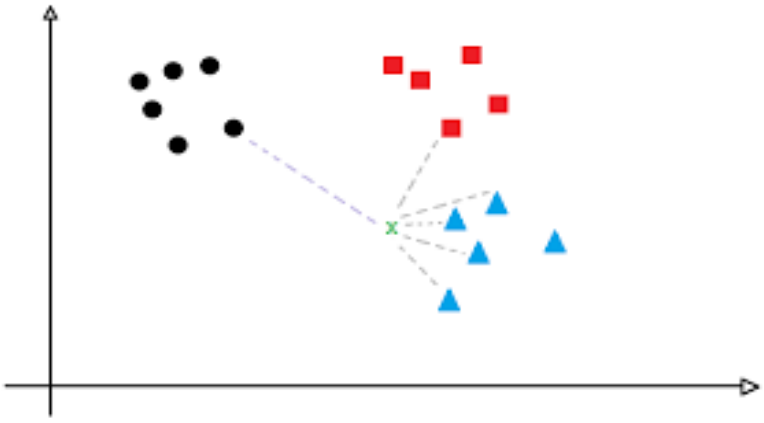

Figure 3.5.6: K-Neighbours Regressor

CHAPTER 4

EXPERIMENTAL RESULTS AND DISCUSSION

4.1 Experimental Setup

In this experiment first of all I have to choose the subject. Still I Thought about student stress, which exists in all of us. Which is why I finally decided to work on student mental stress. Then I develop a prototype for the research and plan the project's execution. We must create a real-life survey questionnaire for our target consumers after project planning.

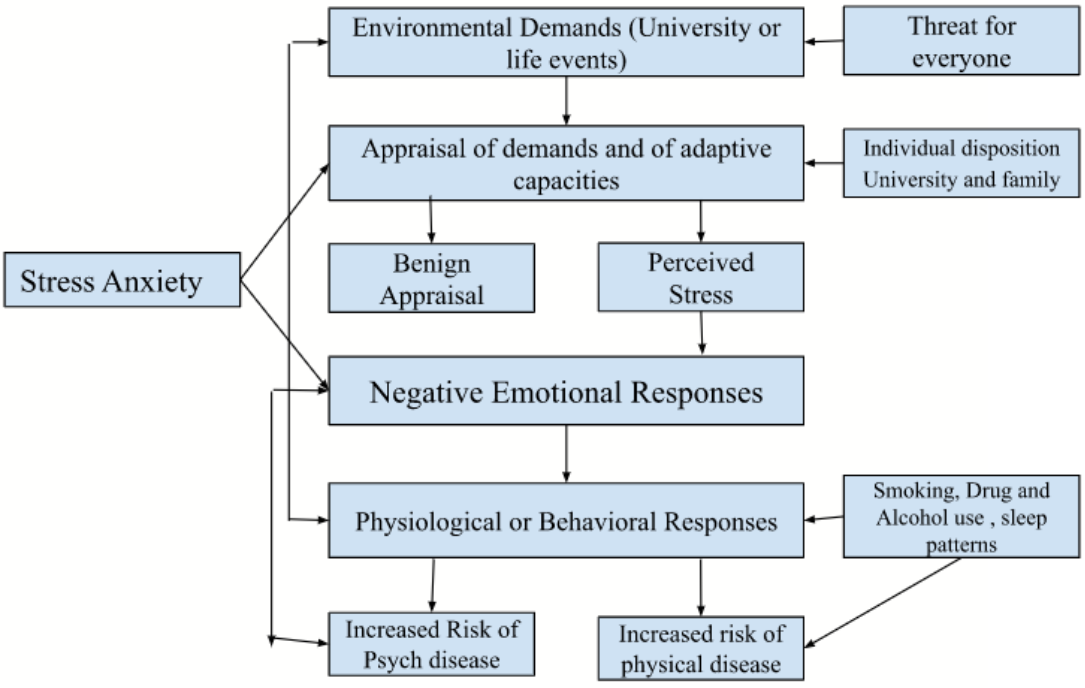

Figure 4.1.1: Flowchart of experimental setup.

4.2 Experimental Results & Analysis

Making questionnaire surveys I go out to collect my expected data. Firstly, I fixed the paper-based surveys, because if I want to collect university students what they think about the question. Collect some data then we start to manually input data on the dataset. And also, I provide the online questions for our target user to data collection

on google form and surprisingly we get more responses on google from then papers. In this way we overall 1098 data can be collected. After analysing the dataset, I get 534 data. I can see that most students are worried about something. We are often through 11 questions for the data collection. I want to justify their thinking about their life and also use their academic site.

From the total response we have analysed, we have gathered a total of 1632 data using a survey form manually. We discovered through the analysis of these 1632 data points that 67% of students are mentally stressed, compared to 33% who are not. According to our survey, the majority of those who are hooked are students.

```
[ ] df['Result'].value_counts()

    1    1058
    0    1058
    Name: Result, dtype: int64
```

```
[ ] y = df["Result"]
    x = df.drop("Result", axis=1)
```

```
[ ] from sklearn.model_selection import train_test_split
```

```
[ ] x_train, x_test, y_train, y_test = train_test_split(x,y,test_size=0.25,stratify=y)
```

```
[ ] from sklearn.ensemble import RandomForestClassifier
    from sklearn.tree import DecisionTreeClassifier
    from sklearn.svm import SVC
    from sklearn.neighbors import KNeighborsClassifier
    from sklearn.naive_bayes import MultinomialNB
    from sklearn.neighbors import KNeighborsRegressor
```

```
[ ] clf = RandomForestClassifier()
    clf.fit(x_train,y_train)
    print("Train Score:", clf.score(x_train, y_train))
    print("Test Score:", clf.score(x_test, y_test))

    Train Score: 0.9968494013862634
    Test Score: 0.9924385633270322
```

```
[ ] clf = DecisionTreeClassifier()
    clf.fit(x_train,y_train)
    print("Train Score:", clf.score(x_train, y_train))
    print("Test Score:", clf.score(x_test, y_test))

    Train Score: 0.9968494013862634
    Test Score: 0.9924385633270322
```

```
[ ] clf = KNeighborsClassifier()
    clf.fit(x_train,y_train)
    print("Train Score:", clf.score(x_train, y_train))
    print("Test Score:", clf.score(x_test, y_test))

    Train Score: 0.9766855702583491
    Test Score: 0.9527410207939508
```

```
[ ] clf = SVC()
    clf.fit(x_train,y_train)
    print("Train Score:", clf.score(x_train, y_train))
    print("Test Score:", clf.score(x_test, y_test))

    Train Score: 0.994328922495274
    Test Score: 0.9829867674858223
```

```
[ ] clf = MultinomialNB()
    clf.fit(x_train,y_train)
    print("Train Score:", clf.score(x_train, y_train))
    print("Test Score:", clf.score(x_test, y_test))

    Train Score: 0.856962822936358
    Test Score: 0.8449905482041588
```

```
[ ] clf = KNeighborsRegressor()
    clf.fit(x_train,y_train)
    print("Train Score:", clf.score(x_train, y_train))
    print("Test Score:", clf.score(x_test, y_test))

    Train Score: 0.9204536546164328
    Test Score: 0.8263887935963408
```

Figure 4.2.1: Algorithm implementation

Table 4.2.1: Table of Experimental Results & Analysis.

Algorithms	Train	Test
Decision Tree Classifier	0.99	0.99
Random Forest Classifier	0.99	0.99
SVC	0.99	0.98
K-Neighbors Classifier	0.98	0.95
Multinomial NB	0.86	0.84
K-Neighbors Regressor	0.92	0.83

I used six algorithms for collated data analysis, the algorithms are: Decision Tree Classifier, Random Forest Classifier, SVC, K-Neighbors Classifier, Multinomial NB, K-Neighbors Regressor.

4.3 Discussion

Insecurities are compounded by monetary concerns. Mental health professionals claim that today's university students have it tougher financially than their parents and grandparents did. As they were growing up, they saw family members lose jobs and homes due to the Great Recession. They are under a lot of pressure to perform well in school since they are unsure of their future career prospects and don't want to lose out on potential job opportunities. Mental stress may have negative effects on a student's health, relationships, and academic achievement. For several reasons, college students' minds might get troubled when they're enrolled in classes.

CHAPTER 5

IMPACT ON SOCIETY, ENVIRONMENT AND SUSTAINABILITY

5.1 Impact on Society

Stress is a common reaction to pressures or demands from the environment, particularly if they are seen as harmful or hazardous. Hormones, which are brain chemicals, flood the body during times of stress. These hormones cause individuals to perspire more quickly, breathe more rapidly, tighten their muscles, and become more alert. A person's "fight-or-flight" reaction, which is part of their inbuilt alarm system, is triggered in response to this to protect them.

Stress is a natural element of everyday life to some extent. Stress in moderation aids productivity, deadline compliance, presentation readiness, and on-time attendance at significant events. Long-term stress, though, may be detrimental. The likelihood of developing both physical and mental health issues rises when stress becomes severe and persistent.

Long-term stress raises the likelihood of physical complaints such muscular tightness as well as mental health issues including anxiety and depression, drug use issues, sleep disorders, and discomfort. Additionally, it raises the chance of health issues including high blood pressure, cardiovascular disease, stroke, gastrointestinal issues, immune system deterioration, infertility, and headaches.

Stress may manifest as cognitive (thinking-related), emotional, physical, or behavioral symptoms. They might be moderate to severe in intensity.

Among the cognitive symptoms are:

a. Trouble focusing or thinking
b. Memory issues
c. Negativity or low self-esteem
d. Persistent anxiety
e. Having trouble making choices.

Among the emotional signs are:

a. Moodiness
b. Poor spirit
c. Irritability
d. A sense of helplessness or despair
e. Experiencing trepidation, anxiety, or nervousness
f. Depressed 6. Disappointed or guilty
g. Not being able to unwind or feeling anxious.

Physical signs comprise:

a. Headaches
b. Tense muscles or other
c. Discomfort or bodily agony
d. Stomach issues
e. Nausea, vomiting, or diarrhea
f. Sex drive loss
g. A quick heartbeat
h. Elevated blood pressure
i. Fatigue.

These behavioral signs include:

a. Modifications to diet or sleeping habits
b. Social exclusion
c. Anxious behaviors like nail biting, gnashing one's teeth, or tapping one's foot.
d. Increased usage of caffeinated beverages, tobacco, alcohol, or other substances neglecting one's obligations to one's family or job.
e. A drop in productivity or performance.

5.2 Impact on Environment

A person may experience stress if they believe they are under a lot of pressure or expectations, that their wellbeing is in danger, or that they lack the means to handle the demands.

Physical factors in a person's surroundings, such as:

a. loud streets
b. a dangerous residence

Bad surroundings impact mental stress:

a. Anxiety
b. Depression
c. Additional mental health problems

5.3 Ethical Aspects

The physical surroundings of a person (such as loud streets or a dangerous home), relationships, job, life circumstances, and significant life transitions are common causes of stress. Negative occurrences including financial troubles, breakups in relationships, challenges at work or in school, difficulties due to accident, sickness, or death, and bereavement may all fall under this category. Positive alterations like job advancements, marriage, or home purchases may sometimes be stressful circumstances. Everyone suffers stress since it is a common occurrence in life. The level, frequency, and duration of stress will vary from person to person, however.

Self-care activities are crucial for lowering stress. Eat healthily, exercise often, attempt to eliminate negativity, prioritize leisure time, limit alcohol and caffeine intake, abstain from smoking and other drugs, and practice excellent sleep hygiene are some effective approaches to manage and reduce stress.

Below are some more suggestions for coping with stress and reducing negative effects:

a. Organizing, prioritizing, and assigning tasks
b. Enlisting the aid of loved ones and friends
c. Participating in a support group or stress management course, seeking medical advice, or using self-help resources.

A person feels stronger and more equipped to recover from stress once they experience emotional well-being. They feel more capable of handling challenging life circumstances as a result.

An anxiety disorder may have symptoms of extreme stress. If you are experiencing increased stress and emotional issues, or if the signs and symptoms of stress have been present for a while and are affecting your functioning at job, school, home, or in social situations, get professional treatment. Chronic stress may be rehabilitated.

5.4 Sustainability Plan

At this point, the majority of my work is gathering information from college students. After cleaning and sorting the data, we put it through six different algorithms for training and then extracted its test values. In the future, I want to make use of selectivity and sensitivity in order to establish which pupils are suffering mental stress and which are not feeling it. I will evaluate how serious the situation is and determine who need particular care.

CHAPTER 6

SUMMARY, CONCLUSION, RECOMMENDATION AND IMPLICATION FOR FUTURE RESEARCH

6.1 Summary of the Study

In this paper, we will use mental stress detection for university students by using a machine learning technique and it's mainly for research work. An important concept of mental stress that is gradually receiving research attention in the fields of neuroscience, medicine, psychology, and related disciplines like sentimental computing is stress. We are researching the mental stress of university students. In order to describe the inter- and intra-individual changeability in the connotation between produced stress levels and environmental events, a cognitive-evaluative component has recently been added to the stress mechanism. University students, from studying to family pressure, many times because the number of members of the family is more, students have to bear the expenses of the family and her. Also, there are many other issues of mental stress. We basically did a survey on these. In this research, we will use machine learning algorithms to detect the mental stress of university students and try to know how many percentages of students are suffering from mental stress among 100% of students.

6.2 Conclusions

We specifically looked at the stress that children experience at school, their personal stressors, and their nervousness while speaking with their teachers. We anticipated that the engagement and communication in the classroom would be different for kids who were experiencing more stress and anxiety. Whether or if students choose their values matters little in the present topic; what is important is the discrepancy between how learner empowerment is conceptualized and how it is operationalized. The idea of learner empowerment has a strong conceptual foundation but a problematic operationalization, according to an analysis of the literature in this field by instructional researchers. Mental stress may have an effect on students' emotional well-being, social skills, and academic achievement. There are many different causes of mental stress among university students. We can assess the stress level by using the machine learning

technique. In this work, we employed train and test cases to detect mental stress using a dataset of 1632 students. Following that, we used six classification algorithms to the dataset: Decision Tree Classifier, Random, Forest Classifier, SVC, KNN Classifier, Multinomial NB, and K-Nearest Neighbors Regressor. With the highest test result of 0.99, we found that the Decision Tree Classifier and Random Forest Classifier outperformed the other five approaches. Using analysis and stress detection algorithms like Decision Tree Classifier and Random Forest Classifier with more precise results may help university students' mental health. We anticipated that the levels of interest among students would vary depending on how much they worry generally, how much stress they are experiencing in their personal life, and how much anxiety they display while speaking with their teachers.

The majority of pupils probably experience stress related to school at some point. Stress levels rise when pupils feel the information to be important. Additionally, stress encourages pupils to interact with their teachers more. More so than students' propensity to worry generally or their concern about talking with their instructors, students' feelings of stress about school have an impact on meaningfulness and their motivations for communicating. Perhaps a reasonable level of stress is not harmful to a student's progress since meaningfulness and some of the reasons have been demonstrated to be positively associated to learning results. Further research must be done to determine what constitutes "normal" levels of stress and how educators could lower the excessive levels of stress that some students report.

6.3 Implication for Further Study

This research examined the relationship between mental stress and employee stress and job performance using self-esteem and work-technology conflict as mediating variables. college students This research addresses other problems brought on by mental stress, such as mental pressure invasion and fatigue. The topic of my research paper is not how to recuperate from mental stress since it has not been discovered or recognized. In the future, I wish to work on these topics. In the future, I'll strive to add more novel ideas to the paper. Future research may examine the adverse impacts of

pressure, such as familial pressure, on students' mental stress. On the other hand, based on individual roles or variations in personality characteristics (such as extroversion), the drawbacks of technology addiction, family pressure, financial difficulties, and strained relationships, etc. Each has a distinctive impact on the various kids. Future research may increase its scope and incorporate mental stress components as predictors, causes, or buffers. Due to cultural variations, future research may look at many cultures to increase the generalizability of this study's results. The Perceived Stress Scale (PSS) test may be used to determine the degree of stress. If a person is experiencing significant levels of mental stress, one may undertake an initial analysis to assist them during the early phases of stress. Future research may help people become more mentally sound and enhance their mental health by discovering cheaper, more precise approaches like PSS.

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