NEW HORIZON COLLEGE OF ENGINEERING

Autonomous College Permanently Affiliated to VTU, Approved by AICTE & UGC
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A PROJECT PHASE-1 REPORT (20CSE78A)

ON

"PROJECTIVE EXPLORATION ON INDIVIDUAL STRESS LEVELS BY USING MACHINE LEARNING "

Submitted in partial fulfillment for the award of the degree of

BACHELOR OF ENGINEERING

IN

COMPUTER SCIENCE AND ENGINEERING

BY

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Academic Year:2021-22

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CERTIFICATE

It is hereby certified that the project phase-I work entitled "**Projective Exploration on Individual Stress Levels using Machine Learning**" is a bonafide work carried out by **BHAVYA B (1NH18CS712), KOTHA SREEJA (1NH18CS728), BHARGAVI P (1NH18CS735)** in partial fulfilment for the award of **Bachelor of Engineering** in **COMPUTER SCIENCE AND ENGINEERING** of the New Horizon College of Engineering during the year **2021-2022.** It is certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in the report deposited in the departmental library. The project report has been approved as it satisfies the academic requirements in respect of project work prescribed for the said degree.

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 Signature of Guide   Signature of HOD

(Mr. S. Nagendra prabhu)   **Dr. B. Rajalakshmi)**

SEE Viva

      Name of Examiner   Signature with date

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2.………………………………………………   …………………………………………..

Projective Exploration- 15

14%
SIMILARITY INDEX

%
INTERNET SOURCES

14%
PUBLICATIONS

%
STUDENT PAPERS

PRIMARY SOURCES

1	Sami Elzeiny, Marwa Qaraqe. "Blueprint to Workplace Stress Detection Approaches", 2018 International Conference on Computer and Applications (ICCA), 2018 Publication	2%
2	Ms. Sumathi, Dr. B.. "Prediction of Mental Health Problems Among Children Using Machine Learning Techniques", International Journal of Advanced Computer Science and Applications, 2016 Publication	2%
3	Pramod Bobade, Vani M.. "Stress Detection with Machine Learning and Deep Learning using Multimodal Physiological Data", 2020 Second International Conference on Inventive Research in Computing Applications (ICIRCA), 2020 Publication	2%
4	Christina S. Malfa, Katerina Karaivazoglou, Konstantinos Assimakopoulos, Philippos Gourzis, Apostolos Vantarakis. "Psychological	2%

ABSTRACT

Recently, Stress Prediction in every individual based on their profile and behaviour is a challenging task in the current sector. Current system is a manual process where it is difficult to identify the stress in the college students or employees. There is no automation for any stress prediction. System uses machine learning algorithms or AI algorithms to find out the stress levels, these technologies are used for application development. The purpose of this project is to reduce stress in students and employees. Computer science has come a long way in the last few years. It is massive and multifaceted. It has been used in a variety of applications to meet the basic needs of human society. In the field of healthcare, machine learning has made significant progress. Stress is a deadly disease that kills a large number of people worldwide. We examine how machine learning techniques can assist reduce the risk of stress prediction, which can lead to accidents, in this study.

Keywords:
Machine Learning, ASP.NET, Stress detection, social communication, Labelled and unlabelled data set.

ACKNOWLEDGEMENT

The satisfaction and euphoria that accompany the successful completion of any task would be impossible without the mention of the people who made it possible, whose constant guidance and encouragement crowned our efforts with success.

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 I would also like to thank Dr**. B. Rajalakshmi**, Professor and Head, Department of Computer Science and Engineering, for her constant support.

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Finally, a note of thanks to the teaching and non-teaching staff of Dept of Computer Science and Engineering, for their cooperation extended to me, and my friends, who helped me directly or indirectly in the course of the project work.

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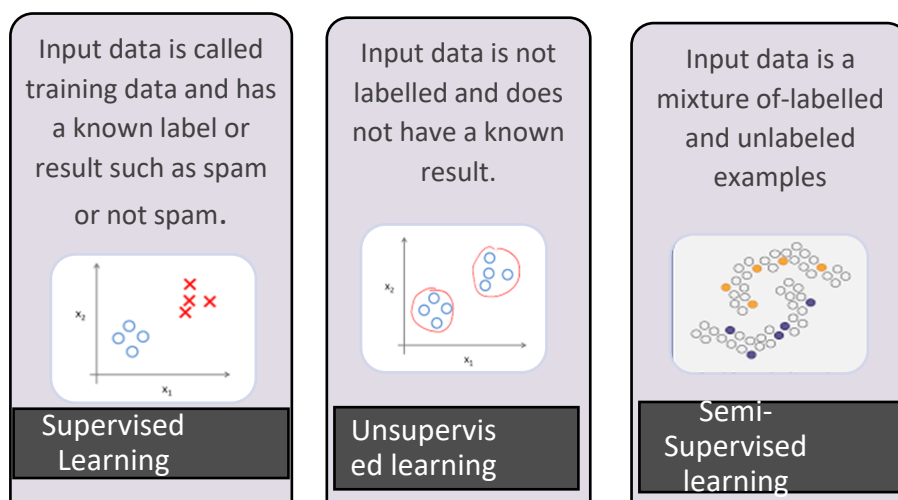# LIST OF FIGURES

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CHAPTER 1

INTRODUCTION

1.1   DOMAIN INTRODUCTION

Stress is regarded as a major issue that is used to create an imbalance in the life of every character and it is additionally regarded as a trouble 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. The ratings that are given by the students on their educational groundwork are recorded. The students would then be given awareness on the theme of stress management to make them reap a superb consequence positively in their final examinations. The rankings of the students are checked based on the performance in their exams so that their stage of stress can be determined accurately. Todecrease the individual stress rate, human societies have been in a position to boosta complete stage of progress in monitoring the stress stage of students and make them score well in academics. The development of the youthful era is viewed as the development of the country's future.

Machine learning is a type of artificial intelligence that allows software applications to become more accurate at predicting outcomes without being explicitly programmed. Machine Learning is a subset of Artificial Intelligence which trains the model without human Intervention. Machine learning is a subset of AI which allows a machine to automatically learn from past data without programming explicitly. To do so, Machine learning algorithms use historical data as input to predict new output values.

It has been categorized into

- Supervised learning

- Unsupervised learning

- Semi- Supervised learning

Input data is called training data and has a known label or result such as spam or not spam.	Input data is not labelled and does not have a known result.	Input data is a mixture of-labelled and unlabeled examples
Supervised Learning	Unsupervised learning	Semi-Supervised learning

Fig 1. Learning algorithms

In the understudies of students such as graduate, undergraduate, postgraduate, and professional students, machine learning allows for the prediction of the potential of stress prediction. We examine the effectiveness of machine learning algorithms in reducing the risk of stress prediction, leading in early treatment of under studies students, in this work.

1.2   PROBLEM DEFINITION

Today's culture, the number of people suffering from stress is steadily increasing. Stress Prediction in every individual based on their profile and behavior is a challenging task in the current sector. Current system is a manual process where it is difficult to identify the stress in the individuals. There is no automation for this type of stress prediction.

Nowadays, stress became a major problem and sometimes it may response in positively or negatively. Now a days the word stress became a major thing which leads to different health problems when it crosses certain level, it complexes day by day.

Now a days both females and males can be introverts. Introverts suffer because they don't understand themselves and they aren't understood when surrounded by extroverts. So, this project helps them, an introvert may believe that going through an experience in great detail will eventually result in figuring out what went wrong according to those suggestions will be given and help them from stress.

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. Individual family background has been conceptualized as a major play that has been taking a path from childhood. Children who are residing in rural or cities are consistently pursuing an exclusive environment. The rural students are normally intended to have low grade because of financial issues and family issues. The fulfilment of the faculty and students is majorly structured on both faculties instructing and learning at home.

1.3   OBJECTIVES

- Proposed system is a real time application.
- The model classifies the students into Stressed and Stress Free.
- Proposed system gives better decisions and also improvises the business.
- Proposed system makes use of data science technique "classification rules" for predicting stress among individuals.
- Major objective is to identify the college students who are in stress using data science techniques.
- Identifying stress in college students and their stress percentages and taking precautionary measures to overcome plays a vital role inthe current educational sector and thus we can improve the student's performance.

1.4   SCOPE OF THE PROJECT

- Proposed system is meant for stress prediction. System build using "VisualStudio" as front-end technology and "SQL Server" as back-end technology.
- According to the literature review, data mining tools have not yet been widely used to analyses stress issues thereby, we use machine learning techniques to overcome this stress issue
- It might manifest as either eustress or distress. Eustress has a beneficial effect, whereas distress has a negative effect. A pattern formed by cognitive, emotional, behavioral, and physiological responses to negative and toxic characteristics of a stressed organization and environment. It's the outcome of misalignment between people and their jobs, as well as interpersonal friction.
- This will assist students, employees, and all individuals in objectively determining the correct vision for themselves. From a psychological standpoint, self-reported measurements are the most common way to assess stress

CHAPTER 2

LITERATURE SURVEY

2.1 TECHNOLOGY

2.1.1 .NET FRAMEWORK

The .NET Framework is a new computing platform that simplifies application development in the highly distributed environment of the Internet. The .NETFramework is designed to fulfil the following objectives:

- To provide a consistent object-oriented programming environment whether object code is stored and executed locally, executed locally but Internet- distributed, or executed remotely.

- To provide a code-execution environment that minimizes software deployment and versioning conflicts.

- To provide a code-execution environment that guarantees safe execution of code, including code created by an unknown or semi-trusted third party.

- To provide a code-execution environment that eliminates the performance problems of scripted or interpreted environments.

- To make the developer experience consistent across widely varying types of applications, such as Windows-based applications and Web-based applications.

- To build all communication on industry standards to ensure that code based on the .NET Framework can integrate with any other code.

The .NET Framework has two main components:

- The common language runtime and
- The .NET Framework class library

The common language runtime is the foundation of the .NET Framework. The runtime can be thought as an agent that manages code at execution time, providing core services such as memory management, thread management, and remoting, while also enforcing strict type safety and other forms of code accuracy that ensuresecurity and robustness. In fact, the concept of code management is a fundamental principle of runtime. Code that targets the runtime is known as managed code, while code that does not target the runtime is known as unmanaged code.

The class library, the other main component of the .NET Framework, is a comprehensive, object-oriented collection of reusable types that you can use to develop applications ranging from traditional command-line or graphical user interface (GUI) applications to applications based on the latest innovations provided by ASP.NET, such as Web Forms and XML Web services.

2.1.2 INTRODUCTION TO ASP.NET:

ASP.NET is a unified Web development platform that provides the services necessary to build enterprise-class Web applications. While ASP.NET is largely syntax compatible with Active Server Pages (ASP), it provides a new programming model and infrastructure that allows to create a powerful new class of applications. ASP.NET is part of the .NET Framework and allows to take full advantage of the features of the common language runtime, such as type safety, inheritance, language interoperability, and versioning.

2.1.3 INTRODUCTION TO C#:

C# (pronounced as 'C Sharp') is a new computer-programming language developed by Microsoft Corporation, USA. C# is a fully object-oriented language like Java and is the first Component-oriented language. It has been designed to support the key features of .NET Framework, the new development platform of Microsoft for building component-based software solutions. It is a simple, efficient, productive and type-safe language derived from the popular C and C++

languages. Although it belongs to the family of C/C++, it is a purely object-oriented, modern language suitable for developing Web-based applications.

C# is designed for building robust, reliable and durable components to handle real-world applications. Major highlights of C# are:

- It is a brand-new language derived from the C/C++ family.

- It simplifies and modernizes C++.It is the only component-oriented languageavailable today.

- It is the only language designed for the .NET Framework.

- It is a concise, lean and modern language. It combines the best features of many commonly used languages: the productivity of Visual Basic, the powerof C++ and the elegance of Java.

- It is intrinsically object-oriented and web-enabled.

- It has a lean and consistent syntax.

- It embodies today's concern for simplicity, productivity and robustness.

- It will become the language of choice for .NET programming.

- Major parts of .NET Framework are actually coded in C#.

2.1.4 ADO.NET - DATABASE CONNECTIVITY:

Most applications need data access at one point of time making it a crucial component when working with applications. Data access is making the application interact with a database, where all the data is stored. Different applications have different requirements for database access. ASP.NET uses ADO .NET (Active X Data Object) as its data access and manipulation protocol which also enables to work with data on the Internet.

2.1.5 INTRODUCTION TO SQL SERVER:

Microsoft SQL Server is a full-featured relational database management system (RDBMS) that offers a variety of administrative tools to ease the burdens of

database development, maintenance and administration. Most frequently used toolsinclude, Enterprise Manager, Query Analyzer, SQL Profiler, Service Manager, Data Transformation Services and Books Online. Enterprise Manager is the main administrative console for SQL Server installations. It provides the client with a graphical "birds-eye" view of all of the SQL Server installations on client's network. High-level administrative functions can be performed that affect one or more servers, schedule common maintenance tasks or create and modify the structure of individual databases.

Query Analyzer offers a quick and dirty method for performing queries against any of your SQL Server databases. It's a great way to quickly pull information out of a database in response to a user request, test queries before implementing them in other applications, create/modify stored procedures and execute administrativetasks.

SQL Profiler provides a window into the inner workings of your database. Client can monitor many different event types and observe database performance in real time. SQL Profiler allows the client to capture and replay system "traces" that log various activities. It's a great tool for optimizing databases with performance issues or troubleshooting particular problems.

Service Manager is used to control the MSSQL Server (the main SQL Server process), MSDTC (Microsoft Distributed Transaction Coordinator) and SQL Server Agent processes.

2.2 EXISTING SYSTEM

In the existing system college students are facing so many mental health problems such as depression, pressure, stress, interpersonal sensitivity, fear, nervousness etc. Though many industries and corporations 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. Current system is a manual process where it is difficult to identify the stress in the college students. There is no automationfor students' stress prediction.

LIMITATIONS OF THE EXISTING SYSTEM

- No Automation for stress prediction
- Less user satisfaction
- Time consuming
- Less Reliable
- Less Efficient
- Manual Process

2.2.1 BASE PAPER

Android platform because of open-source trademark also, Google backing has the biggest worldwide portion of the overall industry. describe that stress among the students they collected the information provided by the students in the form of a quiz or self-rating called a dataset and they used this dataset to make an effective analysis on the stress levels of every student. The information for getting a dataset were collected using both primary as well as secondary fashion. The survey was conducted in the following order such as E-mails, google Drive, survey forms etc., for each questionnaire they provided the students with 5 choices to choose one among them and rate themselves in opinion to their stressful situation. Choice includes: Never, Almost, often, Very Often, Sometimes

Which had its own rating rank so that it would be easy for detecting the stress faced.

Therefore, the data that was collected is being put together and made use on an pss(perceived stress scale). By using this source, they discovered the usage of parameters such as True positive rate, false positive rate, recall and f-score.

The formulas for the above is as follows:

TP=True positive, FN=False negative, P=precision.

- TP = TP+ TP/TP +FN.
- FP = FP + FP/TN.
- F-score=2*P*recall/P+ recall.

As per this research we found that they used the technologies such as Naive bayes; Random Forest; Bayes' net; logistic regression. On comparing, the tool used was weka tool. The overall results on considering various techniques, calculations and comparing we get the following result that is Bayes' net classifier gives the highest accuracy amongst all the other algorithms and provided the final accuracy as 88.5965% as an overall percentage for a particular student's stress level.

Decision Tree: A Decision tree is an ML procedure that groups or relapses the information by making arrangement rules for the trees. A Decision tree is directed by a preparation case in which data is addressed by a tuple and the class mark of the characteristic qualities is recorded. Attributable to the tremendous space to be recovered, a tree is normally directed via preparing information and void trees and into covetous, hierarchical, and recursive cycles. The tree is made involving processes that best segment the preparation information as the root parting characteristic. The preparation information is then divided into disjoint subsets that fulfil the upsides of the parting characteristic. Attributable to the inconvenience of effectively overfitting the trees, pruning might be applied while executing the calculation, or a few trees may be taken out to frame summed up outcomes.

Random Forest: A Random Forest is a classifier comprising of an assortment of uncorrelated tree structure classifiers planned by L. Bierman. Each tree has the trait of tracking down arrangements while deciding in favors of the most summed up class for input qualities. A regulated learning calculation prepared to utilize the sacking strategy

assembles different choice trees and unions them to acquire a more exact and stable expectation.

Decision Table: A Decision table is a straightforward method for archiving various choices or activities taken under various arrangements of conditions. The choice table permits the production of a classifier, which sums up the dataset into a choice table that contains a similar number of qualities as the first dataset and applies the arrangement of new approaching information utilizing the table.

Naive Bayes: Naïve Bayes is a grouping model dependent on the contingent likelihood of a Bayes rule. The autonomous guileless Bayes model depends on assessing and looking at probabilities; the bigger critical likelihood brings up that the real mark is bound to be the class name worth of the bigger likelihood. As the calculation expects that the prescient characteristics are restrictively autonomous given the class, and it sets that no covered-up or dormant traits impact the forecast interaction, it is hard to apply to information reliant upon various classes through explicit properties.

MLP: A multi-layer perceptron (MLP) involves omnidirectional counterfeit neural organizations for learning. The neural organization structure is introduced in three sections: the info layer stowed away layer, and the result layer. The information layer gets the information, the secret layer is determined through an enactment work, and the result layer shows the consequences of grouping/relapse. Although the information/yield layers of the model exist separately, the secret layer can be stacked as different layers. It is additionally realized that the more deeply a model is, the more summed it up can be in contrast with a shallowly stacked model.

SVM: A Support vector machine (SVM), otherwise called a support vector network (SVN), is a learning model for double grouping that encapsulates the possibility that input vectors map non-straight to high-layered components spaces. In this element space, a straight choice surface is developed to guarantee the high speculation capacity of the learning machine attributable to the extraordinary properties of the decision surface.

Logistic Regression: Logistic Regression is an ML method that clarifies how factors with at least two classes are related with a bunch of ceaseless or unmitigated indicators through

likelihood capacities. Dissimilar to customary direct relapse involving straight lines for arrangement, calculated relapse is reasonable for parallel grouping, involving a strategic capacity looking like ex(1+ex) when fitting the information.

AdaBoost: AdaBoost is a helping calculation that joins different powerless classifiers to make a vigorous classifier that expands the exhibition. Not at all like recently proposed supporting calculations, a powerless classifier is described by mistakes returned by the feeble classifier, which influences the focal point of the frail classifier on the hazardous instances of the preparation set, permitting it to more readily arrange the characteristics.

K-NN: As the key guideline of a K-closest neighbour (K-NN), if a large portion of the examples around the information on a point in a specific space has a place with a particular classification, the information on that point can be decided to fall into that class. The K-NN calculation works by checking the name of the suitable quantities of tests nearest to the information being ordered and along these lines marking the information as the most amassed of the samples.
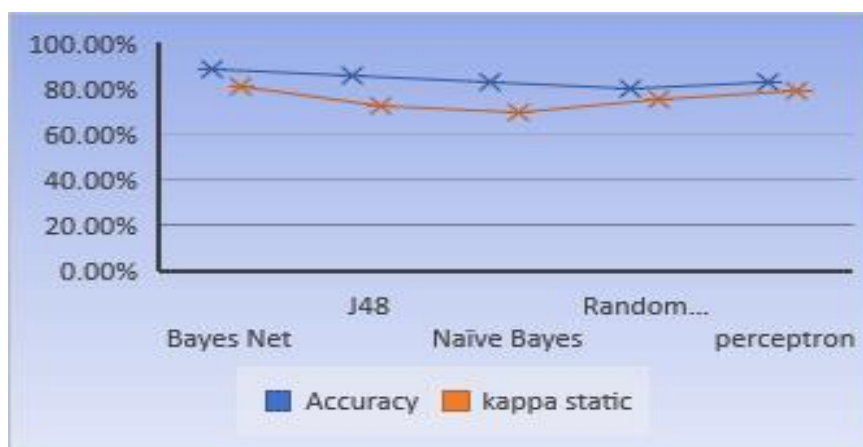

Fig .2.1 Algorithms based graph

2.2.2 RELATED REFERENCE PAPERS

Authors **Jarernsri Mitrpanont et al. (2017) [2]** presents a method to create Emotive Device which defines BCI (Brain Computer Interface) technology is used to assess the values that are sensed by sensors which are placed on human scalp. The basic health Questions are a set of 30 questions used to assess stress levels.

The features of this project is:

- Device

- Detect Stress

- Intervention

- results and Observation data report.

Android 4.4, SQLITE, Adobe photoshop, Bluetooth to connect with emotive device, Java programming language these are the following techniques used in this project. Thus, concentration, relaxation and therapy of music interventions are all included in the proportion of stress. To summaries, this paper it found to be a very important tool for assisting individuals in coping with their own stress by utilizing the most successful approach known as "Neurofeedback," which gives a perfect option in treating and matching with each and every individual.

Authors **Enrique gorcia et al. (2015) [3]** compares the methods to Auto detect stress among the working environments, they collected the information based on behavioral data which was provided by using the built-in sensors, especially with the use of Samsung galaxy STTI mini smartphones. This dataset was collected in the form of smartphones, written format using applications. From the survey conducted for each questionnaire which resulted in the form of low, medium and high, also it is found that it can identify the rate of stress levels day by day with the help of a smartphone. In accordance with this paper, we found that the technologies used were Naive bayes; and decision trees. By considering various techniques their experiment included 19subjects. Thus, the overall accuracy was found to be 75% which was the first thing on evaluating the potential from mobile phones as a stress detector in the in environment.

Authors **MS. Sumathi M. R and Dr.B. Poorna (2016) [4]** proposed the method to predict attention problems, academic problems, anxiety problems, POD. In order to predict this, they used Weka tool and artificial intelligent techniques such as Aodesr, multilayer perceptron (MLP), lestar, multi-class classifier (MCC), Ft and Lad tree. This collected information is formed as a dataset with 60 instances.

Therefore, the overall accuracy classifies into different areas such as Kappa statistics, accuracy, and loc area, on comparison among all the attributes and the selected attributes the highest accuracy was found in multilayer perceptron, multi-class classifier and LAD tree.

Authors **Xiyu Liu et al. (2020) [5]** demonstrates model predict the stress among the college students they collected the information provided by the students in the form of a questionnaire which is designed in the form of four dimensions:

- General Demographic
- Epidemic presentation
- Control in the region
- Psychological stress

They used spss statistics 25.0 software for calculating accuracy. By calculating stress level using above choices, it results the emotional display like worry, tension, anxiety, depressed, fear and mood swings. Thus, they can measure of mental health of a student in a covid pandemic through this project.
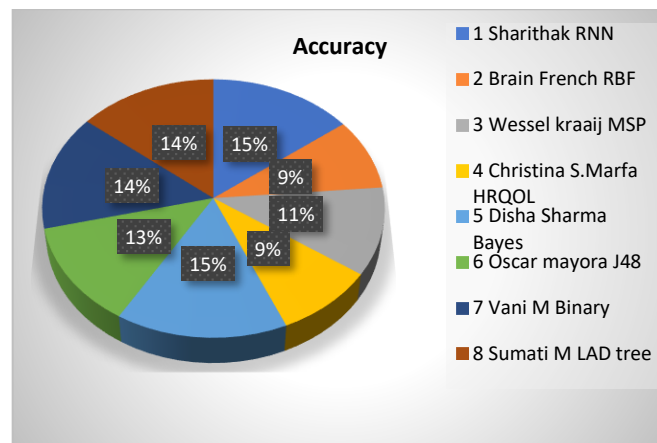
Fig .2.2 Accuracy differentiation

Authors **Yuan Shi et al. (2019) [6]** described We build a personalized stress detecting model based on SVM, and examined it on the collected data. We examine topics like continuous data, non-intrusive detection of physiological measures, involving data collection, feature extraction, and model construction. The concepts which was ECG, GSR, RIP, EMA, RBF kernels.

- Sessions in the lab study.

- EMA questions and possible answers.

- Features extracted from sensor data

- Numbers of +ve and -ve from subjects

- Average and standard errors of precision values

The final result the precision–recall curve of the stress detection model with personalization, segment-based features, and RBF kernel. Even at 100% recall, the model can still achieve high precision over 50%.

Authors **Saskia Koldijk et al. (2021) [7]** compares the Employees often record their experience of stress at work. This is a literature survey on the paper which is done based on ML, mental stress inference, computer log, detection of facial expressions, gestures and posture.

- There are many options on how to deal with the aspect of time.
- There is debate on whether subjective ratings provide a good ground for truth.

The final performance of Accuracy is 0.8416 which has been reached.

Authors **S. Malfa et al. (2021) [8]**Suggests the health-related quality of life and psychological stress between public sector and professional groups.

1.Other main characteristics of the participants by this professional group include.

2.Anxiety, depression and HRQoL are the scores (means and SD) by professional category and between- group comparisons.

Authors **Simhadri Naga Mounika et al. (2019) [9]**The purpose of this paper is that Stress plays a very crucial part in our daily life. This is a literature survey on the paper which is done based on the deep learning concepts those are CNN, RNN, DNN algorithms, FGM for the graph implementation model, SVM for the vector machine, and finally with the neural network. The accuracy is predicted based on the percentage of positive, negative and Neutral.The highest accuracy is 81.6 for RNN and for CNN is 69.8.

Authors **Pramod Bobade, et al. (2020) [10]** demonstrates the task was divided into three categories: amusement, baseline, and stress using Dl and ml. The non-stress class was

created by combining the amusement and baseline states. Second, the non-stress class was created by combining the amusement and baseline states.

In order to predict this, they used WESAD dataset study. This dataset includes Data from numerous physiological modalities such as 3-axis acceleration (ACC), respiration (RESP), and volume blood pulse are also included in the WESAD dataset However during the overall analysis, machine learning techniques yielded accuracy of 81.65 % and 93.20 % for 3-class and binary classification problems and deep learning yielded accuracies up to 84.32 % and 95.21 %, and this was finally predicted as the overall outcome of this paper

CHAPTER 3

ANALYSIS OF REVIEWED PAPERS

- ✓ Disha sharma et al. (2020) [1]:The overall results on considering various techniques, calculations and comparing we get the following result that is Bayes' net classifier gives the highest accuracy amongst all the other algorithms and provided the final accuracy as 88.5965% as an overall percentage for a particular student's stress level.

- ✓ Jarernsri Mitrpanont et al. (2017) [2]:To summaries, this paper it found to be a very important tool for assisting individuals in coping with their own stress by utilizing the most successful approach known as "Neurofeedback," which gives a perfect option in treating and matching with each and every individual.

- ✓ Enrique gorcia et al. (2015) [3] :The overall accuracy was found to be 75% which was the first thing on evaluating the potential from mobile phones as a stress detector in the in environment. They collected the information based on behavioural data.

- ✓ MS. Sumathi M. R and Dr.B. Poorna (2016)[4]:They used Weka tool and artificial intelligent techniques such as Aodesr. This collected information is formed as a dataset with 60 instances. Therefore, the overall accuracy classifies into different areas such as Kappa statistics.

- ✓ Xiyu Liu et al. (2020) [5] :They collected the information provided by the students in the form of a questionnaire which is designed in the form of four dimensions are General Demographic,Epidemic presentation, Control in the region,Psychological stress.

- ✓ Yuan Shi et al. (2019) [6] :The final result the precision–recall curve of the stress detection model with personalization, segment-based features, and RBF kernel. Even at 100% recall, the model can still achieve high precision over 50%.

- ✓ Saskia Koldijk et al. (2021) [7]:It compares the Employees often record their experience of stress at work. This is a literature survey on the paper which is done based on ML, mental stress inference, computer log, detection of facial expressions, gestures and posture.

- ✓ S. Malfa et al. (2021) [8]:Suggests the health-related quality of life and psychological stress between public sector and professional groups. Other main characteristics of the participants by this professional group include anxiety, depression.

- ✓ Simhadri Naga Mounika et al. (2019) [9]:This is a literature survey on the paper which is done based on the deep learning concepts those are CNN, RNN, DNN algorithms, FGM for the graph implementation model.

- ✓ Pramod Bobade, et al. (2020) [10] :In order to predict this they used WESAD dataset study. This dataset includes Data from numerous physiological modalities such as 3-axis acceleration (ACC), respiration (RESP).

CHAPTER 4

REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENTS

Administrator - The one who maintains the whole application, having fullauthority.

Students- Service receivers and who can post any queries to admin.

4.1.1 ADMINISTRATOR FUNCTIONALITIES:

- Login Module – The admin gets access to the admin portal by input of his/her Login Credentials.

- Add Students – The Admin can record the details of every student of variousdepartments. Upon addition of each student record, the automatic email will be sent to the respect individual with their login Credentials.

- View Students –The records of each student will be displayed and with the availability of edit or delete option the admin can either update or delete the record of particular student.

- Prediction Module –This is the core module where the percentage of stress isdetected in bulk of the testing dataset with the help of a Machine Learning technique called as K- Nearest Neighbour's (KNN) algorithm. The testing dataset has been imported to this module from the excel sheet. The various stress percentages of each testing dataset record is classified as Stress-free and Stressful and further classified into the percentage of stress and isencoded and displayed. The Percentage of stress is also graphically Visualized.

- Profile Updation – Admin can change his/her password for security reasons.
- Queries – The queries posted by the particular student is stacked under the pending queries section in the admin's portal. The admin replies to each query. The queries replied by him/her will bedisplayed under

answered queries section.

- Sign-out

4.1.2 STUDENT'S FUNCTIONALITIES:

- Login module - Students can login to the website using their credentials given by the admin.
- Stress prediction Module - Various parameters are enlisted and is visible to the students. Students can input these parameters to predict their stress level.The obtained result is categorized into stressful and stress free and thestressful result is further classified into the percentage of stress and also represented graphically. Each parameter can be described as:
- Parameters List:

SL No	Factors	Sub Factors	Encoded Values
1	Gender		• 1-Male • 2-Female
2	Financial Issues	•Repaying of loans •Deadline of fee payment •Payment For Paying Guest(PG) or Hostel	• 0-No • 1-Yes
3	Family Issues	•Parental Expectations •Being bullied by siblings •Divorce of Parents •Negligence of Children •Poor Communication and misunderstandings	• 0-No • 1-Yes
4	Study Hours		• 1 • 2 • 3…….etc
5	Teaching Method		• 0-Fair • 1-Not Good

6	Health Issues	•Malnutrition •Sinus or Migraine •Insomnia (Sleep deprivation	• 0-No • 1-Yes
7	Partiality Fix		• 0-No • 1-Yes
8	Exam Schedule		• 1-Monthly • 2-Half • 3-yearly • 4-Annual • 5-Slip Test
9	Friends Issues	•Conflicts •Comparison between them •Jealousy •Mistrust •Betrayal	• 0-No • 1-Yes
10	Pressure		• 0-No • 1-Yes
11	Regular	1. Hostler •Home Sick •Lack of nutritious food •Lack of Resources 2. Localite •Time management •Transportation Problem	• 0-No • 1-Yes
12	Interaction		• 1-Excellent• 2-good• 3-Average• 4-Poor

- Solution module- Students find the solution proposed by the admin and can adopt this for reduction of mental stress.
- Post queries- Students can post their queries and grief. The queries which areyet to be replied by the admin are stored in pending Section, and the queries which are answered are stored in the answered section.
- Update Profile-Student can change his/her password.
- Sign-out

4.2   NON-FUNCTIONAL REQUIREMENTS

According to system engineers and requirement engineers, A non-functional requirements are defined as a requirements certain norm which can be utilized to determine the operations / tasks of the system on behalf of actions.

4.3   HARDWARE AND SOFTWARE REQUIREMENTS

HARDWARE REQUIREMENTS

Processor	Pentium IV onwards
Processor Speed	2.4GHz
RAM	2GB+
Hard Disk Space	40GB

SOFTWARE REQUIREMENTS

Operating System	Windows
Design Tool	Visual Studio
Front End	ASP.NET 4.0
Language	C#
SQL Server	SQL Server
Data Access Technology	ADO.NET

CHAPTER 5

DESIGN

5.1 DESIGN GOALS

This phase is the first step in moving from the problem domain to the solution domain. In other words, starting with what is needed, design takes us towards how to satisfy the needs. The design of a system is perhaps the most critical factor affecting the quality of the software; it has a major impact on the later phases particularly testing and maintenance.

5.2 ARCHITECTURAL DESIGN

As a developer, the .NET framework and Visual Studio present many choices for choosing the right architecture, from placing the data access code directly in the UIthrough datasets and data source controls, to creating a data access layer that talks to the database, all the way to creating an n-tier architecture approach that consists of multiple layers, and uses data-transfer objects to pass data back and forth.

This Project is based on three tier architecture.

Three tier architecture consists of three layers. They are:

Data layer:

The key component to most applications is the data. The data has to be served to the presentation layer. The data layer is a separate component (often setup as a separate single or group of projects in a .NET solution), whose sole purpose is to serve up the data from the database and return it to the caller. Through this approach, data can be logically reused, meaning that a portion of an application reusing the same query can make a call to one data layer method, instead of embedding the query multiple times. This is generally more maintainable.

Business Layer:

Though a web site could talk to the data access layer directly, it usually goes through another layer called the business layer. The business layer is vital in that it validates the input conditions before calling a method from the data layer. This ensures the data input is correct before proceeding, and can often ensure that the outputs are correct as well. This validation of input is called business rules, meaning the rules that the business layer uses to make "judgments" about the data.

Presentation Layer:

The ASP.NET web site or windows form application (the UI for the project) is called the presentation layer. The presentation layer is the most important layer simply because it's the one that everyone sees and uses. Even with a well-structured business and data layer, if the presentation layer is designed poorly system.

Fig 5.2: Architectural design

The **presentation tier** contains the UI (User Interface) elements of the site, andincludes all the logic that manages the interaction between the visitor and the client's business. (ASP.NET Web Forms, Web User Controls, ASP.NET MasterPages)

The **business tier** receives requests from the presentation tier and returns a resultto the presentation tier depending on the business logic it contains. (C# Classes)

The **data tier** is responsible for storing the application's data and sending it to the business tier when requested. (SQL Server Stored Procedures).

5.3 SYSTEM ARCHITECTURE

Activity diagram is another important behavioral diagram in UML diagram to describe dynamic aspects of the system. Activity diagram is essentially an advanced version of flow chart that models the flow from one activity to another activity.
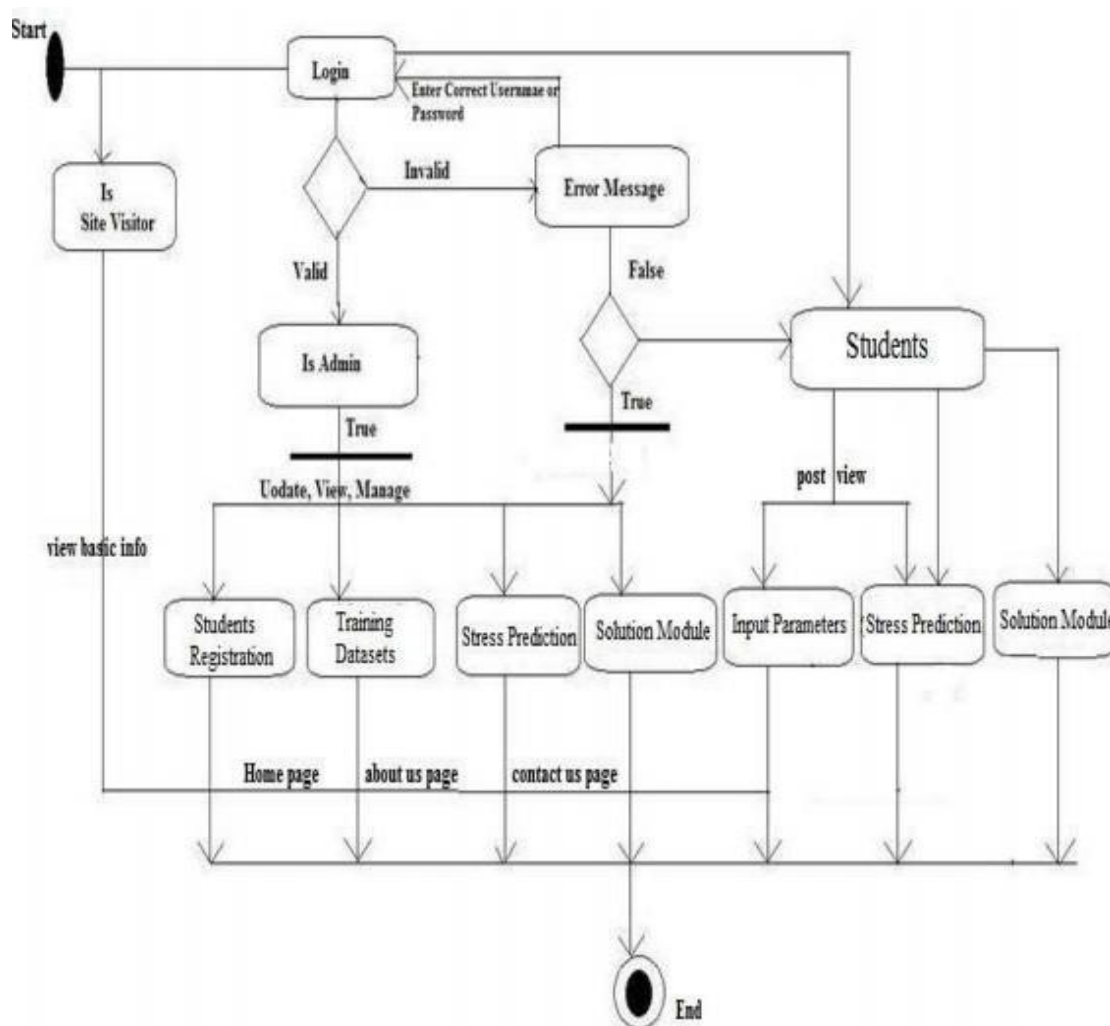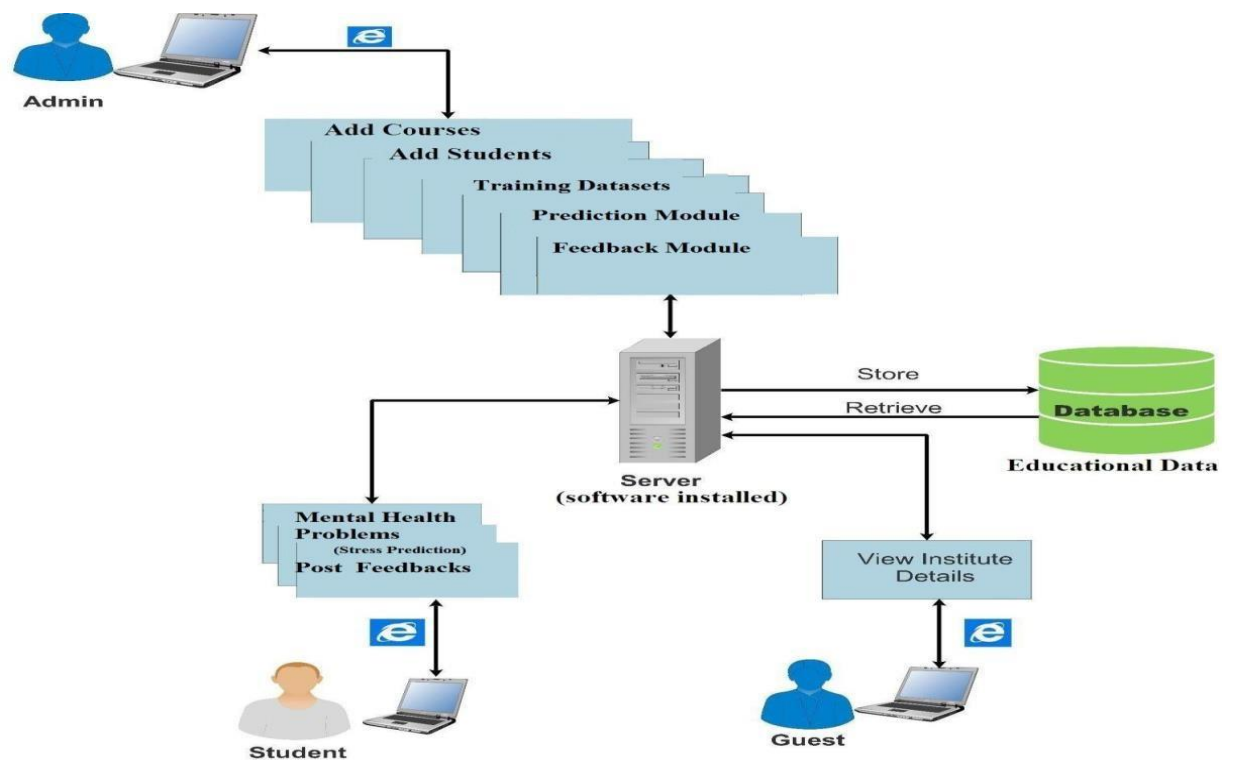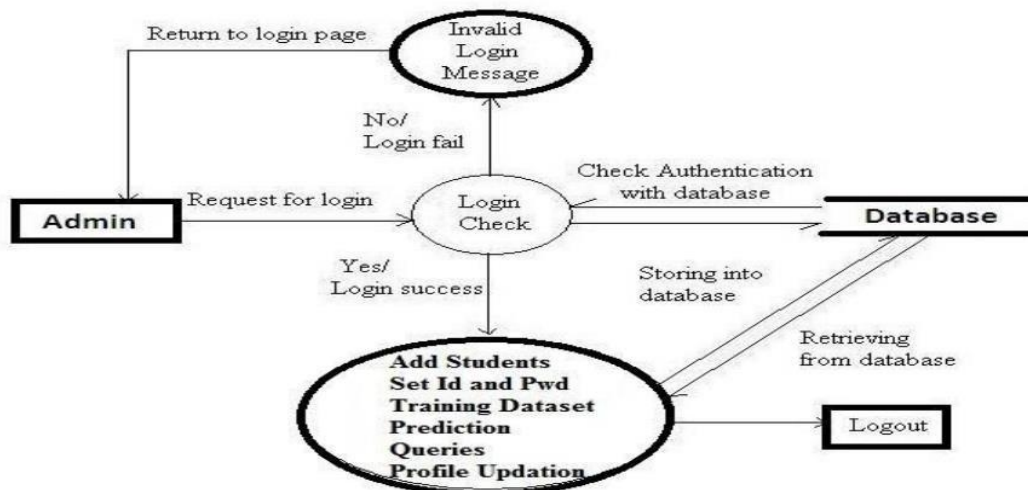

Fig 5.3.1: System framework

**Fig 5.3.2: System architecture**

5.4 DATAFLOW DIAGRAM

Data Flow Diagram (Admin)

Fig 5.4.1: Dataflow diagram for admin

A data flow diagram (DFD) is a graphical representation of the "flow" of data through an information system. DFDs can also be used for the visualization of data processing (structured design).

On a DFD, data items flow from an external data source or an internal data store toan internal data store or an external data sink, via an internal process.

A DFD provides no information about the timing of processes, or about whether processes will operate in sequence or in parallel. It is therefore quite different from a flowchart, which shows the flow of control through an algorithm, allowing a reader to determine what operations will be performed, in what order, and under what circumstances, but not what kinds of data will be input to and output from thesystem, nor where the data will come from and go to, nor where the data will be stored (all of which are shown on a DFD).
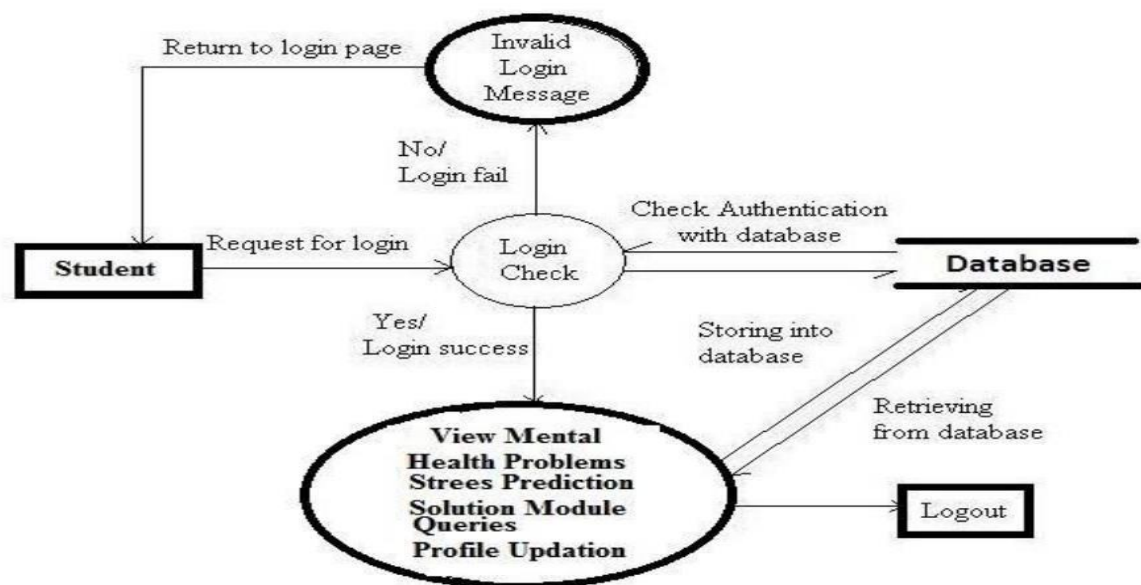

Fig 5.4.2: Dataflow diagram for student
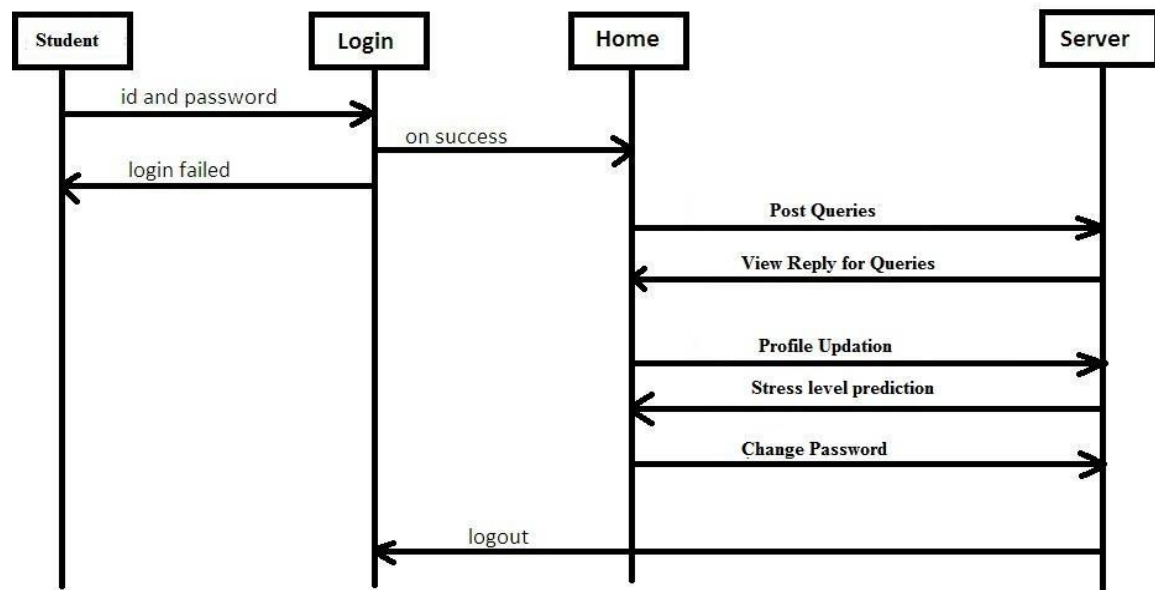
5.5 SEQUENCE DIAGRAM

Sequence diagrams are sometimes called event diagrams, event scenarios, and timing diagrams.

A sequence diagram shows, as parallel vertical lines (*lifelines*), different processes or objects that live simultaneously, and, as horizontal arrows, the messages exchanged between them, in the order in which they occur. This allows the specification of simple runtime scenarios in a graphical manner.
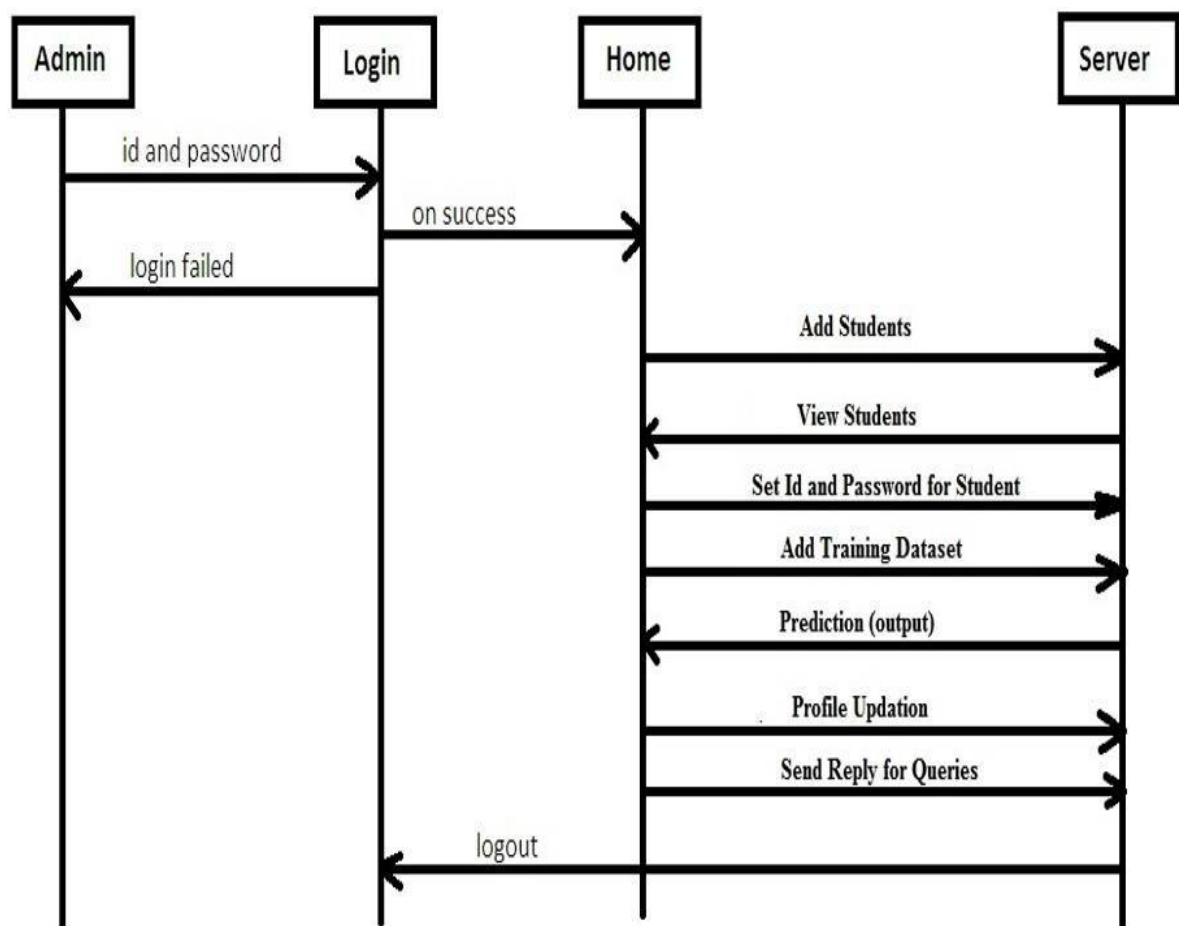
Sequence Diagram - Admin

Fig 5.5.1: Sequence diagram of admin

Fig 5.5.2: Sequence diagram of student

CHAPTER 5

FUTURE WORK

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 (Convoluted Neural Networks) and verify how the model performs for the given datasets.

A much more specific and vaster dataset can be used as a training model since the number of responses is limited in our case.

College students are suffering from many mental health problems including mentalstress, 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

CHAPTER 6

CONCLUSION

- This project helps in predicting the stress levels due to various parameters considered through a survey and it also lists as to whether the students are stress free or stressful and the range of their stress levels.

- The student can incorporate the solution and work towards maintaining his or her mental equilibrium.

- So, this project helps them, an introvert may believe that going through an experience in great detail will eventually result in figuring out what went wrong according to those suggestions will be given and help them from stress.

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