A PROJECT REPORT

ON

STUDENT PERFORMANCE PREDICTION SYSTEM

USING

MACHINE LEARNING

SUBMITTED TO

ROURKELA INSTITUTE OF MANAGEMENT STUDIES

MCA FINAL YEAR

SUBMITTED

BY

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ROURKELA INSTITUTE OF MANAGEMENT STUDIES

(Affiliated to Biju Patnaik University of Technology)

CERTIFICATE

I certify that Sibaprasad Jyotish has completed the project work on "Student Performance Prediction System using Machine Learning" submitted to Rourkela Institute of Management Studies, Rourkela in partial fulfilment of the requirement for the 4th semester of Master of Computer Application is a bonafide work carried out under my guidance.

I wish him all success in life.

Dr. Swatee Rekha Mohanty

Professor, MCA

RIMS

Declaration

I, hereby declare that the project report entitled "Student Performance Prediction System using Machine Learning" is of our work. The above work I submitted to RourkelaInstitute of Management Studies, Rourkela for the award of Master of Computer Application.

To the best of our knowledge, this work has not been submitted or published anywhere for the award of any degree.

Sibaprasad Jyotish

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Acknowledgement

I would like to express my gratitude to Dr. Swatee Rekha Mohanty for is guidance and support during the project work. I am deeply indebted to Rourkela Institute of Management Studies, Chhend, Rourkela, for providing an opportunity to undertake a project work entitled “Student Performance Prediction System using Machine Learning”.

I am grateful to my project guide dr. Swatee Rekha Mohanty without their guidance it would not have been possible on my part to complete the project.
I consider that I have successfully completed this project.

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ABSTRACT

Prediction of student's performance became an urgent desire in most of educational entities and institutes. That is essential in order to help at-risk students and assure their retention, providing the excellent learning resources and experience, and improving the university's ranking and reputation. However, that might be difficult to be achieved for startup to mid-sized universities, especially those which are specialized in graduate and post graduate programs, and have small students' records for analysis. So, the main aim of this project is to prove the possibility of training and modeling a small dataset size and the feasibility of creating a prediction model with credible accuracy rate. This research explores as well the possibility of identifying the key indicators in the small dataset, which will be utilized in creating the prediction model, using visualization and clustering algorithms. Best indicators were fed into multiple machine learning algorithms to evaluate them for the most accurate model. Among the selected algorithms, the results proved the ability of clustering algorithm in identifying key indicators in small datasets. The main outcomes of this study have proved the efficiency of support vector machine and learning discriminant analysis algorithms in training small dataset size and in producing an acceptable classification's accuracy and reliability test rates.

CONTENTS

INTRODUCTION

Today every educational institution handles and deals with large amount of student data which can be beneficial for a number of reasons. One of the important applications of such data is predicting student performance. Such a prediction can be useful not only for the students but also for teachers/mentors. Mentors can provide special assistance to the students who are on the verge of failing. In order to determine which category a student lies; such data can be quite helpful.

This application can be used by any prominent school or colleges. It can be used to predict the pointer ranges or percentage range for future semester exams. These ranges can be predicted using a number of data mining algorithms such as classification algorithms, rule-based algorithms, ensemble methods, and neural networks. The main aim of this project is the selection of features that show a strong relationship with a target attribute that is to be predicted from a high dimensional dataset.

We have evaluated and compared the number of algorithms such as Decision tree, Random Forest, Support Vector Machine by applying them on the dataset.

PROJECT OVERVIEW

Today every educational institution handles and deals with large amount of student data which can be beneficial for a number of reasons. One of the important applications of such data is predicting student performance. Mainly we study about below three points. There are

- To study about and identify the gaps in existing prediction methods.
- To study and identify the variable used in analyzing student performance.
- To study the existing prediction methods for predicting students' performance.

In order to build the predictive modeling, there are several tasks use classification, regression. The most popular task to predict student performance is regression. There are several algorithms like linear regression, support vector machine, Decision tree. Predicting students' performance is mostly useful to help the educators and learners their learning and teaching process.

PROJECT GOAL AND OBJECTIVE

- **GOAL**

Goal importance significantly predicted intention, but not final grade, indicating that perceiving a performance goal as highly, but not necessarily exclusively, important
impacts on students' achievement intentions.

- **OBJECTIVE**

Education is very important issue regarding development of a country. The main objective of educational institutions is to provide high quality education to its students. One way to accomplish this is by predicting student's academic performance and thereby taking early steps to improve student's performance and teaching quality.
This system aims to predict student's marks using linear regression. The idea behind this analysis is to predict the marks of students by their studying hours.Through this project we can determine:
How many hours need to do the study to get 99% marks.
If I will do study x hours per day so how much marks I will get.
Through these points the school/College can determine the performance of the student.

HARDWARE AND SOFTWARE SPECIFICATIONS REQUIREMENTS

Hardware Specifications

- HDD-1TB
- SSD-256 GB
- Processor- i5
- Windows-11

Software Specification

- Frontend Language - HTML, CSS, JAVASCRIPT
- Backend Language - Python 3.10
- Framework - Django
- CSS Library: Bootstrap

Environment Settings

Python Dependencies:

1. numpy==1.19.2
2. pandas==1.3.1
3. matplotlib==3.3.4
4. scipy==1.5.2
5. seaborn-0.11.2
6. scikit-learn==0.24.2

7.joblib==0.16.0

Deployment Platform: Django ENVIRONMENT SETTINGS

Prerequisite

• Python 3.8 or above

• HTML, CSS, JS

• Microsoft Visual Studio Code

• GitHub

• Windows 10, Windows 11

PROJECT DISCUSSION

Our project is on the topic ‘Student performance prediction’. The main constituents of our project are:

• Data

• Machine learning code

• Deployment code

• Website

• Database

Data:

Data is stored in ‘train.csv, test,csv’ and has 21 columns and 649 rows. The columns are:

SN,Age,Location,famsize

Pstatus,medu,fedu,traveltime

Studytime,failure,schoolsup,famsup,paid activites,nursery

Higher,internet,famrel,freetime,health,abscence

EXPLORATORY DATA ANALYSIS

Before creating the model, we need to know about the data and also the caveats that it holds. So that we can pass the data in a form that the model can learn the best. In analysis statistics plays a huge role and we used descriptive statistics here. We did 2 kinds of analysis:

- Numerical analysis
- Graphical analysis

We did not find any major issues in the data.

First of the we have imported all the required libraries:

```
#importing all the required libraries
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
%matplotlib inline
import seaborn as sns
```

```
from sklearn import metrics
from sklearn.preprocessing import LabelEncoder
from sklearn.model_selection import train_test_split
from sklearn.pipeline import Pipeline
from sklearn.model_selection import GridSearchCV
from sklearn.ensemble import RandomForestClassifier
```

```
# to save model
import joblib
```

This is CSV file data that are train.csv & test.csv

```
#Reading csv file
df = pd.read_csv('data/train.csv')
df.head()
```

	S/N	Gender	Age	Location	famsize	Pstatus	Medu	Fedu	traveltime	studytime	...	paid	activities	nursery	higher	internet	famrel	freetime	health	absences	Score
0	1	F	13	U	GT3	A	4	4	2	2	...	no	no	yes	yes	no	4	3	3	4	22
1	2	F	12	U	GT3	T	1	1	1	2	...	no	no	no	yes	yes	5	3	3	2	31
2	3	F	10	U	LE3	T	1	1	1	2	...	no	no	yes	yes	yes	4	3	3	6	37
3	4	F	10	U	GT3	T	4	2	1	3	...	no	yes	yes	yes	yes	3	2	5	0	42
4	5	F	11	U	GT3	T	3	3	1	2	...	no	no	yes	yes	no	4	3	5	0	37

5 rows × 23 columns

```
df.tail()
```

	S/N	Gender	Age	Location	famsize	Pstatus	Medu	Fedu	traveltime	studytime	...	paid	activities	nursery	higher	internet	famrel	freetime	health	absences	Score
320	321	F	13	U	GT3	T	4	4	1	2	...	no	yes	yes	yes	yes	2	4	4	2	39
321	322	F	12	U	GT3	T	2	2	3	3	...	no	no	yes	yes	yes	4	2	1	8	43
322	323	F	14	R	GT3	T	3	2	1	2	...	no	no	yes	no	yes	3	3	3	0	27
323	324	M	13	U	LE3	T	4	3	2	1	...	no	yes	yes	yes	yes	4	2	1	0	30
324	325	M	13	U	GT3	T	1	2	2	1	...	no	no	no	no	yes	3	4	4	10	31

5 rows × 23 columns

These are all the important attributes

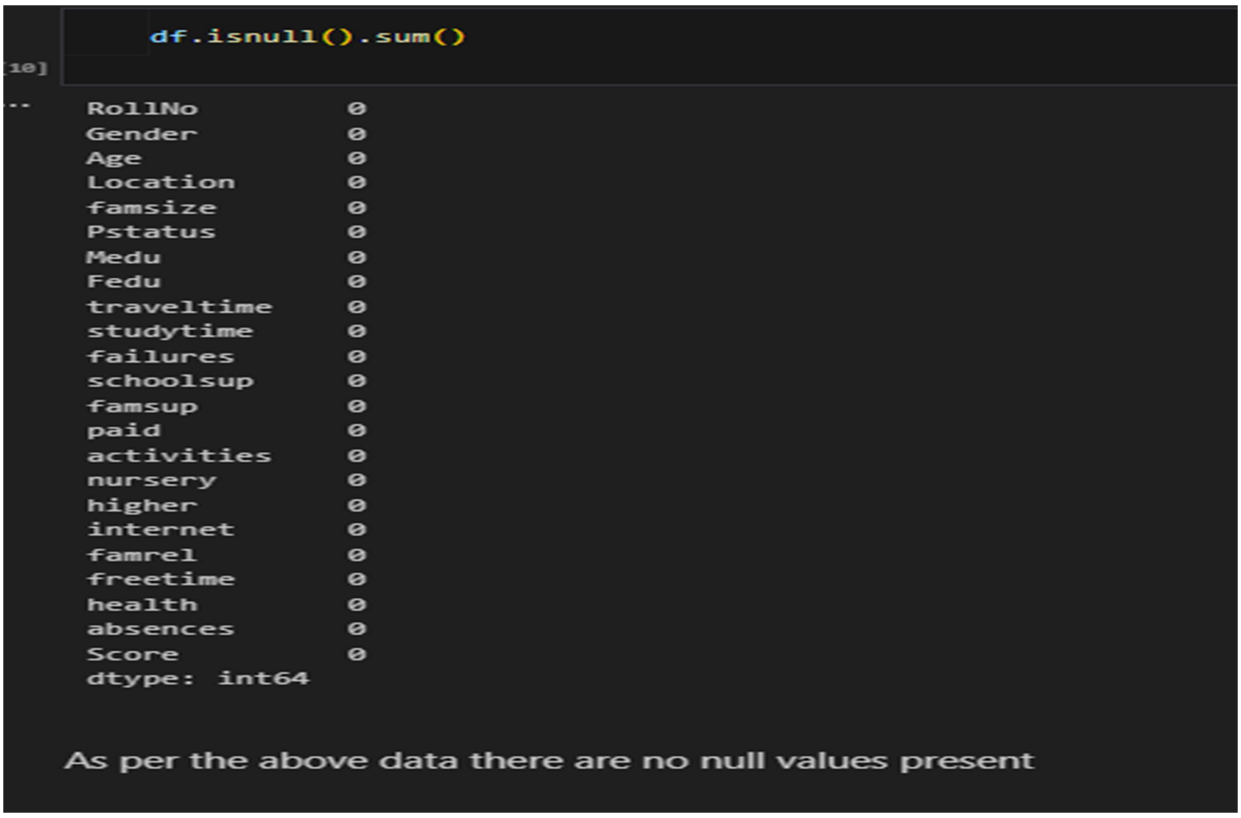
```
df.rename(columns={'S/N': 'RollNo'}, inplace = True)
```

```
#features of the dataset
df.columns
```

```
Index(['RollNo', 'Gender', 'Age', 'Location', 'famsize', 'Pstatus', 'Medu',
       'Fedu', 'traveltime', 'studytime', 'failures', 'schoolsup', 'famsup',
       'paid', 'activities', 'nursery', 'higher', 'internet', 'famrel',
       'freetime', 'health', 'absences', 'Score'],
      dtype='object')
```

```
#Representation of the statistical data
df.describe()
```

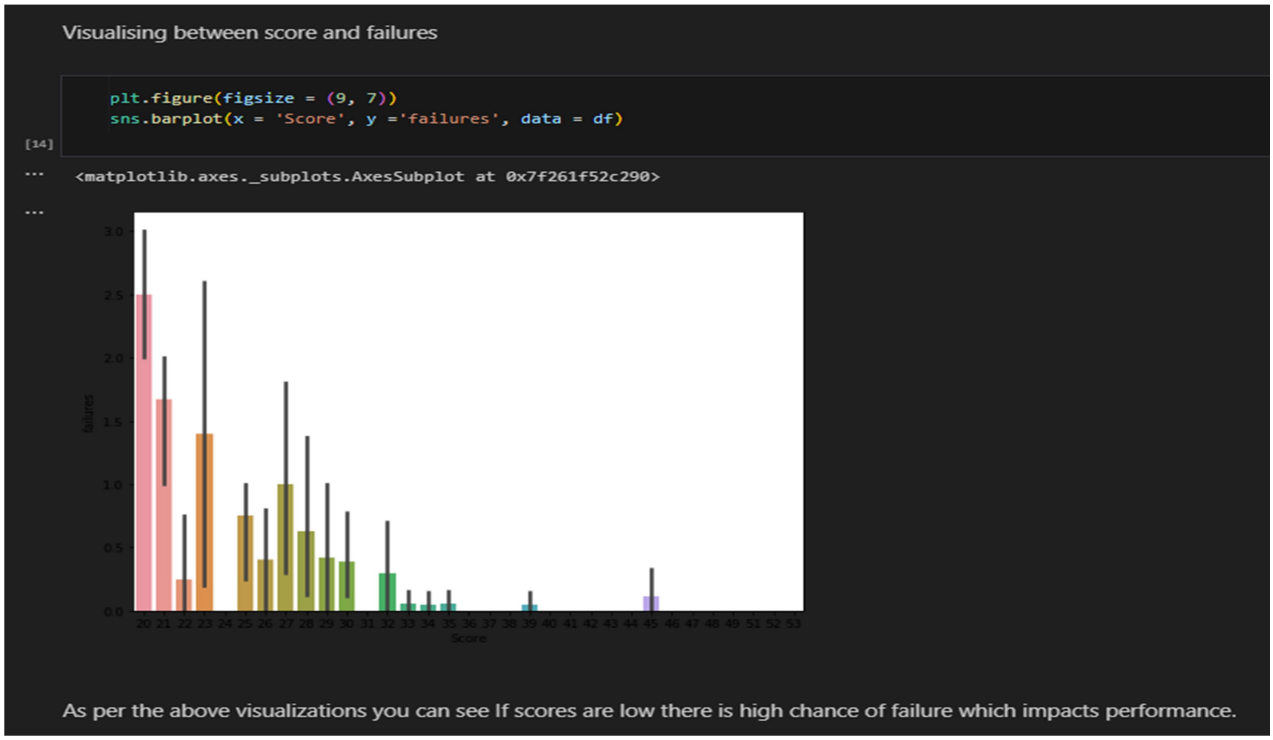
	RollNo	Age	Medu	Fedu	traveltime	studytime	failures	famrel	freetime	health	absences	Score
count	325.000000	325.000000	325.000000	325.000000	325.000000	325.000000	325.000000	325.000000	325.000000	325.000000	325.000000	325.000000
mean	163.000000	11.320000	2.710769	2.476923	1.449231	1.956923	0.184615	3.926154	3.178462	3.590769	4.341538	35.713846
std	93.963645	1.123157	1.086977	1.093015	0.725234	0.819133	0.579812	0.913256	0.987029	1.438634	5.200038	6.732175
min	1.000000	10.000000	0.000000	0.000000	1.000000	1.000000	0.000000	1.000000	1.000000	1.000000	0.000000	20.000000
25%	82.000000	10.000000	2.000000	2.000000	1.000000	1.000000	0.000000	3.000000	3.000000	3.000000	0.000000	31.000000
50%	163.000000	11.000000	3.000000	2.000000	1.000000	2.000000	0.000000	4.000000	3.000000	4.000000	2.000000	36.000000
75%	244.000000	12.000000	4.000000	3.000000	2.000000	2.000000	0.000000	5.000000	4.000000	5.000000	6.000000	40.000000
max	325.000000	17.000000	4.000000	4.000000	4.000000	4.000000	3.000000	5.000000	5.000000	5.000000	32.000000	53.000000



Checking the Duplicate values in the data set

Data Visualization using matplotlib.

Visualizing the data between failure and scores



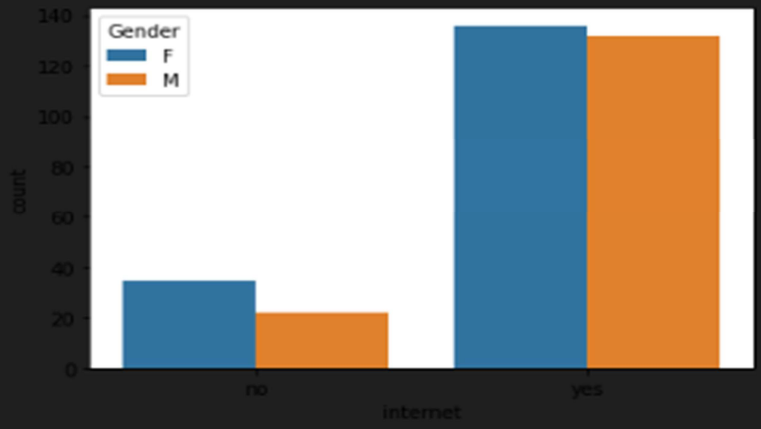
Visualizing between internet and the score

Visualizing between Internet and the score

```
#univariate Analysis for finding how many people using internet
sns.countplot(x = 'internet',data = df, hue = 'Gender')
```

15]

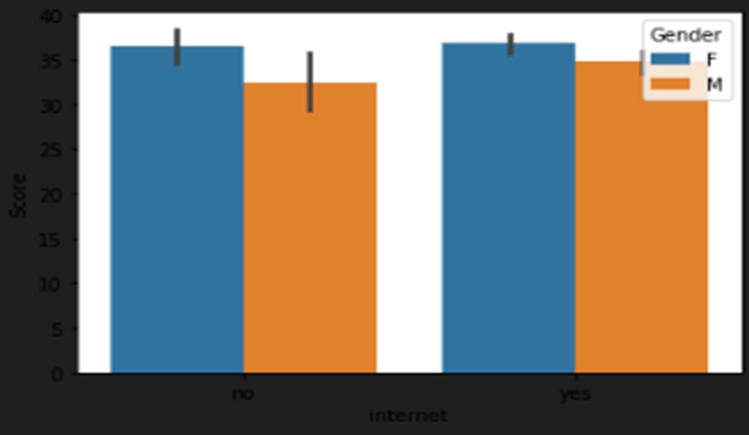
```
<matplotlib.axes._subplots.AxesSubplot at 0x7f261c0ef810>
```




```
sns.barplot(x = 'internet', y = 'Score', data = df, hue = 'Gender')
```

16]

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f261c05fc90>
```



Visualization between internet and the score

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15]

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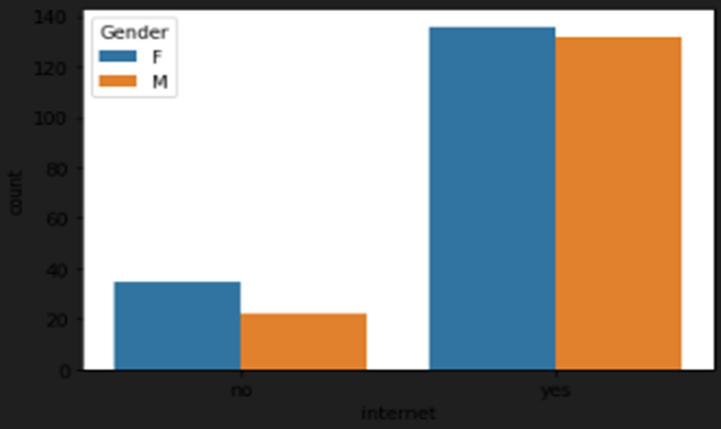
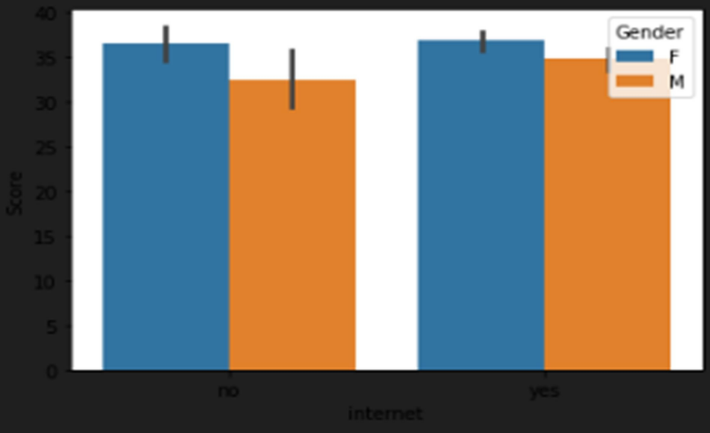
<matplotlib.axes._subplots.AxesSubplot at 0x7f261c0ef810>
```




```
sns.barplot(x = 'internet', y = 'Score', data = df, hue = 'Gender')
```

16]

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f261c05fc90>
```



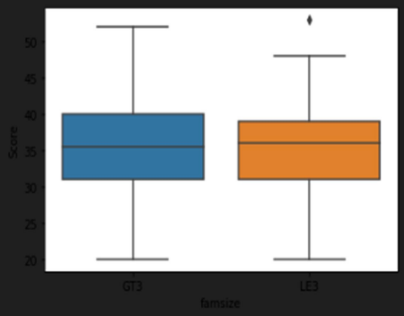
Visualization data between family-size and scores

So As per the above two visualizations there are huge number of students using internet but it slightly helped to improve the performance of students

Visualizing data between family-size and scores

```
sns.boxplot(x='famsize',y='Score',data=df)
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f261f52c1d0>
```



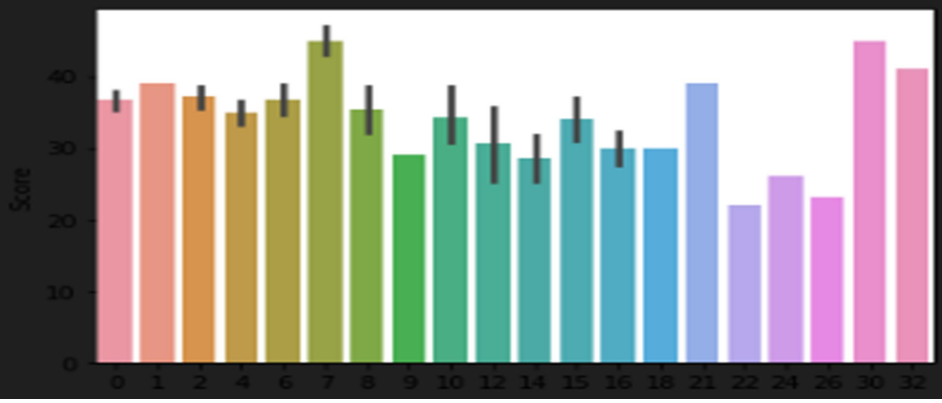
As we can see if the family members are Greater than 3 that students are well performing than LE3 .

Visualization between scores and absences

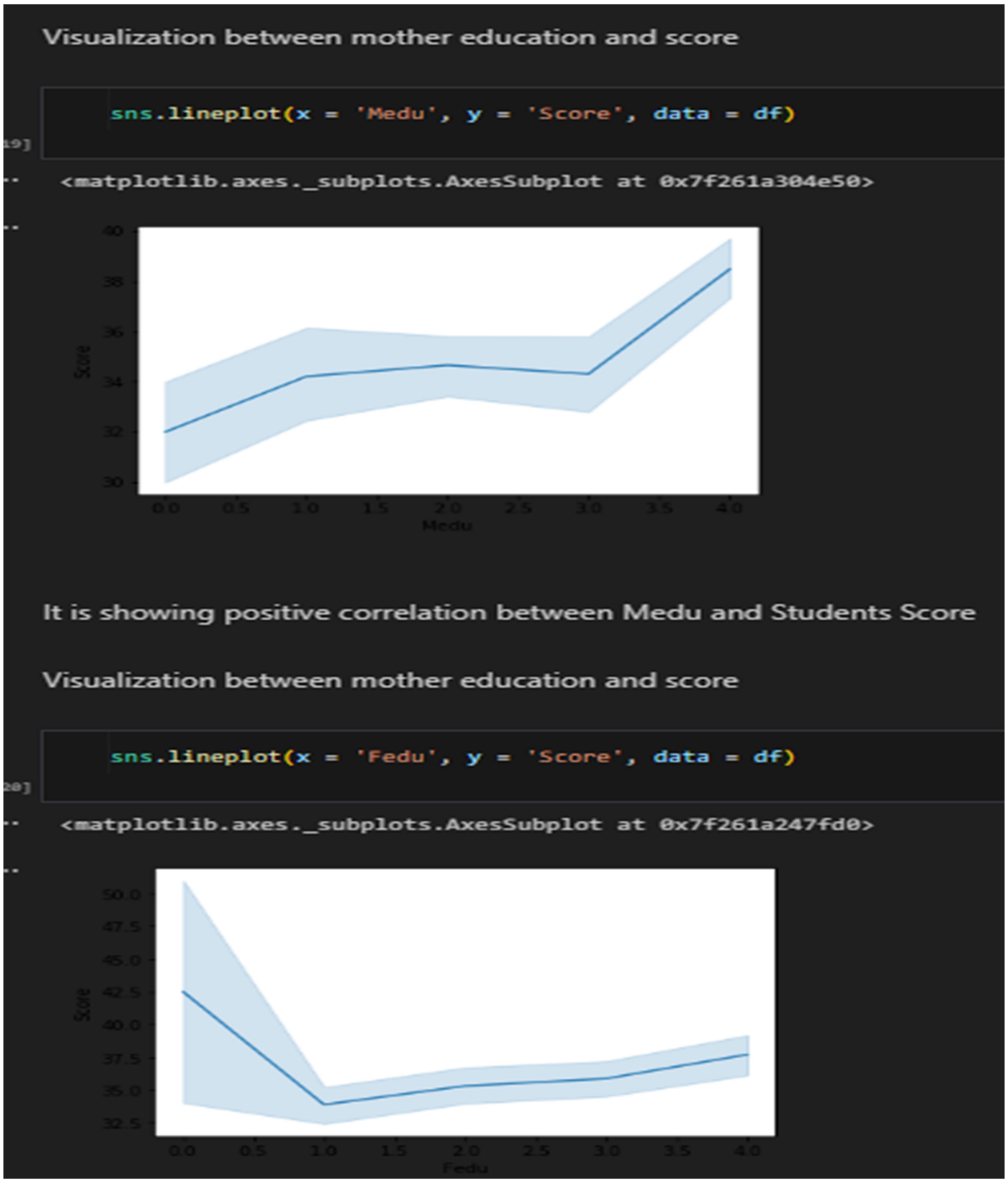
Visualizing between Scores and absences

```
sns.barplot(x = 'absences', y = 'Score', data = df)
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f261bf75550>
```



Visualization between mother education and score

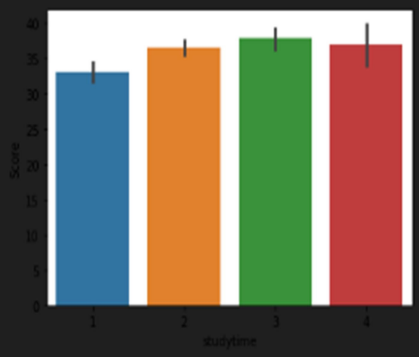


Visualizing between study time and score

Visualizing between Study Time and Score

```
sns.barplot(x = 'studytime', y = 'Score', data = df)
```

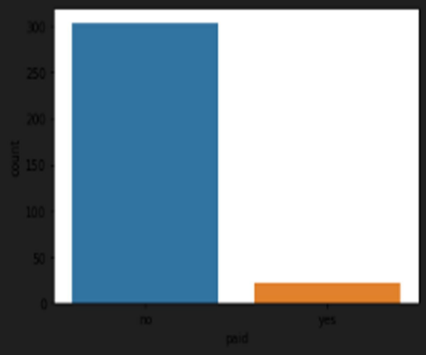
```
<matplotlib.axes._subplots.AxesSubplot at 0x7f261a1c3b90>
```



Above Visualizations are showing the increasing trends for those study upto 10 hours but it is slightly low for those studying >= 10 hours

```
sns.countplot(x = 'paid', data = df)
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f261a13db50>
```



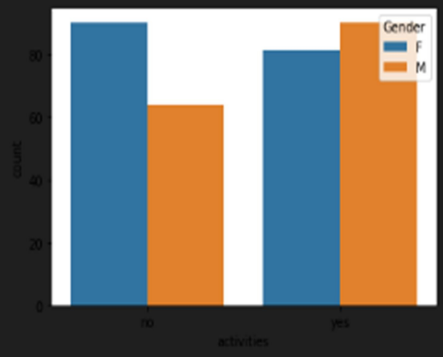
So there are less number of students who have paid for extra classes.

Univariate analysis for activities

Univariate analysis for activities

```
[23] sns.countplot(x = 'activities', data = df, hue = 'Gender')
```

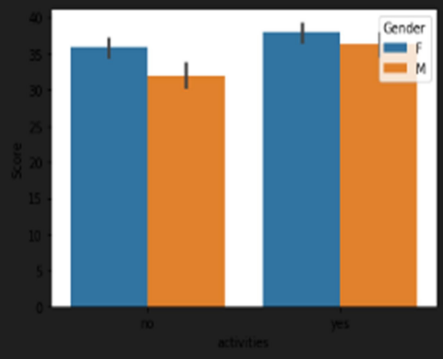
```
<matplotlib.axes._subplots.AxesSubplot at 0x7f261a09f2d0>
```



Female students are taking more part in extra curricular activities

```
[24] sns.barplot(x = 'activities', y = 'Score', data = df, hue = 'Gender')
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f261eb3c350>
```



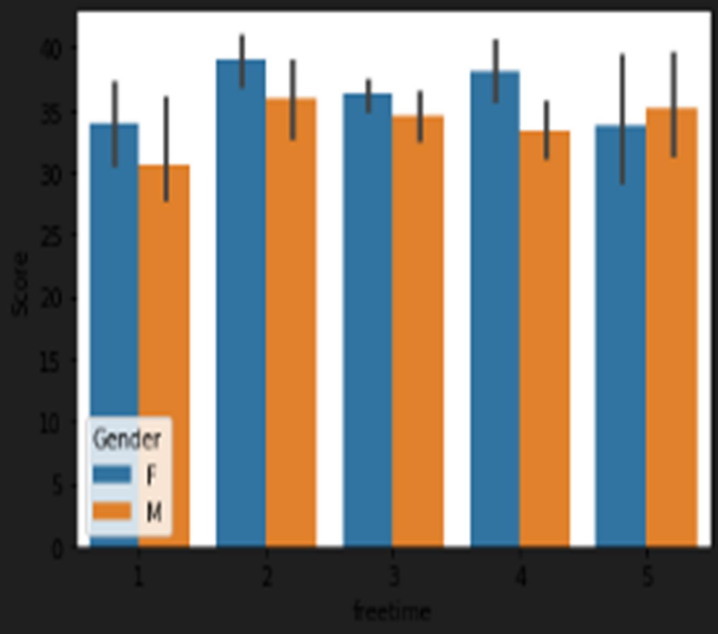
So From the above visualizations those who are taking part in extra curricular activities are having high scores then those who are not taking part

Visualization between free time and scores

Visualizing between free time and score

```
sns.barplot(x = 'freetime', y = 'Score', data = df, hue = 'Gender')
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f261a005210>
```



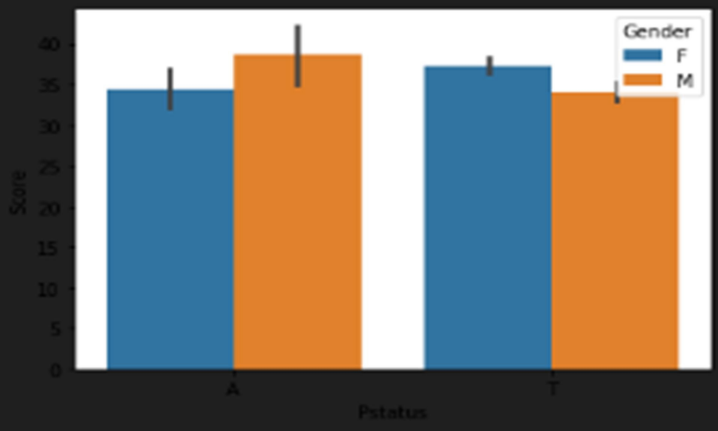
Above visualizations show no relations between freetime and students performance

Visualizing between pass status and score.

Visualizing between Pstatus and Score

```
[26] sns.barplot(x = 'Pstatus', y = 'Score', data = df, hue = 'Gender')
```

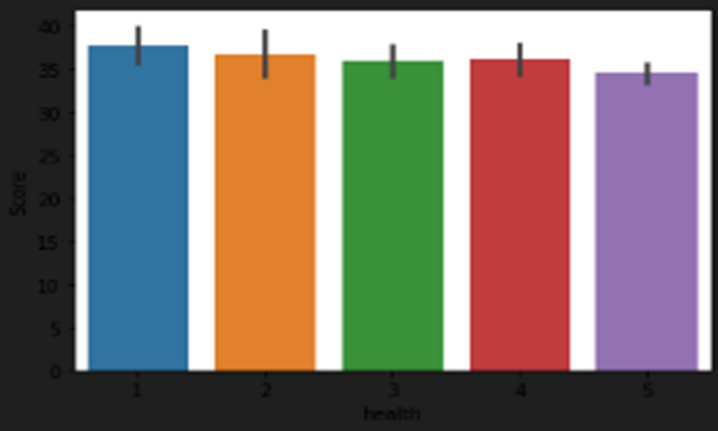
```
<matplotlib.axes._subplots.AxesSubplot at 0x7f2619f17690>
```



Visualizing between Health and Score

```
[27] sns.barplot(x = 'health', y = 'Score', data = df)
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f2619ea8e90>
```

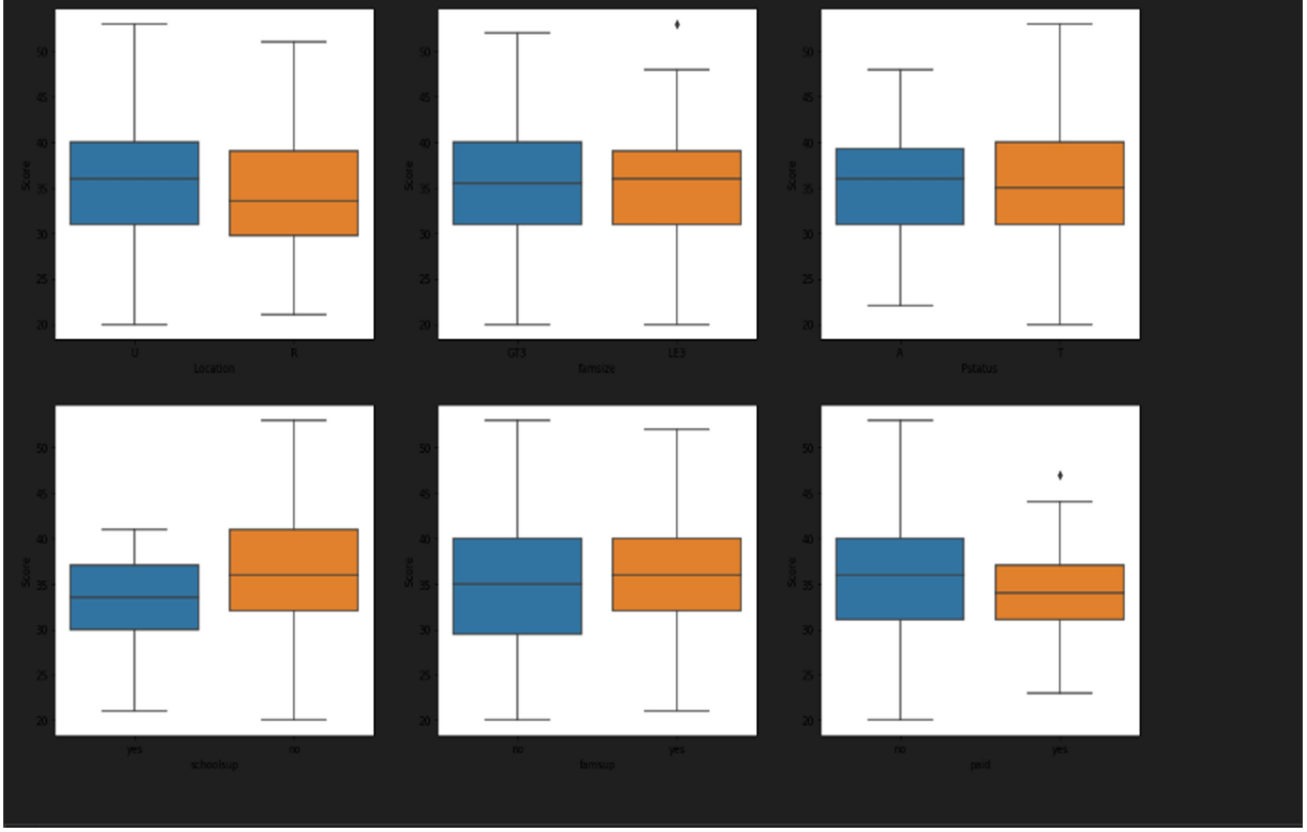


Visualizing between location and score

Below graph shows the entire block of the location, famsize, pstatus, schoolsup, famsup, paid with the score

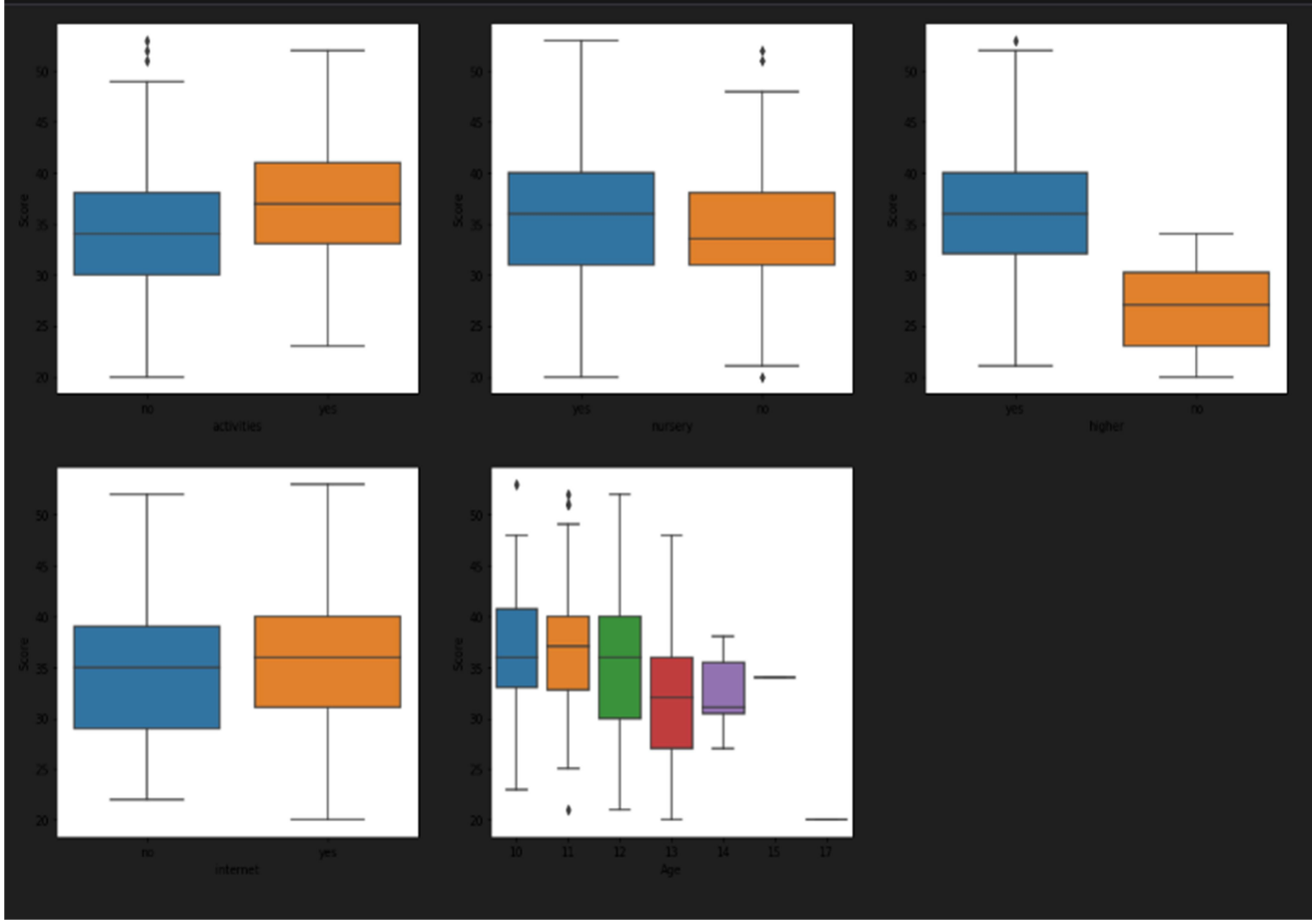
```
# sns.pairplot(df)
# plt.show()
```

```
plt.figure(figsize=(20, 12))
plt.subplot(2,3,1)
sns.boxplot(x = 'Location', y = 'Score', data = df)
plt.subplot(2,3,2)
sns.boxplot(x = 'famsize', y = 'Score', data = df)
plt.subplot(2,3,3)
sns.boxplot(x = 'Pstatus', y = 'Score', data = df)
plt.subplot(2,3,4)
sns.boxplot(x = 'schoolsup', y = 'Score', data = df)
plt.subplot(2,3,5)
sns.boxplot(x = 'famsup', y = 'Score', data = df)
plt.subplot(2,3,6)
sns.boxplot(x = 'paid', y = 'Score', data = df)
plt.show()
```



Below graph shows the entire block of the activites, nursery, higher, internet, age ,paid with the score

```
plt.figure(figsize=(20, 12))
plt.subplot(2,3,1)
sns.boxplot(x = 'activities', y = 'Score', data = df)
plt.subplot(2,3,2)
sns.boxplot(x = 'nursery', y = 'Score', data = df)
plt.subplot(2,3,3)
sns.boxplot(x = 'higher', y = 'Score', data = df)
plt.subplot(2,3,4)
sns.boxplot(x = 'internet', y = 'Score', data = df)
plt.subplot(2,3,5)
sns.boxplot(x = 'Age', y = 'Score', data = df)
plt.show()
```



PRE-INSTALLED LIBRARIES

Django libraries in Python refer to the collection of pre-built modules and packages that come bundled with the Django web framework. These libraries provide developers with tools and functionalities to efficiently build web applications. Some key Django libraries include:

1. django.urls: Allows developers to define URL patterns for their views, enabling navigation within the web application.

2. django.db: Provides an ORM (Object-Relational Mapping) system for interacting with databases, abstracting away the complexities of SQL queries and database management.

3. django.forms: Simplifies the creation and processing of HTML forms, handling validation and data manipulation on the server side.

4. django.contrib.auth: Offers user authentication and authorization functionalities, including user login, logout, password management, and permission management.

5. django.contrib.sessions: Manages user sessions, allowing developers to store and retrieve session data for each user.

6. django.contrib.admin: Provides a built-in administration interface for managing database records through a web interface.

7. django.contrib.staticfiles: Simplifies the handling of static files (e.g., CSS, JavaScript) by automatically serving them during development and collecting them for deployment.

8. django.contrib.messages: Facilitates displaying messages to users, such as success or error messages, typically after form submissions or other actions.

These libraries, along with many others, streamline common web development tasks, reduce boilerplate code, and promote code reusability, making Django a powerful framework for building web applications in Python.

Pre-Installed Libraries:

Anaconda distribution of Jupyter Notebook shipped with several pre-installed data libraries, such as Pandas, NumPy, Matplotlib, which is awesome.

What is HTML5?

HTML stands for Hyper Text Markup Language. It is used to design web pages using a markup language. HTML is an abbreviation of Hypertext and Markup language. Hypertext defines the link between the web pages. The markup language is used to define the text document within the tag which defines the structure of web pages. HTML 5 is the fifth and current version of HTML. It has improved the markup available for documents and has introduced application programming interfaces (API) and Document Object Model (DOM).

Features:

- It has introduced new multimedia features which support audio and video controls by using <audio> and <video> tags.
- There are new graphics elements including vector graphics and tags.
- Enrich semantic content by including <header> <footer>, <article>, <section> and <figure> are added.
- Drag and Drop- The user can grab an object and drag it further dropping it to a new location.
- Geo-location services- It helps to locate the geographical location of a client.
- Web storage facility which provides web application methods to store data on the web browser.
- Uses SQL database to store data offline.
- Allows drawing various shapes like triangle, rectangle, circle, etc.
- Capable of handling incorrect syntax.
- Easy DOCTYPE declaration i.e., <!doctype html>
- Easy character encoding i.e., <meta charset=″ UTF-8″>

What is CSS?

Cascading Style Sheets, fondly referred to as CSS, is a simple design language intended to simplify the process of making web pages presentable.

CSS handles the look and feel part of a web page. Using CSS, you can control the colors of the text, the style of fonts, the spacing between paragraphs, how columns are sized and laid out, what background images or colors are used, layout designs, variations in display for different devices and screen sizes as well as a variety of other effects.

CSS is easy to learn and understand but it provides powerful control over the presentation of an HTML document. Most commonly, CSS is combined with the markup languages HTML or XHTML.

Advantages of CSS

• CSS saves time − You can write CSS once and then reuse same sheet in multiple HTML pages. You can define a style for each HTML element and apply it to as many Web pages as you want.

• Pages load faster − If you are using CSS, you do not need to write HTML tag attributes every time. Just write one CSS rule of a tag and apply it to all the occurrences of that tag. So, less code means faster download times.

• Easy maintenance − To make a global change, simply change the style, and all elements in all the web pages will be updated automatically.

• Superior styles to HTML − CSS have a much wider array of attributes than HTML, so you can give a far better look to your HTML page in comparison to HTML attributes.

• Multiple Device Compatibility − Style sheets allow content to be optimized for more than one type of device. By using the same HTML document, different versions of a website can be presented for handheld devices such as PDAs and cell phones or for printing.

• Global web standards − Now HTML attributes are being deprecated and it is being recommended to use CSS. So it's a good idea to start using CSS in all the HTML pages to make them compatible to future browsers.

Introduction to python:

Python is an easy to learn, powerful programming language. It has efficient high-level data structures and a simple but effective approach to object-oriented programming. Python's elegant syntax and dynamic typing, together with its interpreted nature, make it an ideal language for scripting and rapid application development in many areas on most platforms.

The Python interpreter and the extensive standard library are freely available in source or binary form for all major platforms from the Python Web site, https://www.python.org/, and

may be freely distributed. The same site also contains distributions of and pointers to many free third party Python modules, programs and tools, and additional documentation.

The Python interpreter is easily extended with new functions and data types implemented in C or C++ (or other languages callable from C). Python is also suitable as an extension language for customizable applications.

Features of Python: -

Easy to Learn, Open Source, Platform Independent, Python is interpreted, Python is object-oriented programming (OOPs), Portable, Large Standard library

1. Matplotlib:

Matplotlib is an amazing visualization library in Python for 2D plots of arrays. Matplotlib is a multi- platform data visualization library built on NumPy arrays and designed to work with the broader SciPy stack. It was introduced by John Hunter in the year 2002.

One of the greatest benefits of visualization is that it allows us visual access to huge amounts of data in easily digestible visuals. Matplotlib consists of several plots like line, bar, scatter, histogram etc.

2. Pandas:

Pandas is an open-source library that is made mainly for working with relational or labeled data both easily and intuitively. It provides various data structures and operations for manipulating numerical data and time series. This library is built on top of the NumPy library. Pandas is fast and it has high performance & productivity for users.

3. Numpy:

NumPy is a general-purpose array-processing package. It provides a high-performance multidimensional array object, and tools for working with these arrays. It is the fundamental package for scientific computing with Python. It is open-source software.

4. Scikit-learn:

Scikit-learn is probably the most useful library for machine learning in Python. The sklearn library contains a lot of efficient tools for machine learning and statistical modelling including classification, regression, clustering and dimensionality reduction.

5. Seaborn:

Seaborn is an amazing visualization library for statistical graphics plotting in Python. It provides beautiful default styles and color palettes to make statistical plots more attractive. It is built on the top of matplotlib library and also closely integrated to the data structures from pandas.

Seaborn aims to make visualization the central part of exploring and understanding data. It provides dataset-oriented APIs, so that we can switch between different visual representations for same variables for better understanding of dataset.

Machine Learning

Machine Learning (ML) is the technology that provides the self-learning capability to the computer system. The Machine learning Provides the capability to the computer system to function without the need for any explicit computer program.

In the real world, we are surrounded by humans who can learn everything from their experiences with their learning capability, and we have computers or machines which work on our instructions. But can a machine also learn from experiences or past data like a human does? So here comes the role of Machine Learning.

Different types of ML algorithm

1. Linear Regression:

In statistics, linear regression is a linear approach for modelling the relationship between a scalar response and one or more explanatory variables (also known as dependent and independent variables). The case of one explanatory variable is called simple linear regression; for more than one, the process is called multiple linear regression. This term is distinct from multivariate linear regression, where multiple correlated dependent variables are predicted, rather than a single scalar variable.

In linear regression, the relationships are modeled using linear predictor functions whose unknown model parameters are estimated from the data. Such models are called linear models. Most commonly, the conditional mean of the response given the values of the

explanatory variables (or predictors) is assumed to be an affine function of those values; less commonly, the conditional median or some other quantile is used. Like all forms of regression analysis, linear regression focuses on the conditional probability distribution of the response given the values of the predictors, rather than on the joint probability distribution of all of these variables, which is the domain of multivariate analysis.

2. Logistic Regression Algorithm:

Logistic regression may be a **supervised learning** classification algorithm wont to **predict the probability** of a target variable. It's one among the only ML algorithms which will be used for various classification problems like **spam detection**, **Diabetes prediction**, **cancer detection** etc.

Logistic regression is simpler to **implement**, **interpret**, and really **efficient** to coach.

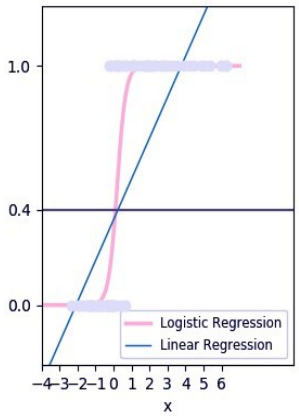
If the amount of observations is lesser than the **amount of features**, **Logistic Regression** shouldn't be used, otherwise, it's going to cause **overfitting**.

We use logistic regression for the binary classification of **data-points**. We perform categorical classification such that an output belongs to either of the **two classes (1 or 0)**.

Two of the important parts of logistic regression are **Hypothesis and Sigmoid Curve**. With the help of this hypothesis, we can derive the **likelihood** of the event.

The data generated from this hypothesis can fit into the **log function** that creates an **S-shaped curv**e known as **"sigmoid"**. Using this **log function**, we can further predict the **category of class**.

We can represent the sigmoid as follows:



The produced graph is through this logistic function:

1 / (1 + e^-x)

The **'e'** in the above equation represents the

S-shaped curve that has values between **0 and 1**.

We write the equation for **logistic regression** as follows:

y = e^(b0 + b1*x) / (1 + e^(b0 + b1*x))

In the above equation, **b0** and **b1** are the **two coefficients** of the **input x**.

We estimate these two coefficients using **"maximum likelihood estimation"**.

3. K-Nearest Neighbour (KNN) Algorithm

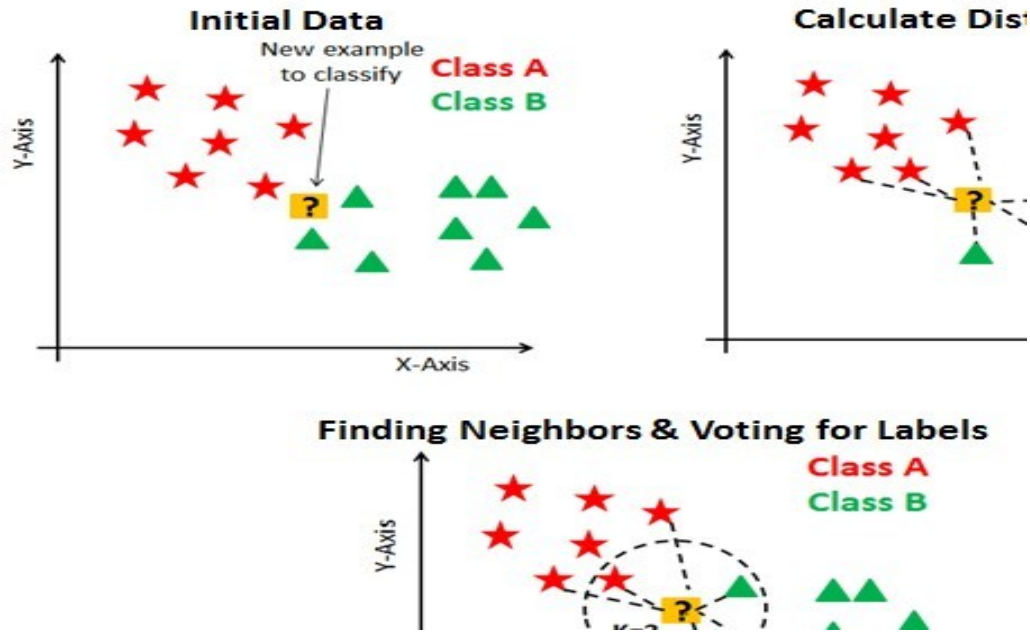
The K-Nearest Neighbour (KNN) algorithm assumes that similar items and things that exists in close distances or proximity. In music genre classification, K-Nearest Neighbour (KNN) algorithms help to find out the similar genre of music near to each other and can be beneficial for recommending alike music to listeners.

The K-Nearest Neighbor (KNN) algorithm is an implementation of supervised machine learning model. This mathematical conceptual theory proves the working functionality of KNN:

$$d(\mathbf{p},\mathbf{q}) = d(\mathbf{q},\mathbf{p}) = \sqrt{(q_1 - p_1)^2 + (q_2 - p_2)^2 + \cdots + (q_n - p_n)^2}$$
$$= \sqrt{\sum_{i=1}^{n}(q_i - p_i)^2}.$$

The initial step is conversion of feature vectors from data points, that represent the mathematical values. The distances between these mathematical values are find using algorithm. Euclidean distance is the most common way for finding the distance which is also shown in fig. 10 with mathematical evaluation.

The KNN algorithm will select the right K(n) that is used for labelling the prediction of an actual data. The implementation of KNN is versatile and high accuracy with quick computing calculation time. But, the accuracy of output is totally depending on the properties of data.

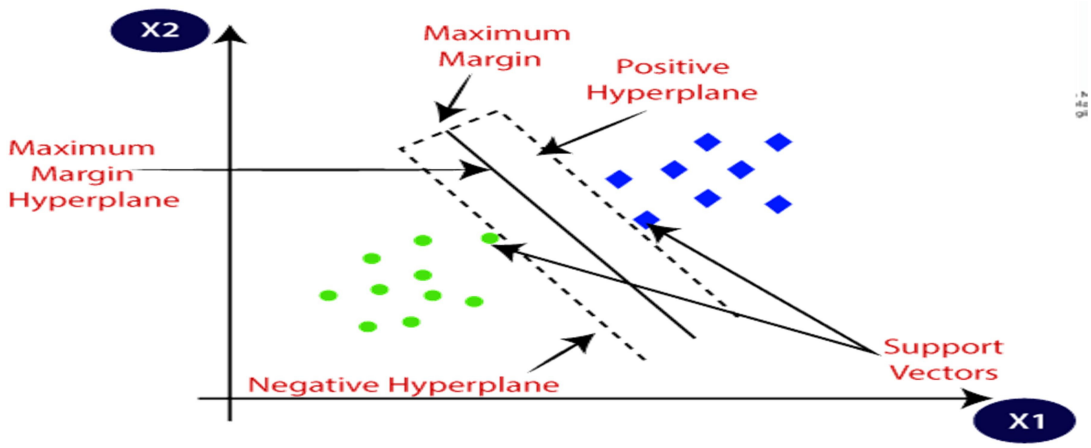


4. Support Vector Machine

SVM is one of the most popular Supervised Learning algorithms, which is used for Classification as well as Regression problems. However, primarily, it is used for Classification problems in Machine Learning.

The goal of the SVM algorithm is to create the best line or decision boundary that can segregate n-dimensional space into classes so that we can easily put the new data point in the correct category in the future. This best decision boundary is called a hyperplane.

SVM chooses the extreme points/vectors that help in creating the hyperplane. These extreme cases are called as support vectors, and hence algorithm is termed as Support Vector Machine. Consider the below diagram in which there are two different categories that are classified using a decision boundary or hyperplane:

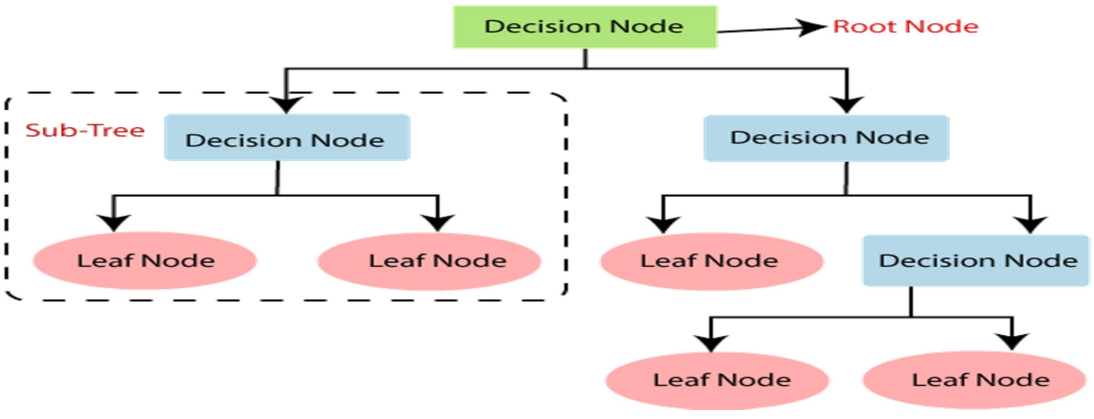


(https://www.javatpoint.com/machine-learning-support-vector-machine-algorithm)

5. Decision Tree

A decision tree is a tree-like graph with nodes representing the place where we pick an attribute and ask a question; edges represent the answers the to the question; and the leaves represent the actual output or class label. They are used in non-linear decision making with simple linear decision surface.

Decision trees classify the examples by sorting them down the tree from the root to some leaf node, with the leaf node providing the classification to the example. Each node in the tree acts as a test case for some attribute, and each edge descending from that node corresponds to one of the possible answers to the test case. This process is recursive in nature and is repeated for every subtree rooted at the new nodes.

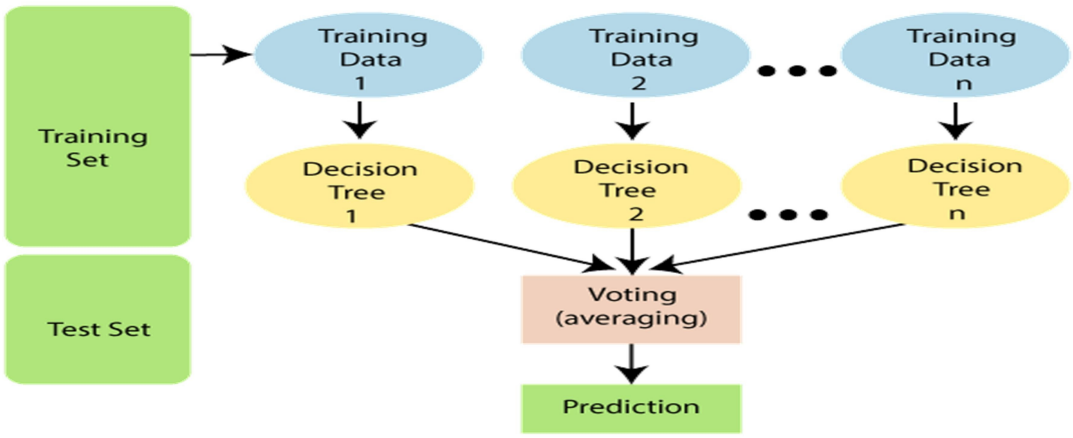


6. Random Forest

Random Forest is a popular machine learning algorithm that belongs to the supervised learning technique. It can be used for both Classification and Regression problems in ML. It is based on the concept of **ensemble learning,** which is a process of combining multiple classifiers to solve a complex problem and to improve the performance of the model.

As the name suggests, **"Random Forest is a classifier that contains a number of decision trees on various subsets of the given dataset and takes the average to improve the predictive accuracy of that dataset."** Instead of relying on one decision tree, the random forest takes the prediction from each tree and based on the majority votes of predictions, and it predicts the final output. The greater number of trees in the forest leads to higher accuracy and prevents the problem of overfitting.

The below diagram explains the working of the Random Forest algorithm:



7. Artificial Neural Network

Neural networks are a set of algorithms, modeled loosely after the human brain, that are designed to recognize patterns. They interpret sensory data through a kind of machine perception, labeling or clustering raw input. The patterns they recognize are numerical, contained in vectors, into which all real-world data, be it images, sound, text or time series, must be translated.

Neural networks help us cluster and classify. You can think of them as a clustering and classification layer on top of the data you store and manage. They help to group unlabeled data according to similarities among the example inputs, and they classify data when they have a labelled dataset to train on.

Database:

A database is an organized collection of structured information, or data, typically stored electronically in a computer system. A database is usually controlled by a database management system (DBMS). Together, the data and the DBMS, along with the applications that are associated with them, are referred to as a database system, often shortened to just database.

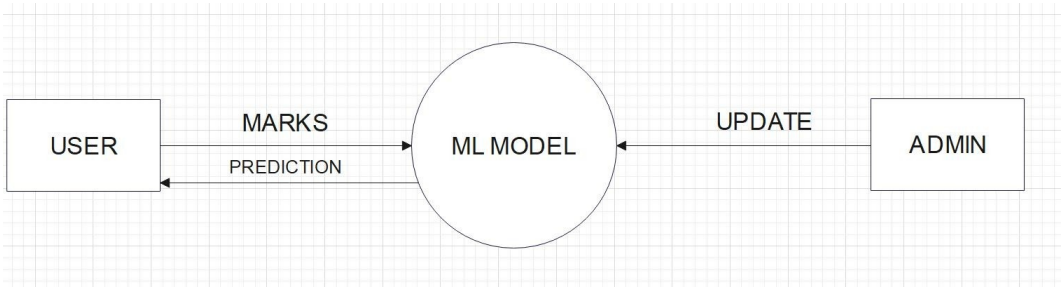
Data within the most common types of databases in operation today is typically modelled in rows and columns in a series of tables to make processing and data querying efficient. The data can then be easily accessed, managed, modified, updated, controlled, and organized. Most databases use structured querylanguage (SQL) for writing and querying data.

MySQL:

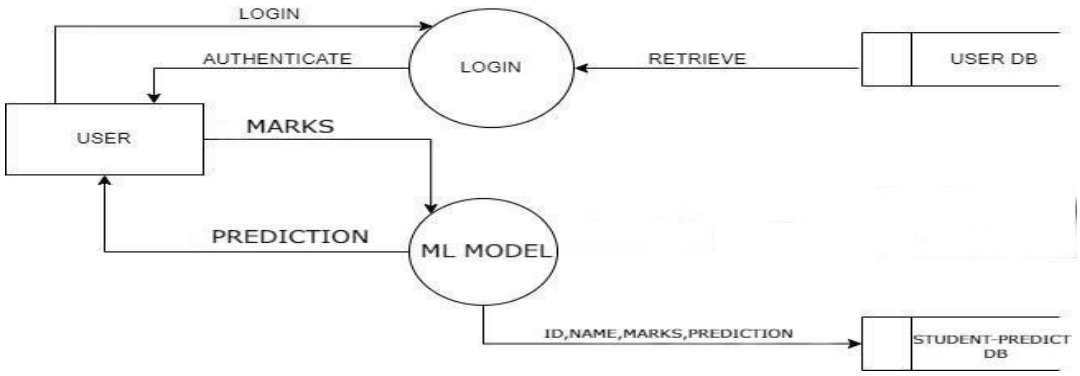
MySQL is a free and open-source relational database management system (RDBMS) emphasizing extensibility and SQL compliance.

DFD

FLOWCHARTS:DFD (LEVEL 0)



DFD (LEVEL 1):



UML DIAGRAMS

UML is simply anther graphical representation of a common semantic model. UML provides a comprehensive notation for the full lifecycle of object-oriented development.

ADVANTAGES

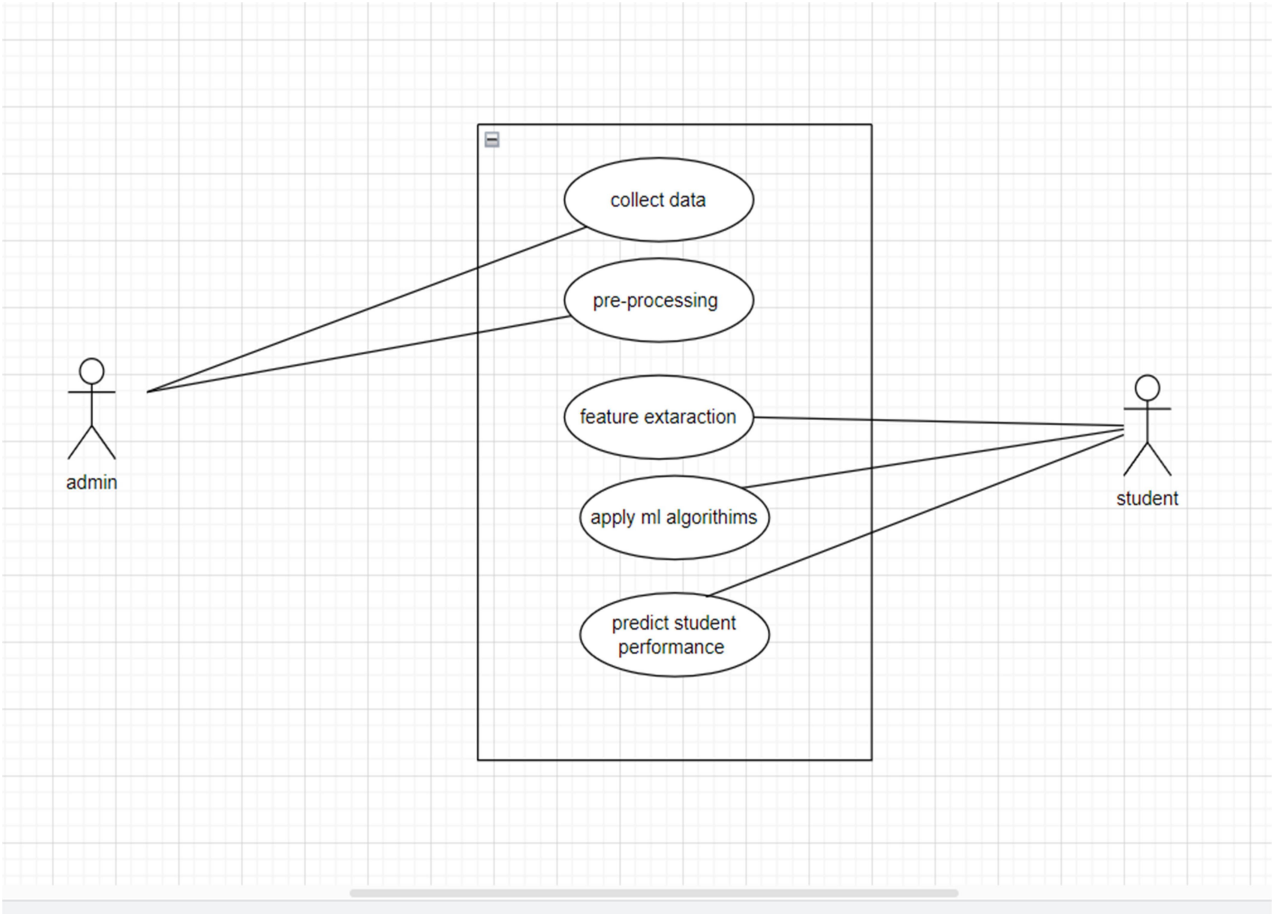
- To represent complete systems (instead of only the software portion) using object oriented concepts
- To establish an explicit coupling between concepts and executable code
- To take into account the scaling factors that are inherent to complex and critical systems
- To creating a modeling language usable by both humans and machines UML defines

several models for representing systems

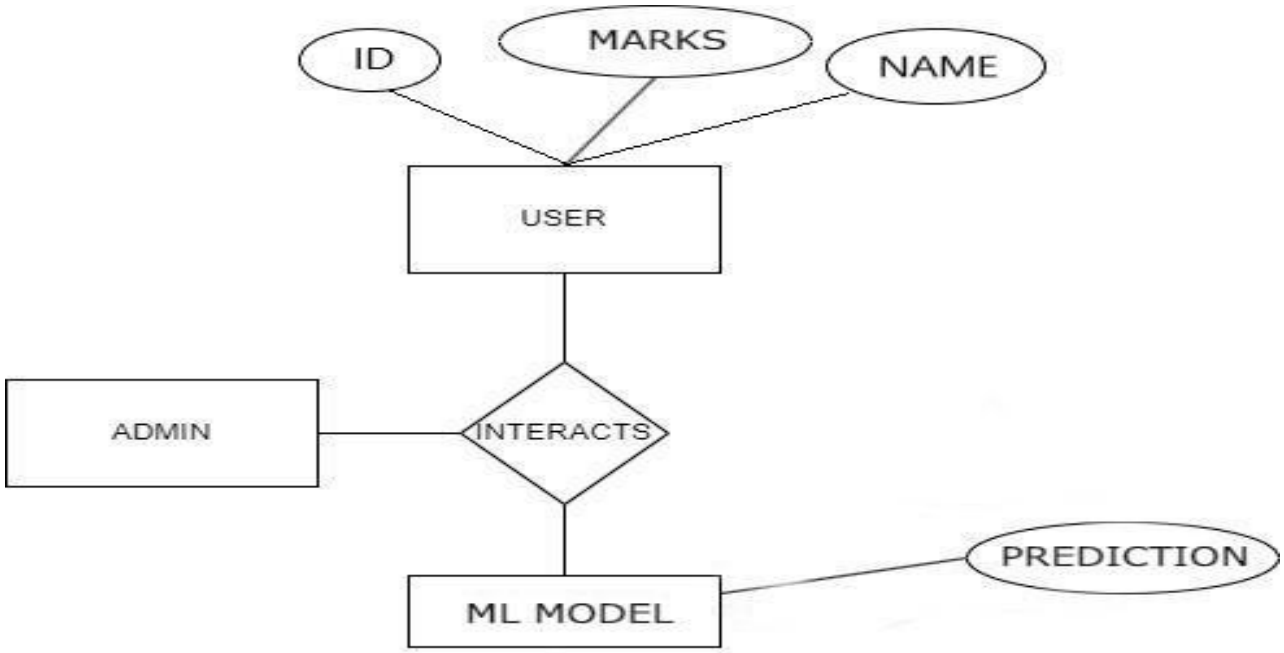
- The class model captures the static structure
- The state model expresses the dynamic behavior of objects
- The use case model describes the requirements of the user
- The interaction model represents the scenarios and messages flows
- The implementation model shows the work units 18
- The deployment model provides details that pertain to process allocation

USECASE DIAGRAM

Use case diagrams overview the usage requirement for system. They are useful for presentations to management and/or project stakeholders, but for actual development you will find that use cases provide significantly more value because they describe “the meant” of the actual requirements. A use case describes a sequence of action that provides something of measurable value to an action and is drawn as a horizontal ellipse.


collect data
pre-processing
feature extaraction
apply ml algorithims
predict student performance
admin
student

ER-DIAGRAM:



CODING

base.html

```
{% load static %}

<!DOCTYPE html>

<html lang="en">

<head>

<meta charset="utf-8">

  <!-- Favicon -->

<link rel="icon" href="{% static 'hacker.svg' %}" type="image/gif"
sizes="16x16">

<title>{% block title %}PyContributors{% endblock %}</title>

<!-- Google-Font -->

<link
href="https://fonts.googleapis.com/css?family=Open+Sans:300,300i,400,400i,700,
700i|Montserrat:300,400,500,700" rel="stylesheet">

<meta name="viewport" content="width=device-width, initial-scale=1.0">

<script src="https://kit.fontawesome.com/83ea256c90.js"
crossorigin="anonymous"></script>

<!-- custom Css Files-->

<link rel="stylesheet" type="text/css" href="{% static 'assets/css/main.css'
%}">

<!-- Bootstrap css-->

<!-- Option 1: Include in HTML -->

<link rel="stylesheet" href="https://cdn.jsdelivr.net/npm/bootstrap-
icons@1.3.0/font/bootstrap-icons.css">

<link rel="stylesheet"
href="https://stackpath.bootstrapcdn.com/bootstrap/4.5.2/css/bootstrap.min.css
"

 integrity="sha384-
JcKb8q3iqJ61gNV9KGb8thSsNjpSL0n8PARn9HuZOnIxN0hoP+VmmDGMN5t9UJ0Z"
crossorigin="anonymous">

</head>

<body>
```

```
    {% include 'includes/navbar.html' %}
    <div class="container content">
        {% block content %}{% endblock %}
      </div>
<!-- custom Js Files-->
<script src="{% static 'assets/js/main.js' %}"></script>
<!-- Bootstrap script-->
<script src="https://code.jquery.com/jquery-3.4.1.slim.min.js"
integrity="sha384-
J6qa4849blE2+poT4WnyKhv5vZF5SrPo0iEjwBvKU7imGFAV0wwj1yYfoRSJoZ+n"
crossorigin="anonymous"></script>
<script
src="https://cdn.jsdelivr.net/npm/popper.js@1.16.0/dist/umd/popper.min.js"
 integrity="sha384-
Q6E9RHvbIyZFJoft+2mJbHaEWldlvI9IOYy5n3zV9zzTtmI3UksdQRVvoxMfooAo"
  crossorigin="anonymous"></script>
<script
src="https://stackpath.bootstrapcdn.com/bootstrap/4.4.1/js/bootstrap.min.js"
integrity="sha384-
wfSDF2E50Y2D1uUdj0O3uMBJnjuUD4Ih7YwaYd1iqfktj0Uod8GCExl3Og8ifwB6"
crossorigin="anonymous"></script>
</body>
</html>
```

navbar.html

```
<style>
  #clgLogo{
    background-color: #fff;
  }
</style>
<nav class=”navbar sticky-top navbar-expand-lg bg-light”>
```

```
  <div class="container">
    <a class="navbar-brand" href="#"><img
src="https://i0.wp.com/rimsedu.ac.in/wp-
content/uploads/2022/08/LOGO.png?fit=3101%2C632&ssl=1"
       height="50" width="200" id="clgLogo" alt=""></a>
    <button class="navbar-toggler" type="button" data-toggle="collapse" data-
target="#navbarSupportedContent"
    aria-controls="navbarSupportedContent" aria-expanded="false" aria-
label="Toggle navigation">
 <I class="fas fa-bars"></i>
</button>

    <div class="collapse navbar-collapse" id="navbarSupportedContent">
      <ul class="navbar-nav mr-auto w-100 justify-content-end">
        <li class="nav-item active">
          <a class="nav-link" href="https://rimsedu.ac.in/">Home <span
class="sr-only">(current)</span></a>
        </li>
        <li class="nav-item">
          <a class="nav-link" href="https://rimsedu.ac.in/about-us/">About</a>
          <li class="nav-item">
            <a class="nav-link"
href="https://rimsedu.ac.in/courses/">Courses</a>
          </li>

      </ul>
    </div>
  </div>
</nav>
```

index.html

```
{% extends 'base.html' %}
{% load static %}
{% block title %}Home{% endblock title %}
```

```
{% block content %}

  <!-- Put page content Here -->

  <div class="row mt-5">

    <div class="col-md-6">

      <img src="{% static 'assets/img/admin.png' %}" style="width: 160px;
height: 230px;">

      <div class="container">

      <a href="/admin" class="btn btn-lg btn-primary text-light">Admin
Login</a>

      </div>

    </div>


    <div class="col-md-6">

      <img src="{% static 'assets/img/student.jpg' %}" style="width: 160px;
height: 250px; margin-left:30px;">

      <div class="container">

      <a class="btn btn-lg btn-primary text-light" href="{% url 'prediction'
%}" >Predict Student Performance</a>

      </div>

      </div>


  </div> <!-- Row Div closed-->

{% endblock content %}
```

Prediction.html

```
{% extends 'base.html' %}

{% block title %}Predict{% endblock title %}


{% block content %}

  <!-- Put page content Here -->
```

```
    <h1 class="text-center mt-5 mb-3">Provide Student Information here for
prediction</h1>

    <form name="myForm" method="post" enctype="multipart/form-data">

      {% csrf_token %}

      <div class="row">

      <div class="col-md-6">

      <div class="form-group">

        <label for="cylinders">Gender</label>

        <select class="form-control" name="gender" id="gender">

          <option value="1">Male</option>

          <option value="0">Female</option>

        </select>

      </div>

      <div class="form-group">

        <label for="cylinders">Age</label>

        <input class="form-control" type="number" name="age"
placeholder="Enter age in years">

      </div>

      <div class="form-group">

        <label for="cylinders">Location</label>

        <select class="form-control" name="location" id="location">

          <option value="1">Urban</option>

          <option value="0">Rural</option>

        </select>

      </div>

      <div class="form-group">

        <label for="cylinders">Family Size</label>

        <select class="form-control" name="famsize" id="famsize">

          <option value="1">Less of Equal to 3</option>

          <option value="0">Grater than 3</option>

        </select>

      </div>
```

```
      <div class="form-group">
        <label for="cylinders">Travel-Time</label>
        <select class="form-control" name="traveltime" id="traveltime">
          <option value="1">Less than 15 minutes</option>
          <option value="2">15-30 Minutes</option>
          <option value="3">30 minutes- 1 hour</option>
          <option value="4">More than 1 hour</option>
        </select>
      </div>
      <div class="form-group">
        <label for="cylinders">Study-Time</label>
        <select class="form-control" name="studytime" id="studytime">
          <option value="1">Less than 2 hours</option>
          <option value="2">2 to 5 hours</option>
          <option value="3">5 to 10 hours</option>
          <option value="4">More than 10 hours</option>
        </select>
      </div>

      <div class="form-group">
        <label for="cylinders">Failures</label>
        <select class="form-control" name="failures" id="failures">
          <option value="0">Never</option>
          <option value="1">Once</option>
          <option value="2">Twice</option>
          <option value="3">Thrice</option>
          <option value="4">More than Thrice</option>
        </select>
      </div>
    </div>
<!--Second Column-->
```

```
<div class="col-md-6">
  <div class="form-group">
    <label for="cylinders">Extra Paid Classes</label>
    <select class="form-control" name="paid" id="paid">
      <option value="1">Yes</option>
      <option value="0">No</option>
    </select>
  </div>
  <div class="form-group">
    <label for="cylinders">Extra Curricular Activities</label>
    <select class="form-control" name="activities" id="activities">
      <option value="1">Yes</option>
      <option value="0">No</option>
    </select>
  </div>
  <div class="form-group">
    <label for="cylinders">Attend Nursery School</label>
    <select class="form-control" name="nursery" id="nursery">
      <option value="1">Yes</option>
      <option value="0">No</option>
    </select>
  </div>
  <div class="form-group">
    <label for="cylinders">Wants to Take Higher Education</label>
    <select class="form-control" name="higher" id="higher">
      <option value="1">Yes</option>
      <option value="0">No</option>
    </select>
  </div>
  <div class="form-group">
    <label for="cylinders">Is Internet Available ?</label>
```

```
        <select class="form-control" name="internet" id="internet">
          <option value="1">Yes</option>
          <option value="0">No</option>
        </select>
      </div>
      <div class="form-group">
        <label for="cylinders">Free-Time</label>
        <select class="form-control" name="freetime" id="freetime">
          <option value="1">Very low</option>
          <option value="2">low</option>
          <option value="3">Average</option>
          <option value="4">Good</option>
          <option value="5">very Good</option>
        </select>
      </div>
      <div class="form-group">
        <label for="cylinders">Health(1 -5)</label>
        <select class="form-control" name="health" id="health">
          <option value="1">Very bad</option>
          <option value="2">Bad</option>
          <option value="3">Average</option>
          <option value="4">Good</option>
          <option value="5">Awesome</option>
        </select>
      </div>
    </div>
      </div><!--Row Div closed-->
      <div class="container text-center mb-4">
        <button class="shadow-lg btn btn-primary btn-lg text-white font-
weight-bold my-2" style="width:280px" type="submit">Predict</button>
      </div>
    </form>
```

```
{% endblock content %}
```

result.html

```
{% extends 'base.html' %}
{% block title %}Result{% endblock title %}


{% block content %}
  <!-- Put page content Here -->
  <div class="alert alert-dismissible alert-success mt-3">
    <button type="button" class="close" data-dismiss="alert">&times;</button>
    <h4 class="alert-heading">Student Predicted Marks - {{result}}</h4>
  </div>
  <h2 class="text-center">
    Enter New Information
  </h2>
    <form name="myForm" method="post" enctype="multipart/form-data">
      {% csrf_token %}
      <div class="row">
      <div class="col-md-6">
      <div class="form-group">
        <label for="cylinders">Gender</label>
        <select class="form-control" name="gender" id="gender">
          <option value="1">Male</option>
          <option value="0">Female</option>
        </select>
      </div>
      <div class="form-group">
        <label for="cylinders">Age</label>
        <input class="form-control" type="number" name="age"
placeholder="Enter age in years">
      </div>
      <div class="form-group">
```

```
    <label for="cylinders">Location</label>
    <select class="form-control" name="location" id="location">
      <option value="1">Urban</option>
      <option value="0">Rural</option>
    </select>
  </div>
  <div class="form-group">
    <label for="cylinders">Family Size</label>
    <select class="form-control" name="famsize" id="famsize">
      <option value="1">Less of Equal to 3</option>
      <option value="0">Grater than 3</option>
    </select>
  </div>
  <div class="form-group">
    <label for="cylinders">Travel-Time</label>
    <select class="form-control" name="traveltime" id="traveltime">
      <option value="1">Less than 15 minutes</option>
      <option value="2">15-30 Minutes</option>
      <option value="3">30 minutes- 1 hour</option>
      <option value="4">More than 1 hour</option>
    </select>
  </div>
  <div class="form-group">
    <label for="cylinders">Study-Time</label>
    <select class="form-control" name="studytime" id="studytime">
      <option value="1">Less than 2 hours</option>
      <option value="2">2 to 5 hours</option>
      <option value="3">5 to 10 hours</option>
      <option value="4">More than 10 hours</option>
    </select>
  </div>
```

```
      <div class="form-group">
        <label for="cylinders">Failures</label>
        <select class="form-control" name="failures" id="failures">
          <option value="0">Never</option>
          <option value="1">Once</option>
          <option value="2">Twice</option>
          <option value="3">Thrice</option>
          <option value="4">More than Thrice</option>
        </select>
      </div>
    </div>
<!--Second Column-->
    <div class="col-md-6">
      <div class="form-group">
        <label for="cylinders">Extra Paid Classes</label>
        <select class="form-control" name="paid" id="paid">
          <option value="1">Yes</option>
          <option value="0">No</option>
        </select>
      </div>
      <div class="form-group">
        <label for="cylinders">Extra Curricular Activities</label>
        <select class="form-control" name="activities" id="activities">
          <option value="1">Yes</option>
          <option value="0">No</option>
        </select>
      </div>
      <div class="form-group">
        <label for="cylinders">Attend Nursery School</label>
        <select class="form-control" name="nursery" id="nursery">
```

```
          <option value="1">Yes</option>
          <option value="0">No</option>
        </select>
      </div>
      <div class="form-group">
        <label for="cylinders">Wants to Take Higher Education</label>
        <select class="form-control" name="higher" id="higher">
          <option value="1">Yes</option>
          <option value="0">No</option>
        </select>
      </div>
      <div class="form-group">
        <label for="cylinders">Is Internet Available ?</label>
        <select class="form-control" name="internet" id="internet">
          <option value="1">Yes</option>
          <option value="0">No</option>
        </select>
      </div>
      <div class="form-group">
        <label for="cylinders">Free-Time</label>
        <select class="form-control" name="freetime" id="freetime">
          <option value="1">Very low</option>
          <option value="2">low</option>
          <option value="3">Average</option>
          <option value="4">Good</option>
          <option value="5">very Good</option>
        </select>
      </div>
      <div class="form-group">
        <label for="cylinders">Health(1 -5)</label>
        <select class="form-control" name="health" id="health">
```

```
          <option value="1">Very bad</option>
          <option value="2">Bad</option>
          <option value="3">Average</option>
          <option value="4">Good</option>
          <option value="5">Awesome</option>
        </select>
      </div>
    </div>
      </div><!--Row Div closed-->
      <div class="container text-center mb-4">
        <button class="shadow-lg btn btn-primary btn-lg text-white font-
weight-bold my-2" style="width:280px" type="submit">Predict</button>
      </div>
    </form>
{% endblock content %}
```

Forms.css

```
@import url('widgets.css');

/* FORM ROWS */

.form-row {
    overflow: hidden;
    padding: 10px;
    font-size: 13px;
    border-bottom: 1px solid #eee;
}

.form-row img, .form-row input {
```

```
    vertical-align: middle;
}

.form-row label input[type="checkbox"] {
    margin-top: 0;
    vertical-align: 0;
}

form .form-row p {
    padding-left: 0;
}

.hidden {
    display: none;
}

/* FORM LABELS */

label {
    font-weight: normal;
    color: #666;
    font-size: 13px;
}

.required label, label.required {
    font-weight: bold;
    color: #333;
}

/* RADIO BUTTONS */
```

```
form ul.radiolist li {
    list-style-type: none;
}

form ul.radiolist label {
    float: none;
    display: inline;
}

form ul.radiolist input[type="radio"] {
    margin: -2px 4px 0 0;
    padding: 0;
}

form ul.inline {
    margin-left: 0;
    padding: 0;
}

form ul.inline li {
    float: left;
    padding-right: 7px;
}

/* ALIGNED FIELDSETS */

.aligned label {
    display: block;
    padding: 4px 10px 0 0;
    float: left;
    width: 160px;
```

```
    word-wrap: break-word;
    line-height: 1;
}

.aligned label:not(.vCheckboxLabel):after {
    content: '';
    display: inline-block;
    vertical-align: middle;
    height: 26px;
}

.aligned label + p, .aligned label + div.help, .aligned label + div.readonly {
    padding: 6px 0;
    margin-top: 0;
    margin-bottom: 0;
    margin-left: 170px;
}

.aligned ul label {
    display: inline;
    float: none;
    width: auto;
}

.aligned .form-row input {
    margin-bottom: 0;
}

.colMS .aligned .vLargeTextField, .colMS .aligned .vXMLLargeTextField {
    width: 350px;
}
```

```
form .aligned ul {
    margin-left: 160px;
    padding-left: 10px;
}

form .aligned ul.radiolist {
    display: inline-block;
    margin: 0;
    padding: 0;
}

form .aligned p.help,
form .aligned div.help {
    clear: left;
    margin-top: 0;
    margin-left: 160px;
    padding-left: 10px;
}

form .aligned label + p.help,
form .aligned label + div.help {
    margin-left: 0;
    padding-left: 0;
}

form .aligned p.help:last-child,
form .aligned div.help:last-child {
    margin-bottom: 0;
    padding-bottom: 0;
}
```

```
form .aligned input + p.help,
form .aligned textarea + p.help,
form .aligned select + p.help,
form .aligned input + div.help,
form .aligned textarea + div.help,
form .aligned select + div.help {
    margin-left: 160px;
    padding-left: 10px;
}

form .aligned ul li {
    list-style: none;
}

form .aligned table p {
    margin-left: 0;
    padding-left: 0;
}

.aligned .vCheckboxLabel {
    float: none;
    width: auto;
    display: inline-block;
    vertical-align: -3px;
    padding: 0 0 5px 5px;
}

.aligned .vCheckboxLabel + p.help,
.aligned .vCheckboxLabel + div.help {
    margin-top: -4px;
```

```
}

.colM .aligned .vLargeTextField, .colM .aligned .vXMLLargeTextField {
    width: 610px;
}

.checkbox-row p.help,
.checkbox-row div.help {
    margin-left: 0;
    padding-left: 0;
}

fieldset .fieldBox {
    float: left;
    margin-right: 20px;
}

/* WIDE FIELDSETS */

.wide label {
    width: 200px;
}

form .wide p,
form .wide input + p.help,
form .wide input + div.help {
    margin-left: 200px;
}

form .wide p.help,
form .wide div.help {
```

```
    padding-left: 38px;
}

form div.help ul {
    padding-left: 0;
    margin-left: 0;
}

.colM fieldset.wide .vLargeTextField, .colM fieldset.wide .vXMLLargeTextField
{
    width: 450px;
}

/* COLLAPSED FIELDSETS */

fieldset.collapsed * {
    display: none;
}

fieldset.collapsed h2, fieldset.collapsed {
    display: block;
}

fieldset.collapsed {
    border: 1px solid #eee;
    border-radius: 4px;
    overflow: hidden;
}

fieldset.collapsed h2 {
    background: #f8f8f8;
    color: #666;
```

```
}

fieldset .collapse-toggle {
    color: #fff;
}

fieldset.collapsed .collapse-toggle {
    background: transparent;
    display: inline;
    color: #447e9b;
}

/* MONOSPACE TEXTAREAS */

fieldset.monospace textarea {
    font-family: "Bitstream Vera Sans Mono", Monaco, "Courier New", Courier,
monospace;
}

/* SUBMIT ROW */

.submit-row {
    padding: 12px 14px;
    margin: 0 0 20px;
    background: #f8f8f8;
    border: 1px solid #eee;
    border-radius: 4px;
    text-align: right;
    overflow: hidden;
}

body.popup .submit-row {
```

```
    overflow: auto;
}

.submit-row input {
    height: 35px;
    line-height: 15px;
    margin: 0 0 0 5px;
}

.submit-row input.default {
    margin: 0 0 0 8px;
    text-transform: uppercase;
}

.submit-row p {
    margin: 0.3em;
}

.submit-row p.deletelink-box {
    float: left;
    margin: 0;
}

.submit-row a.deletelink {
    display: block;
    background: #ba2121;
    border-radius: 4px;
    padding: 10px 15px;
    height: 15px;
    line-height: 15px;
    color: #fff;
```

```
}

.submit-row a.closelink {
    display: inline-block;
    background: #bbbbbb;
    border-radius: 4px;
    padding: 10px 15px;
    height: 15px;
    line-height: 15px;
    margin: 0 0 0 5px;
    color: #fff;
}

.submit-row a.deletelink:focus,
.submit-row a.deletelink:hover,
.submit-row a.deletelink:active {
    background: #a41515;
}

.submit-row a.closelink:focus,
.submit-row a.closelink:hover,
.submit-row a.closelink:active {
    background: #aaaaaa;
}

/* CUSTOM FORM FIELDS */

.vSelectMultipleField {
    vertical-align: top;
}
```

```
.vCheckboxField {
    border: none;
}

.vDateField, .vTimeField {
    margin-right: 2px;
    margin-bottom: 4px;
}

.vDateField {
    min-width: 6.85em;
}

.vTimeField {
    min-width: 4.7em;
}

.vURLField {
    width: 30em;
}

.vLargeTextField, .vXMLLargeTextField {
    width: 48em;
}

.flatpages-flatpage #id_content {
    height: 40.2em;
}

.module table .vPositiveSmallIntegerField {
    width: 2.2em;
```

```
}

.vTextField, .vUUIDField {
    width: 20em;
}

.vIntegerField {
    width: 5em;
}

.vBigIntegerField {
    width: 10em;
}

.vForeignKeyRawIdAdminField {
    width: 5em;
}

/* INLINES */

.inline-group {
    padding: 0;
    margin: 0 0 30px;
}

.inline-group thead th {
    padding: 8px 10px;
}

.inline-group .aligned label {
    width: 160px;
```

```
}

.inline-related {
    position: relative;
}

.inline-related h3 {
    margin: 0;
    color: #666;
    padding: 5px;
    font-size: 13px;
    background: #f8f8f8;
    border-top: 1px solid #eee;
    border-bottom: 1px solid #eee;
}

.inline-related h3 span.delete {
    float: right;
}

.inline-related h3 span.delete label {
    margin-left: 2px;
    font-size: 11px;
}

.inline-related fieldset {
    margin: 0;
    background: #fff;
    border: none;
    width: 100%;
}
```

```
.inline-related fieldset.module h3 {
    margin: 0;
    padding: 2px 5px 3px 5px;
    font-size: 11px;
    text-align: left;
    font-weight: bold;
    background: #bcd;
    color: #fff;
}

.inline-group .tabular fieldset.module {
    border: none;
}

.inline-related.tabular fieldset.module table {
    width: 100%;
}

.last-related fieldset {
    border: none;
}

.inline-group .tabular tr.has_original td {
    padding-top: 2em;
}

.inline-group .tabular tr td.original {
    padding: 2px 0 0 0;
    width: 0;
    _position: relative;
```

```
}

.inline-group .tabular th.original {
    width: 0px;
    padding: 0;
}

.inline-group .tabular td.original p {
    position: absolute;
    left: 0;
    height: 1.1em;
    padding: 2px 9px;
    overflow: hidden;
    font-size: 9px;
    font-weight: bold;
    color: #666;
    _width: 700px;
}

.inline-group ul.tools {
    padding: 0;
    margin: 0;
    list-style: none;
}

.inline-group ul.tools li {
    display: inline;
    padding: 0 5px;
}

.inline-group div.add-row,
```

```
.inline-group .tabular tr.add-row td {
    color: #666;
    background: #f8f8f8;
    padding: 8px 10px;
    border-bottom: 1px solid #eee;
}

.inline-group .tabular tr.add-row td {
    padding: 8px 10px;
    border-bottom: 1px solid #eee;
}

.inline-group ul.tools a.add,
.inline-group div.add-row a,
.inline-group .tabular tr.add-row td a {
    background: url(../img/icon-addlink.svg) 0 1px no-repeat;
    padding-left: 16px;
    font-size: 12px;
}

.empty-form {
    display: none;
}

/* RELATED FIELD ADD ONE / LOOKUP */

.add-another, .related-lookup {
    margin-left: 5px;
    display: inline-block;
    vertical-align: middle;
    background-repeat: no-repeat;
```

```
    background-size: 14px;
}

.add-another {
    width: 16px;
    height: 16px;
    background-image: url(../img/icon-addlink.svg);
}

.related-lookup {
    width: 16px;
    height: 16px;
    background-image: url(../img/search.svg);
}

form .related-widget-wrapper ul {
    display: inline-block;
    margin-left: 0;
    padding-left: 0;
}

.clearable-file-input input {
    margin-top: 0;
}
```

Login.css

```
/* LOGIN FORM */

body.login {
    background: #f8f8f8;
}
```

```
.login #header {
    height: auto;
    padding: 15px 16px;
    justify-content: center;
}

.login #header h1 {
    font-size: 18px;
}

.login #header h1 a {
    color: #fff;
}

.login #content {
    padding: 20px 20px 0;
}

.login #container {
    background: #fff;
    border: 1px solid #eaeaea;
    border-radius: 4px;
    overflow: hidden;
    width: 28em;
    min-width: 300px;
    margin: 100px auto;
}

.login #content-main {
    width: 100%;
```

```
}

.login .form-row {
    padding: 4px 0;
    float: left;
    width: 100%;
    border-bottom: none;
}

.login .form-row label {
    padding-right: 0.5em;
    line-height: 2em;
    font-size: 1em;
    clear: both;
    color: #333;
}

.login .form-row #id_username, .login .form-row #id_password {
    clear: both;
    padding: 8px;
    width: 100%;
    -webkit-box-sizing: border-box;
       -moz-box-sizing: border-box;
            box-sizing: border-box;
}

.login span.help {
    font-size: 10px;
    display: block;
}
```

```
.login .submit-row {
    clear: both;
    padding: 1em 0 0 9.4em;
    margin: 0;
    border: none;
    background: none;
    text-align: left;
}

.login .password-reset-link {
    text-align: center;
}
```

Urls.py

```
from django.urls import path
from face import views

urlpatterns = [
    path('', views.indexView, name="home"),
    path('prediction', views.predictionView, name="prediction"),
]
```

Views.py

```
import sys
import warnings
import numpy as np
import joblib
if not sys.warnoptions:
    warnings.simplefilter("ignore")
```

```
from django.shortcuts import render
#loading model
with open("model/model2.pkl", "rb") as file:
    model = joblib.load(file)
# Create your views here.
def indexView(request):
    return render(request, "face/index.html")

def predictionView(request):
    if request.method == "POST":
        gender = request.POST["gender"]
        age = request.POST["age"]
        location = request.POST["location"]
        famsize = request.POST["famsize"]
        traveltime = request.POST["traveltime"]
        studytime = request.POST["studytime"]
        failures = request.POST["failures"]
        paid = request.POST["paid"]
        activities = request.POST["activities"]
        nursery = request.POST["nursery"]
        higher = request.POST["higher"]
        internet = request.POST["internet"]
        freetime = request.POST["freetime"]
        health = request.POST["health"]



        data = np.array([gender, age, location, famsize, traveltime,
studytime, failures,
                         paid, activities, nursery, higher,
internet,freetime, health]).reshape(-1,14)
        result = model.predict(data)[0]
```

```
        print(result) #debug
        context = {"result" : result}
        return render(request, "face/result.html", context)
    return render(request, "face/prediction.html")
```

apps.py

```
from django.apps import AppConfig


class FaceConfig(AppConfig):
    name = 'face'
```

manage.py

```
#!/usr/bin/env python
"""Django's command-line utility for administrative tasks."""
import os
import sys
def main():
    os.environ.setdefault('DJANGO_SETTINGS_MODULE', 'base.settings')
    try:
        from django.core.management import execute_from_command_line
    except ImportError as exc:
        raise ImportError(
            "Couldn't import Django. Are you sure it's installed and "
            "available on your PYTHONPATH environment variable? Did you "
            "forget to activate a virtual environment?"
        ) from exc
    execute_from_command_line(sys.argv)
if __name__ == '__main__':
    main()
```

RESULT

Process to run the code and generate the output through local host.

i. Go to Vs code or any IDE

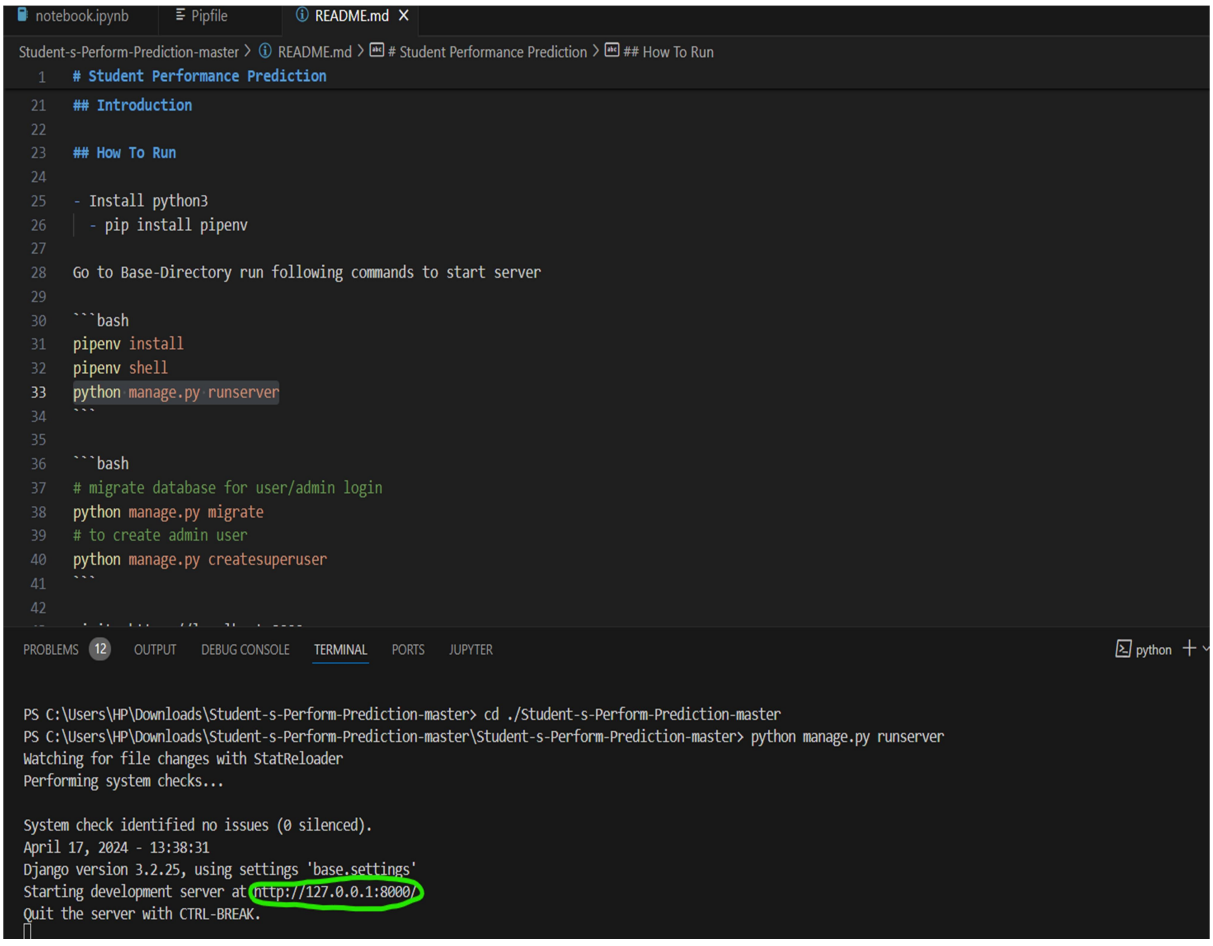
ii. Open terminal

iii. Go to specific folder in this project >> cd ./Student-Performance-Prediction

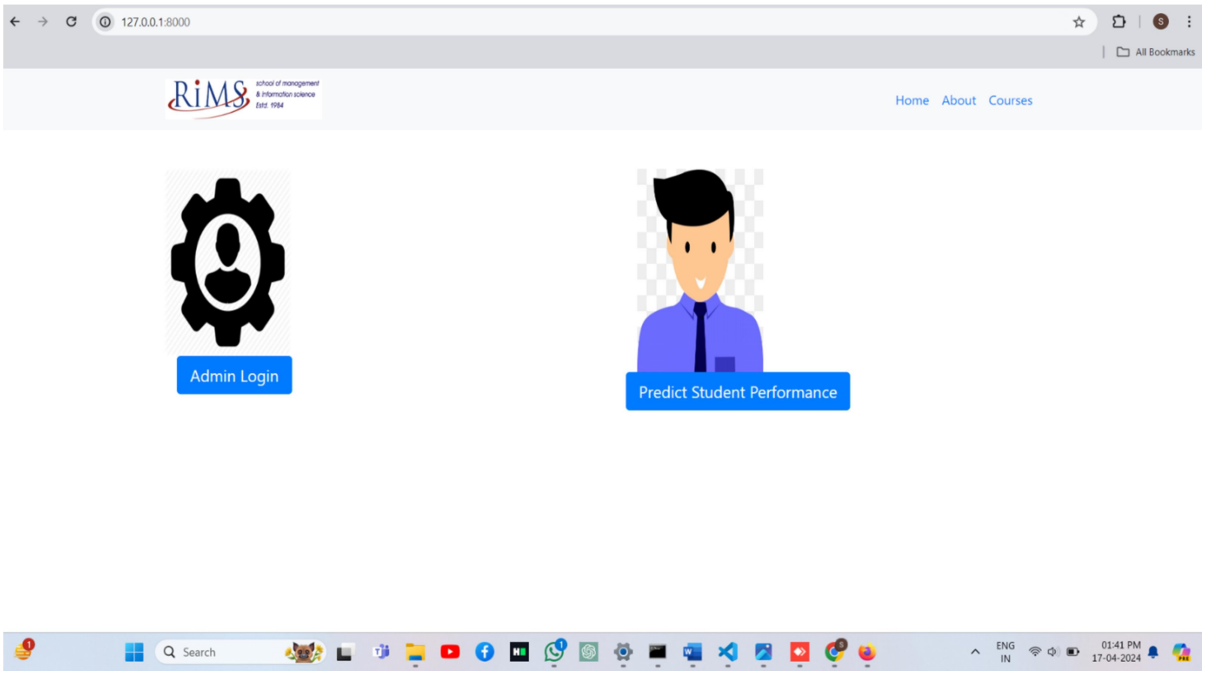
iv. Type >> python manage.py runserver

v. Press enter

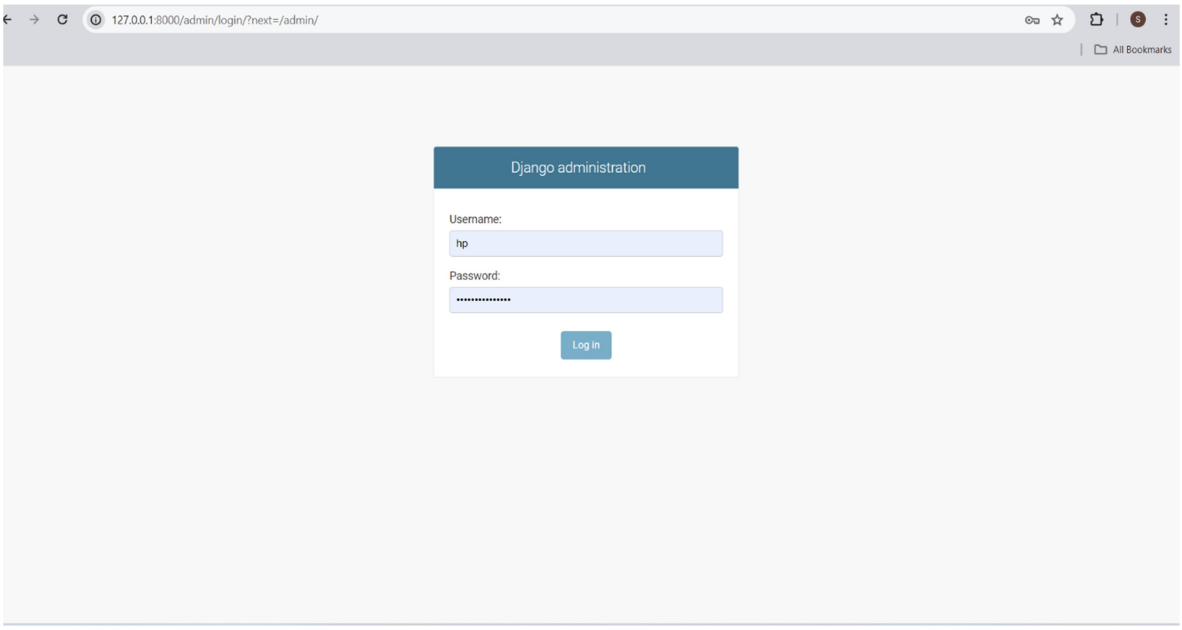
vi. The project ran on http://127.0.0.1:8000/



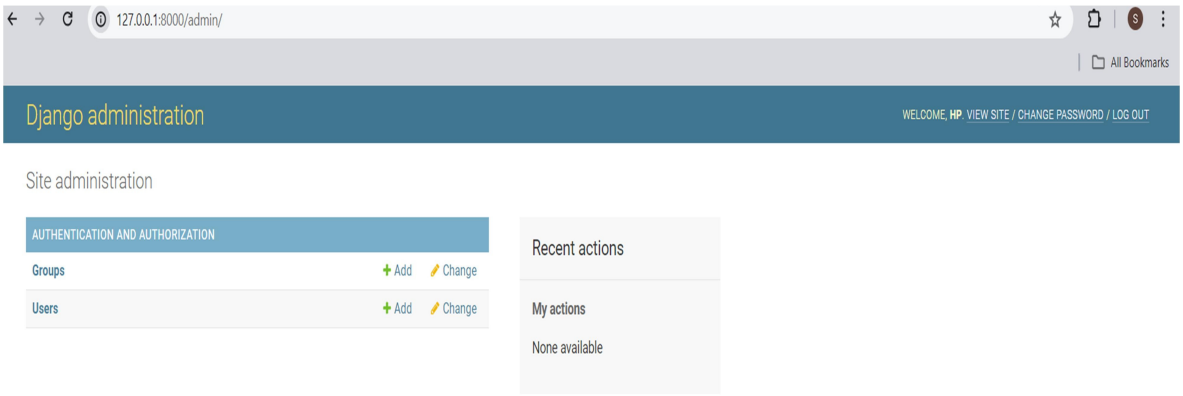
Here user can choose any one option if a ADMIN they can logged in into the system by Admin login, other user need to choose Student option.



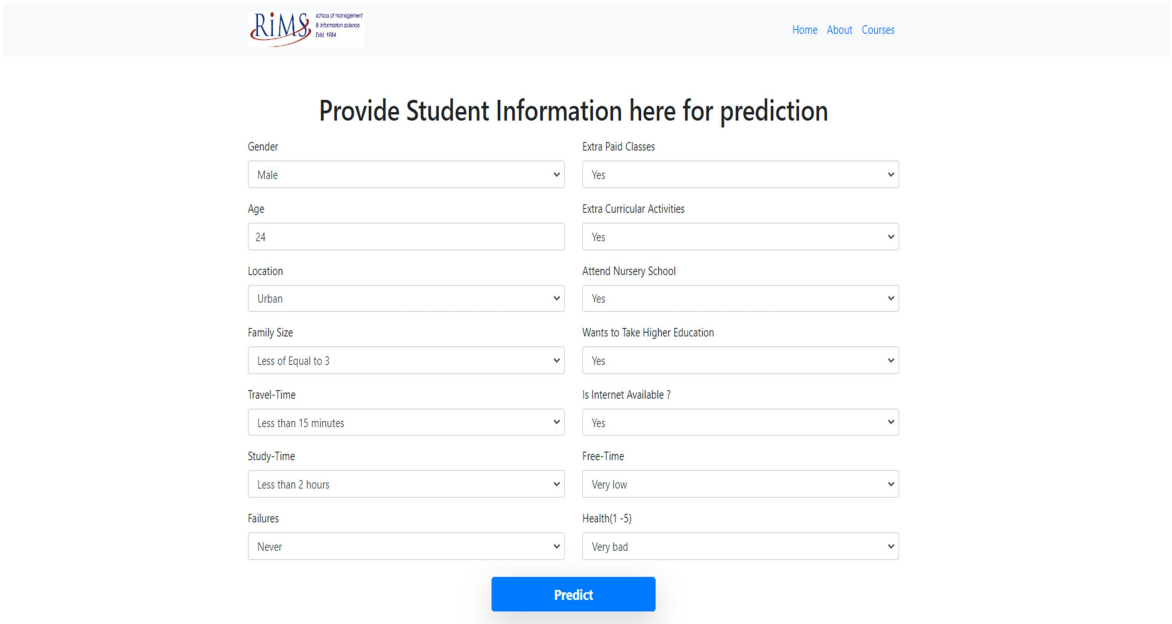
Admin login screen: Admin need to put their username and password in the below dialogue box.



After admin login the admin logged dashboard

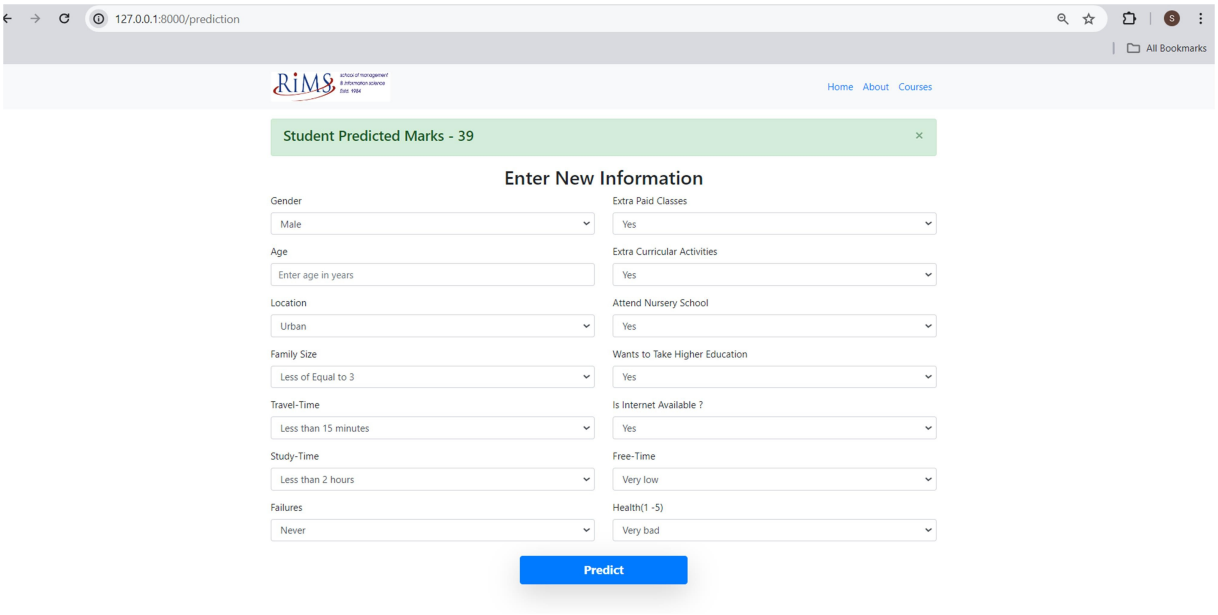


On student login the below UI will appear.



On putting the values, the prediction screen will look like this.

`



CONCLUSION

In this chapter the research aim along with some reflections are presented.

1. Generate data insights to further understand patterns in the student wellbeing data. The key data insights related to the impact of gender and age on reported well-being, and the relationships between various well-being dimensions.

2. Design a model using ML methods to predict student grades based on well-being data, and validate the model against actual performance data provided by the schools.

3. Carry out an ethical evaluation of the data analysis and grade prediction model using Value Sensitive Design.

The scientific contribution of this thesis is to provide information for educators to understand the factors influencing student performance and well-being. Implementing the predictive model in schools may help identify students who are at risk of failing, allowing for timely interventions and support. However, it is crucial to consider the social implications of using a technology-driven approach for academic performance prediction. The model's accuracy and potential misclassifications must be balanced with the ethical considerations and potential impacts on students' well-being and educational experiences. This thesis also highlights these ethical considerations. With new AI and machine learning breakthroughs every few months, and a lot of money at stake, developers of educational technology are often scrambling to release new products before their competitors, meaning that ethical considerations are often an afterthought. This can have harmful implications for many stakeholders, resulting in conflicts and negative consequences for the company itself if their reputation becomes damaged by engaging in unethical practices. Learning how to incorporate ethical values into Learning Analytics technology using techniques such as Value Sensitive Design is therefore crucial.

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END