

Student Performance Analysis Software using Python, MySQL & Power BI

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ABSTRACT:

In education, assessing student performance and understanding learning patterns are critical tasks for educators and administrators. Every university has its own method of storing and accessing data. Mostly data is stored in form of files, document, records etc. hence while analyzing individuals it becomes hectic and time-consuming as data is stored in unorganized textual form.

To tackle this problem, this project proposes a system named Student Performance Analysis System (SPAS) using AI, POWERBI and DBMS to keep track of college data. In order to get required benefits from such big data, powerful tools are required. The available statistics could be analyzed to extract beneficial facts. With these tools any authority can access individuals' data in charts and graphical format. Making it much easier for understanding and analyzing.

Keywords: Student Management System, DBMS, Power BI, SQL, Objective Based Education

INTRODUCTION:

Every university/college has a management system in place that is required to keep specific student records. The number of students attending college rises along with it, and so does the amount of content about them. With an enormous increase in data daily, it is expected to gather the student information management system to improve the efficiency and performance of management.

The majority of people on the planet now use the Internet in their daily lives. People perform various tasks on the Internet; one of them is

storing their data in a database where they are interested. In those databases, they are able to post the queries and retrieve the required information. There is a need for Student Information System software to manage students' data that helps in providing the required data with time efficiency, make all these data accessible on the online interface[1].

There are many management departments to oversee college information and student databases in any group. All these departments provide various records concerning students. Most of these track records are needed to

preserve information about the students. These facts will be the overall details like scholar name, cope with, performance, attendance, or specific facts associated with departments like statistics series. All the modules in university management are interdependent & maintained manually.

So, they want to be automated and centralized as facts from one module can be wished by different modules to share course content and track students' progress.

The "Student Performance Analysis Software for Object-Based Education" is a groundbreaking project that seeks to address this pressing need of empowering educators and institutions with a comprehensive solution for managing, analyzing, and optimizing student performance in the context of object-based education[2]. By seamlessly integrating the power of MySQL and Python, it offers a versatile and sophisticated platform to facilitate the transition from traditional teaching methods to dynamic, interactive, and object-based learning experiences.

The proposed system will show the outcomes of pupil overall performance on a single click motion by way of the consumer, for that reason implementing automation and minimizing the efforts of workforce in analyzing pupil overall progress manually. The designed system finds student trends based on student's academic performance outcomes, strengths, weaknesses, attendance, and extra-curricular activities. Academic data includes Unit tests, students' Theory, Practical and Term work marks. This data collected will be processed by the classification algorithm of Data Mining[3].

A result from this algorithm will be ginned as Trend. This graph will help us to track where the students are doing good and where not and what their abilities that can be worked upon. The analysis will summarize the outcome and will classify students based on their results.

In the contemporary landscape of education, the emergence of object-based and digital learning systems has revolutionized the way students engage with educational content. Object-based education, with its emphasis on interactive and immersive learning experiences, has gained significant popularity for its ability to cater to diverse learning styles and engage students in ways that traditional methods often struggle to achieve. However, with the increasing adoption of these novel educational approaches, the need for effective tools to assess and enhance student performance within these environments has become evident.

There are some objectives that are identified during the research of this system:

- ❖ To develop a system for Students' Performance Analysis.
- ❖ To assist the lecturers in analyzing and predicting student performance in course System. Analysis and Design by

using AI, DBMS, and Power BI in the designed system.

- ❖ To identify the factors that affects the students.
- ❖ To help faculties in keeping track of the students' progress throughout their academic year.

Literature Review:

In recent years, the application of artificial intelligence (AI) in analyzing student data has garnered significant attention in educational research. This literature review aims to provide an overview of key studies and developments in student analysis using AI techniques[4].

1)Predictive Analytics for Student Success:

Numerous studies have explored the use of machine learning algorithms to predict student outcomes and identify at-risk individuals. For example, Baker and Siemens (2014) utilized predictive modeling techniques to forecast student dropout rates based on academic performance, engagement metrics, and demographic factors.

2)Personalized Learning Recommendations:

AI-powered recommendation systems have been employed to provide personalized learning pathways for students. Herodotus et al. (2019) investigated the effectiveness of personalized learning recommendations generated through machine learning algorithms, demonstrating improved student engagement and performance outcomes.

3)Natural Language Processing in Educational Assessment:

Natural language processing (NLP) techniques have been leveraged to analyze text-based student assessments and provide meaningful feedback. Balyan developed an NLP framework to assess student essays, identify linguistic patterns and provide targeted feedback to enhance writing proficiency[5].

In conclusion, the integration of AI technologies holds immense potential for transforming student analysis and informing data-driven decision-making processes in education. By leveraging advanced AI algorithms and techniques, educators can gain deeper insights into student learning behaviors, tailor instructional interventions, and foster inclusive learning environments conducive to academic success. However, it is essential to address ethical considerations and ensure the responsible deployment of AI systems to uphold principles of equity, transparency, and accountability in educational practice.

Flowchart:

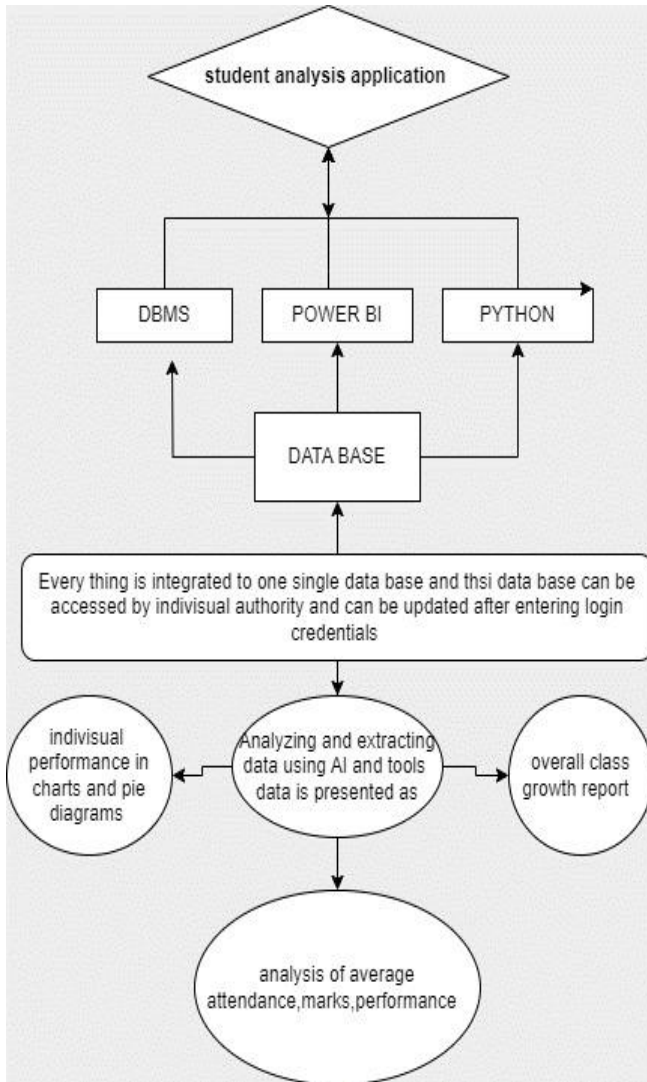
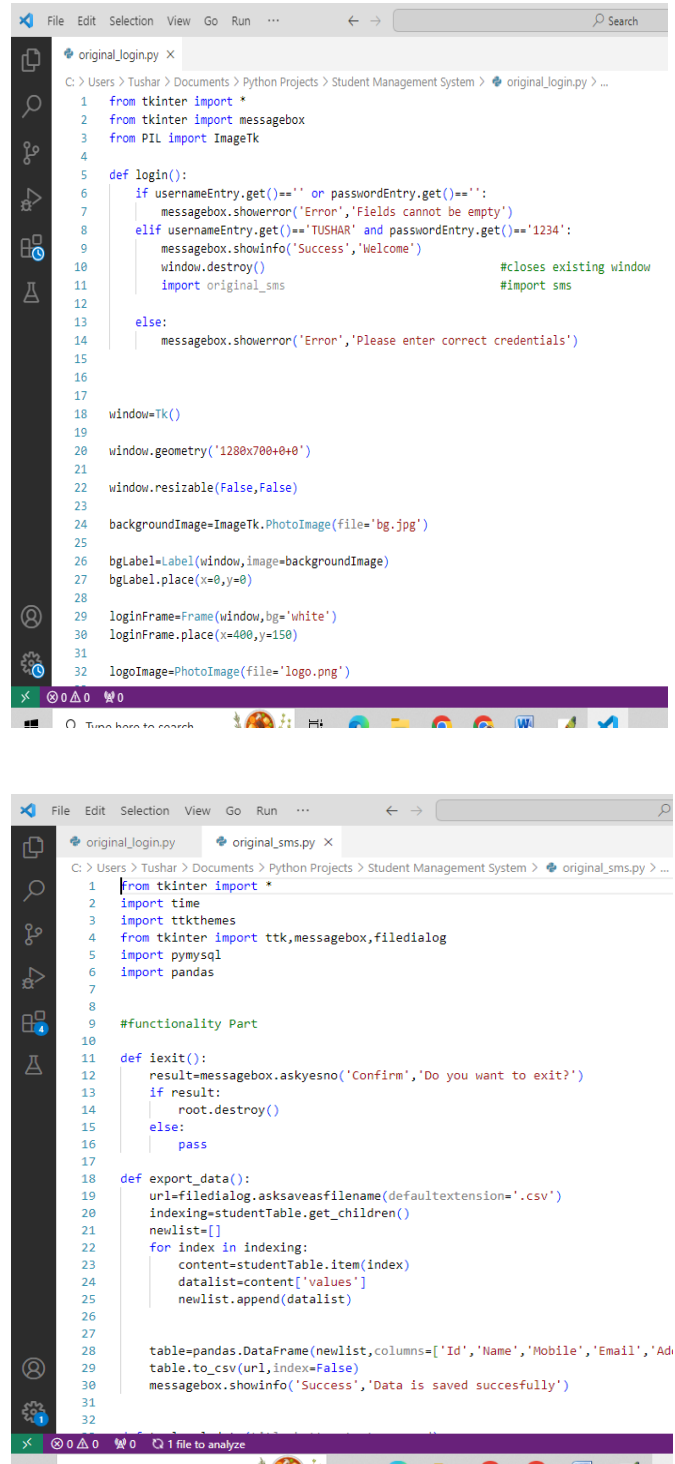


Fig 1: Flowchart of Application

Project Code:



```

original_login.py X
C:\Users> Tushar > Documents > Python Projects > Student Management System > original_login.py > ...
1 from tkinter import *
2 from tkinter import messagebox
3 from PIL import ImageTk
4
5 def login():
6     if usernameEntry.get()==' ' or passwordEntry.get()==' ':
7         messagebox.showerror('Error','Fields cannot be empty')
8     elif usernameEntry.get()=='TUSHAR' and passwordEntry.get()=='1234':
9         messagebox.showinfo('Success','Welcome')
10        window.destroy() #closes existing window
11        import original_sms #import sms
12
13    else:
14        messagebox.showerror('Error','Please enter correct credentials')
15
16
17
18 window=Tk()
19
20 window.geometry('1288x700+0+0')
21
22 window.resizable(False,False)
23
24 backgroundImage=ImageTk.PhotoImage(file='bg.jpg')
25
26 bgLabel=Label(window,image=backgroundImage)
27 bgLabel.place(x=0,y=0)
28
29 loginFrame=Frame(window,bg='white')
30 loginFrame.place(x=400,y=150)
31
32 logoImage=PhotoImage(file='logo.png')
  
```

```

original_login.py original_sms.py X
C:\Users> Tushar > Documents > Python Projects > Student Management System > original_sms.py > ...
1 from tkinter import *
2 import time
3 import ttkthemes
4 from tkinter import ttk,messagebox,filedialog
5 import pymysql
6 import pandas
7
8 #functionality Part
9
10 def iexit():
11     result=messagebox.askyesno('Confirm','Do you want to exit?')
12     if result:
13         root.destroy()
14     else:
15         pass
16
17
18 def export_data():
19     url=filedialog.asksaveasfilename(defaultextension='.csv')
20     indexing=studentTable.get_children()
21     newlist=[]
22     for index in indexing:
23         content=studentTable.item(index)
24         datalist=content['values']
25         newlist.append(datalist)
26
27     table=pandas.DataFrame(newlist,columns=['Id','Name','Mobile','Email','Adi
28     table.to_csv(url,index=False)
29     messagebox.showinfo('Success','Data is saved succesfully')
30
31
32
  
```

Fig 2: Project Code Sample

Student management system for Object-based learning.

A Student Management System for Object-Based Learning (SOS-OBL) is a comprehensive software solution designed to support educators, students, and institutions in the administration, delivery, and assessment of object-based learning experiences[6]. Object-Based Learning (OBL) emphasizes the use of physical and digital objects as central elements in the educational process. Such a system plays a critical role in facilitating the transition from traditional teaching methods to dynamic, interactive, and immersive learning experiences.

Key Features of a Student Management System for Object-Based Learning:

- **User Authentication and Profiles:** User accounts for administrators, educators, and students, each with their respective roles and permissions, ensuring data security and privacy.
- **Course Management:** The system allows educators to create, manage, and organize courses, including the uploading and organization of object-based educational materials.
- **Enrollment and Student Profiles:** Streamlined enrollment processes and comprehensive student profiles that track their progress, assignments, and assessment results.
- **Object Repository:** A digital repository for storing and categorizing various objects,

both physical and digital, that will be used for teaching and learning purposes [7].

- **Interactive Object Access:** Students can access object-based learning materials, interact with objects digitally, and view related content, fostering a more engaging and immersive learning experience.
- **Performance Assessment:** Tools for educators to assess student performance, provide feedback, and track progress. This includes the ability to assess how students interact with and interpret objects.
- **Collaborative Learning:** Features that promote collaborative learning, such as group assignments or projects centered on objects.
- **Analytics and Reporting:** Data analytics and reporting capabilities that offer insights into learning trends and individual and class-wide performance[8].
- **Integration with Digital Tools:** Seamless integration with digital tools and resources, such as augmented reality (AR), virtual reality (VR), and interactive simulations, to enhance the learning experience.



Fig 3: Tools & Features

Database Management System used in the project

- MySQL is an open-source, widely adopted, and well-documented RDBMS that integrates seamlessly with Python. Here are some reasons why MySQL is a suitable choice for managing the database in your SOS-OBL project.
- Open Source: MySQL is an open-source database management system, which means it is freely available and can be customized to suit the needs of your project.
- Reliability: MySQL is famous for its reliability and robustness. It can handle substantial amounts of data and concurrent connections efficiently.
- Performance: MySQL offers high performance, making it suitable for applications where data retrieval and storage need to be fast and responsive.
- Scalability: MySQL can be scaled to accommodate the growth of data and users, making it a suitable choice for projects that may expand over time.
- Community Support: There is a vast and active community of developers and users who can provide support and resources for working with MySQL and Python[9].
- Security: MySQL provides a range of security features, including user authentication, encryption, and access control, which are crucial for protecting sensitive student and educational data.

Output Result:

Login Page:

The Software starts with the login page where the user has to put the login Id and Password from where they are able to access the software.



Fig 4: Faculty Login Page

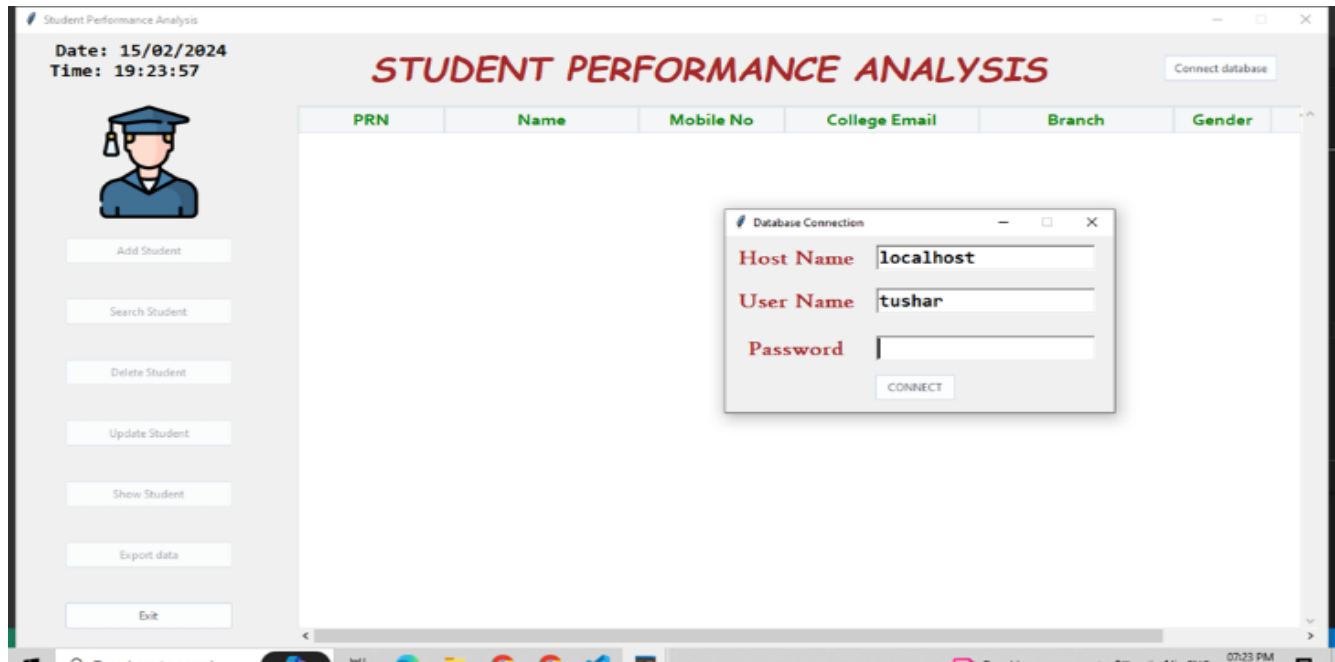


Fig 5: Connect Database

Student Performance Analysis window:

After login, the faculty member can add new students, search Data of student, update the current database.

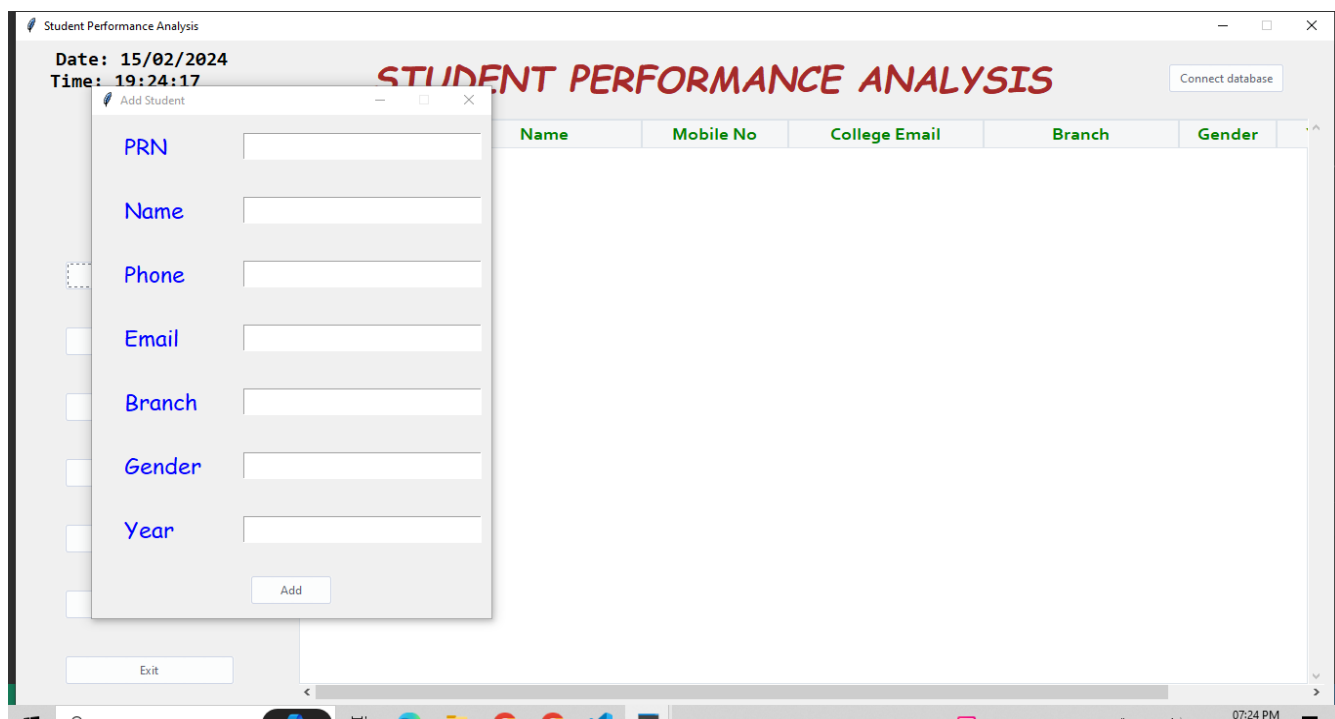


Fig 6: Adding/Updating Student

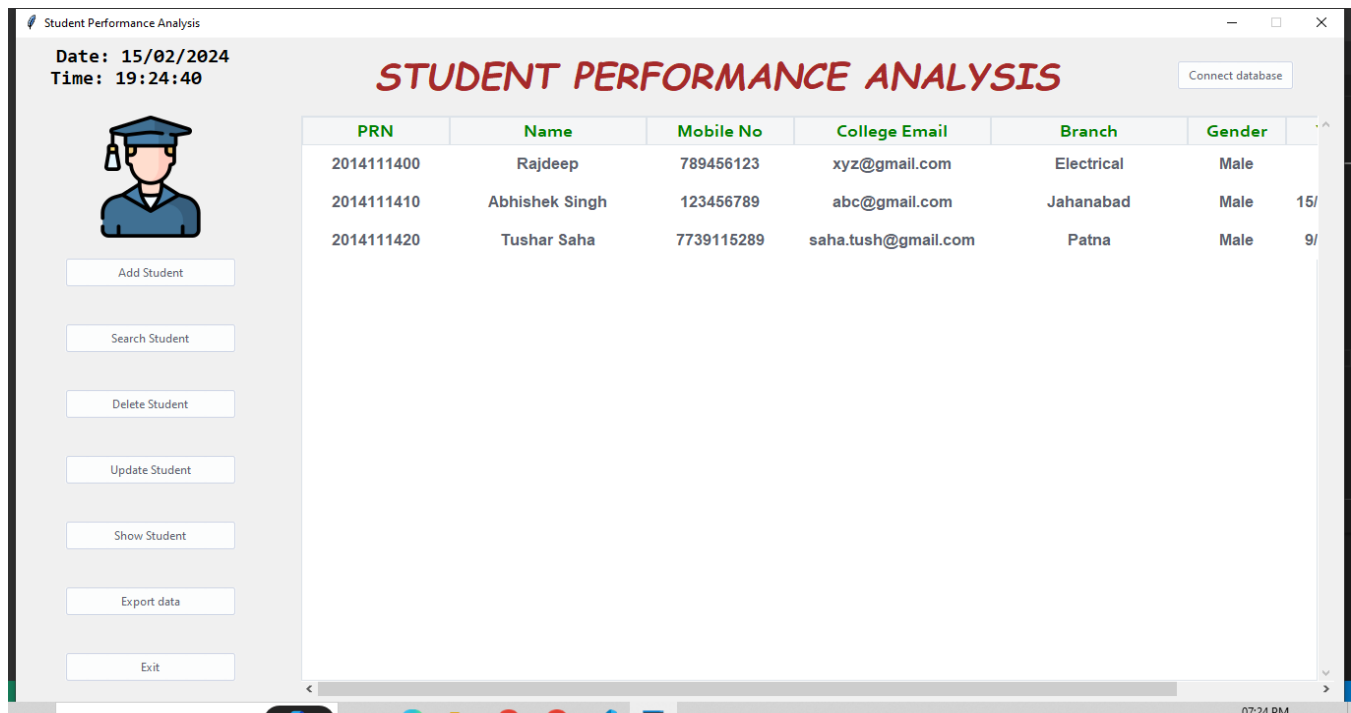


Fig 7: Viewing Datasets

Database system:

After the student performance analysis window the data is exported into CSV file which can be imported by the Excel or Power BI Software.

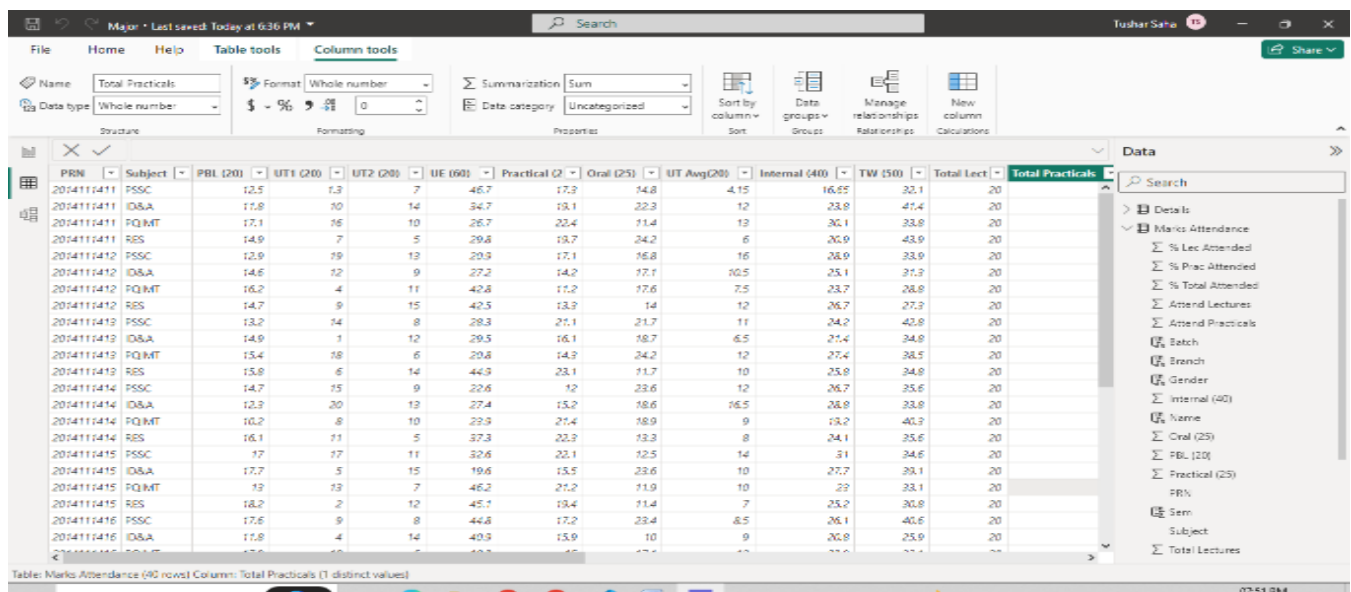


Fig 8: Power Query Editor

Power BI Software:

All the Data is imported into Power BI where the information about all the students individually and for whole class can be viewed with insights.

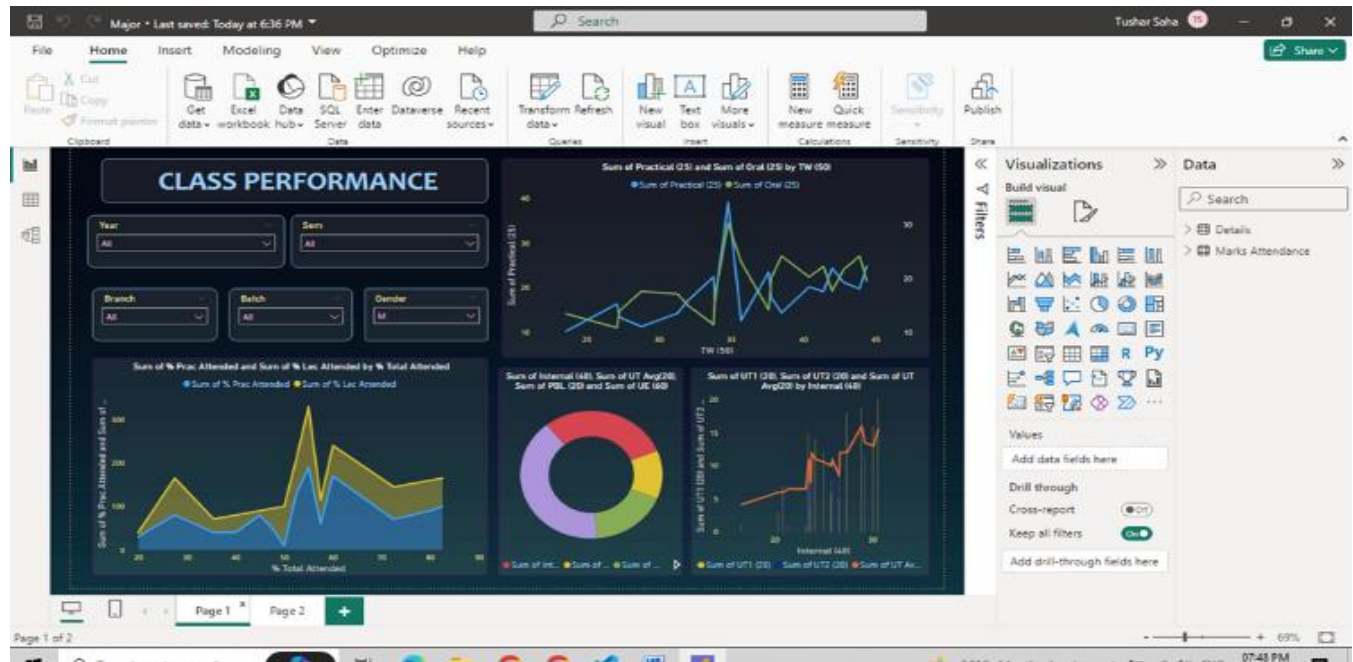


Fig 9: Power BI Dashboard

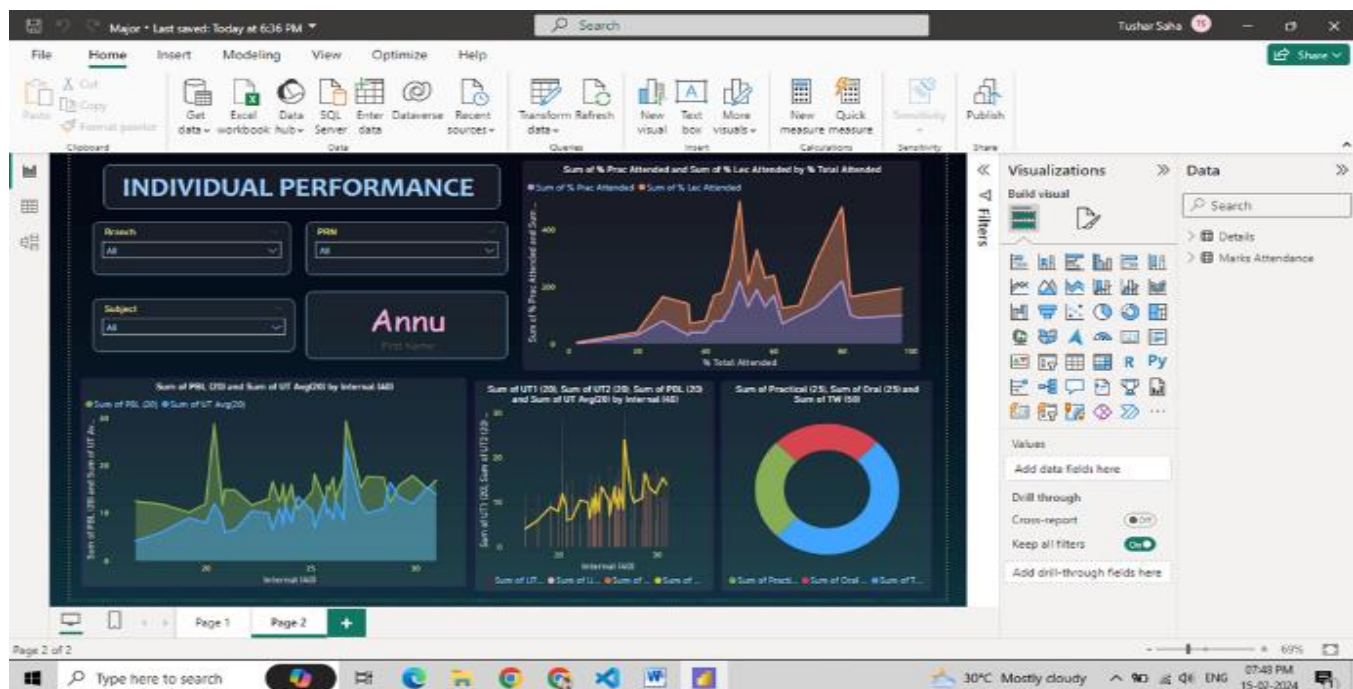


Fig 10: Dashboard with Filters

RESULT & DISCUSSION:

Hence we came out with the result that this software is the present needs of universities & institutions for better understanding of growth & performance of individuals, as well as batch. It is beneficial for both student's point of view & teachers too. With this analysis pupil can see which areas they need to focus on & put their effort to get maximum growth.

The New Education Policy which aims to revolutionize the Indian Education System by emphasizing holistic development, flexibility, and innovation. One of its key pillars is Object-Based Education, which shifts the focus from rote learning to experiential learning. Object-based education encourages students to learn through direct interaction with real-life objects and experiences rather than solely relying on textbooks or lectures.

This approach promotes critical thinking, problem-solving skills, and a deeper understanding of concepts by engaging students in hands-on activities and exploration. It develops creativity, curiosity, and a passion for learning, making education more meaningful and enjoyable for students.

It prepares students for the challenges of the 21st century and nurtures them to become lifelong learners & empowers students to thrive in a rapidly changing world.

CONCLUSION:

In conclusion, the project focuses at the research & development of a software for student overall performance evaluation. A data analytical technique with classification algorithm is applied in this project to ensure the trend & prediction of the student performance in System Analysis and Design is possible. The main impact of the SPAS is that it guides the faculties in conducting Student Evaluation. The software assists faculties in figuring out the scholars which can be predicted to score low, besides SPAS assists teachers to retrieve statistics in their college students' performance in the course of the semesters in marks and attendance.