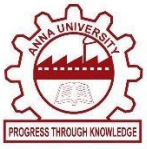


Project Title : Unleashing the potential of your youth : A student performance analysis

Project Submitted to : IBM

Year : 4th year

Department : Artificial Intelligence and Data Science

Semester : 7th Semester

Team ID : NM2023TMID00765

Team Size : 4

Team Leader : Harini K

Team Member : Swathi V

Team Member : Hema S

Team Member : Swathy R

Guided by : Mercy – Assistant Professor, Department of Artificial Intelligence and Data Science, AIHT, Anna university

1.INTRODUCTION

1.1 Project Overview

A country's growth is strongly measured by quality of its education system. Education sector, across the globe has witnessed sea change in its functioning. Today it is recognized as an industry and like any other industry it is facing challenges, the major challenges of higher education being decrease in students' success rate and their leaving a course without completion.

Analysing student work is an essential part of teaching. Teachers assign, collect and examine student work all the time to assess student learning and to revise and improve teaching. Ongoing assessment of student learning allows teachers to engage in continuous quality improvement of their courses. Many factors can influence a student's performance, including the influence of the parents' educational background, test preparation and so on.

The dataset contains the marks secured by 1000 students from a school. This project analyses and correlates student performance with different attributes. The analysis aims to understand the influence of important factors such as parental level of education, the status of test preparation course etc. on the performance of the students in the exams.

1.2 Purpose

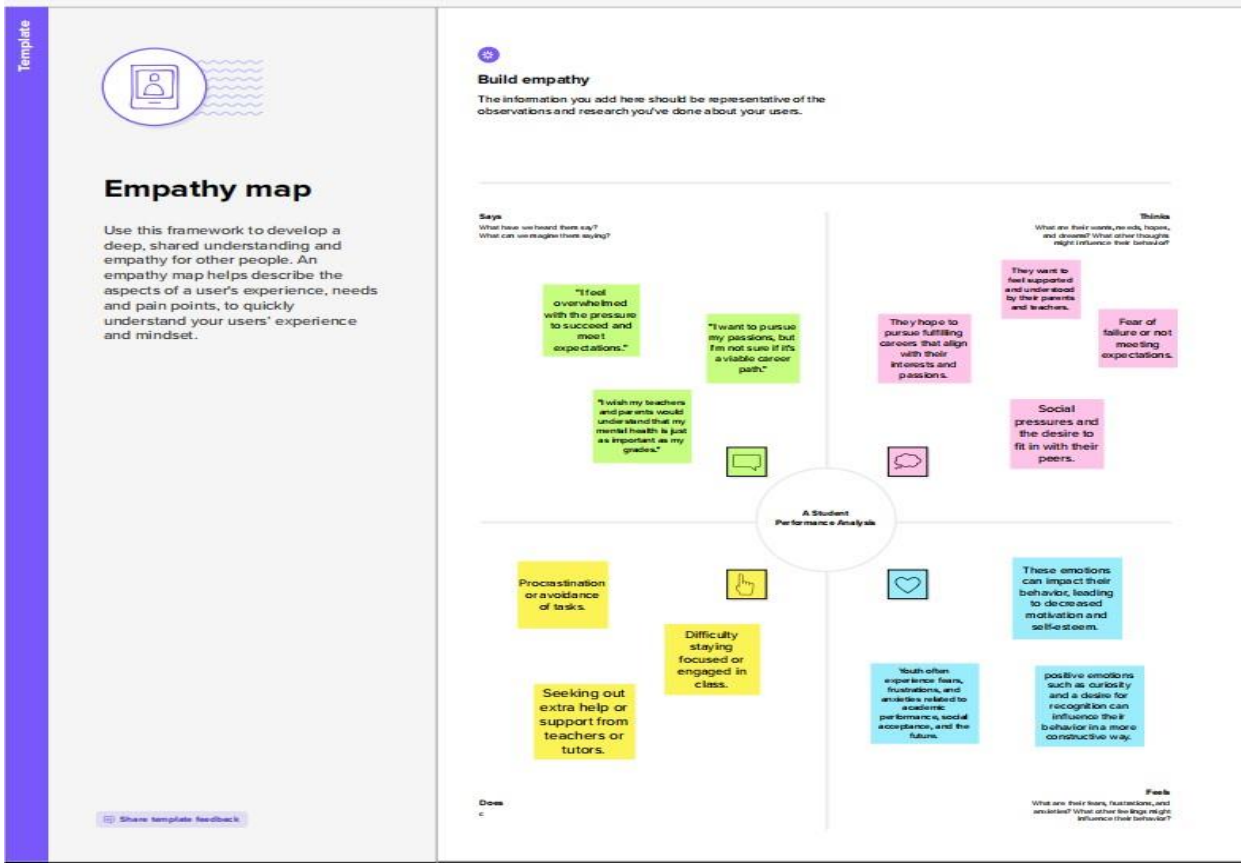
In today’s world technology has reached to extent that it can be used to do various task in day-to-day life easily with less effort and time. World today has realized importance of education in one’s life which has led to revolution in field of education. Universities, colleges, schools today have loads of task to be completed in given timeline. In today’s scenario colleges needs to analyse student performance manually which takes a lot of time and effort by faculties working on it. Hence in order to simplify this task a web-based system is introduced which can perform student performance analysis system. Student Performance Analysis System provides a interface for school maintenance. It can used by educational institutes or coaching classes to analyse the student performance easily.

2. Ideation and Proposed Solution

2.1 Problem statement definition

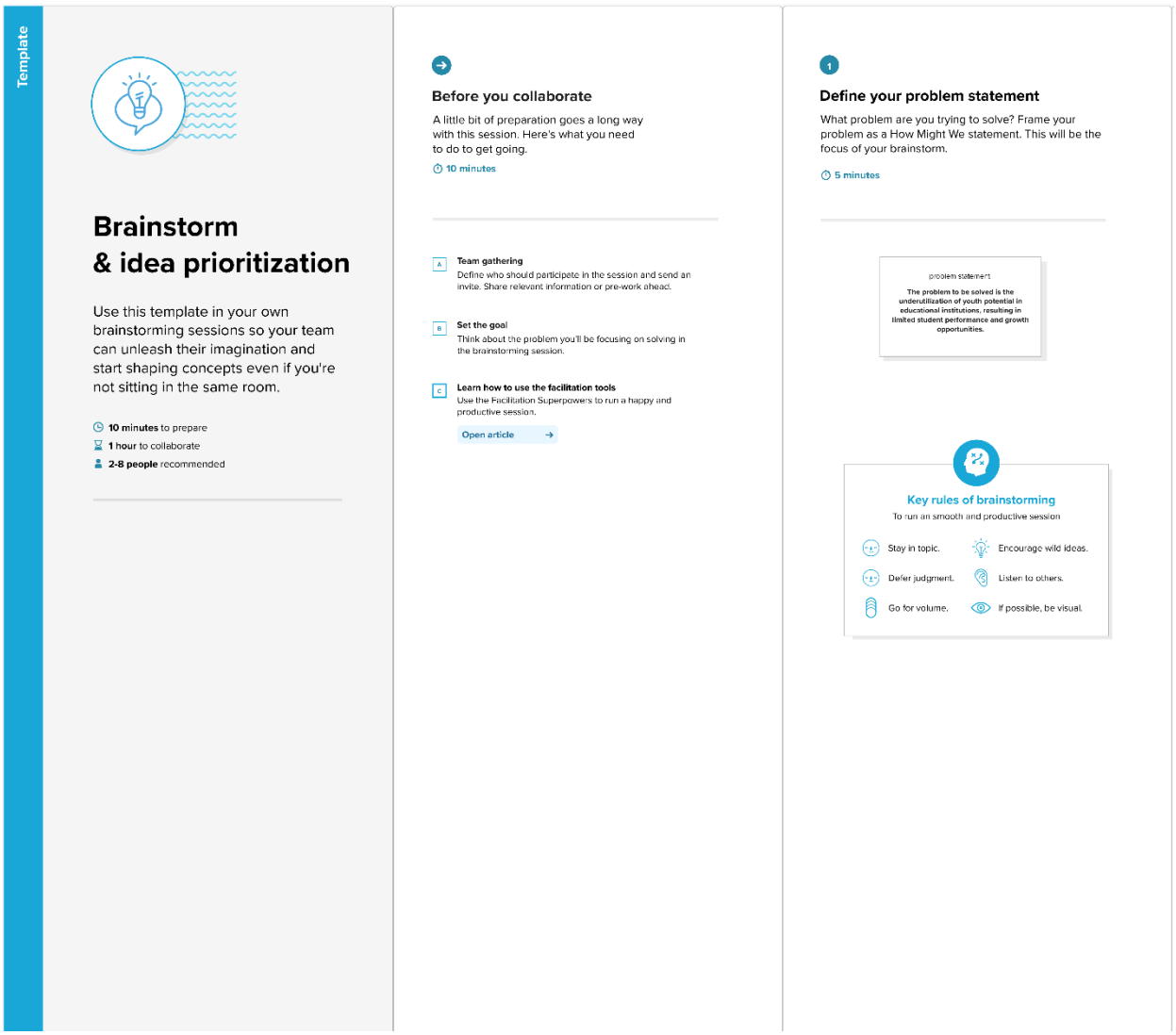
Implement the bootstrap, HTML, CSS, JavaScript for the formation of an application which is used by students & teachers to represent & analyse their performance monthly, yearly basis in the tabular form & graph. The goal of online student performance analysis system is to develop software produce high quality software. For any school, college or other educational institute, students are an important asset in order to of great quality who excel in academics, practical knowledge, self-development and innovative thinking. To achieve this, it is become essential for every school, college or any other educational institute to analyse the performance of students. Academic performance (AP) can be measured by conducting various examinations, assessments and other form of measurements. Managing the grades of an entire class in its learning makes the grading process easier, and the teachers have a clearly-set-out overview.

2.2 Empathy map canvas



2.3 Ideation and Brainstorming

Step-1: Team Gathering, Collaboration and Select the Problem Statement



Step-2: Brainstorm, Idea Listing and Grouping

2

Brainstorm

Write down any ideas that come to mind that address your problem statement.

10 minutes

TIP

You can select a color type and hit the pencil (switch to sketch) icon to start drawing!

Harini K

Implement personalized learning plans for students, allowing them to explore their interests and talents.

Establish mentorship programs where older students or professionals guide and inspire younger students.

Swathy R

Develop peer tutoring programs that allow students to teach and learn from each other, promoting a sense of responsibility and shared growth.

Create partnerships with local businesses and organizations to offer internship opportunities to students, allowing them to gain real-world experience.

Swathi V

Provide career counseling and expose students to various careers and industries. This can broaden their horizons and motivate them to aim higher.

Emphasize project-based learning that allows students to apply their knowledge and skills in real-world contexts

Hema S

Integrate educational technology to provide personalized resources and opportunities for students to explore and expand their interests.

Involve the community in educational initiatives, such as bringing in local professionals for career talks and workshops.

3

Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. Once all sticky notes have been grouped, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you and break it up into smaller sub-groups.

20 minutes

TIP

Add customizable tags to sticky notes to make it easier to find, browse, organize, and categorize important ideas as themes within your mural.

Continuously collect data on student performance, interests, and aspirations, and use this information to inform educational policies and practices.

Engage students in community service and projects that connect their learning to real-world problems and encourage civic responsibility.

Encourage students to set and review their personal and academic goals regularly, helping them stay motivated and focused.

Extra curricular activities can help students discover their passions and develop essential skills.

Step-3: Idea Prioritization

4

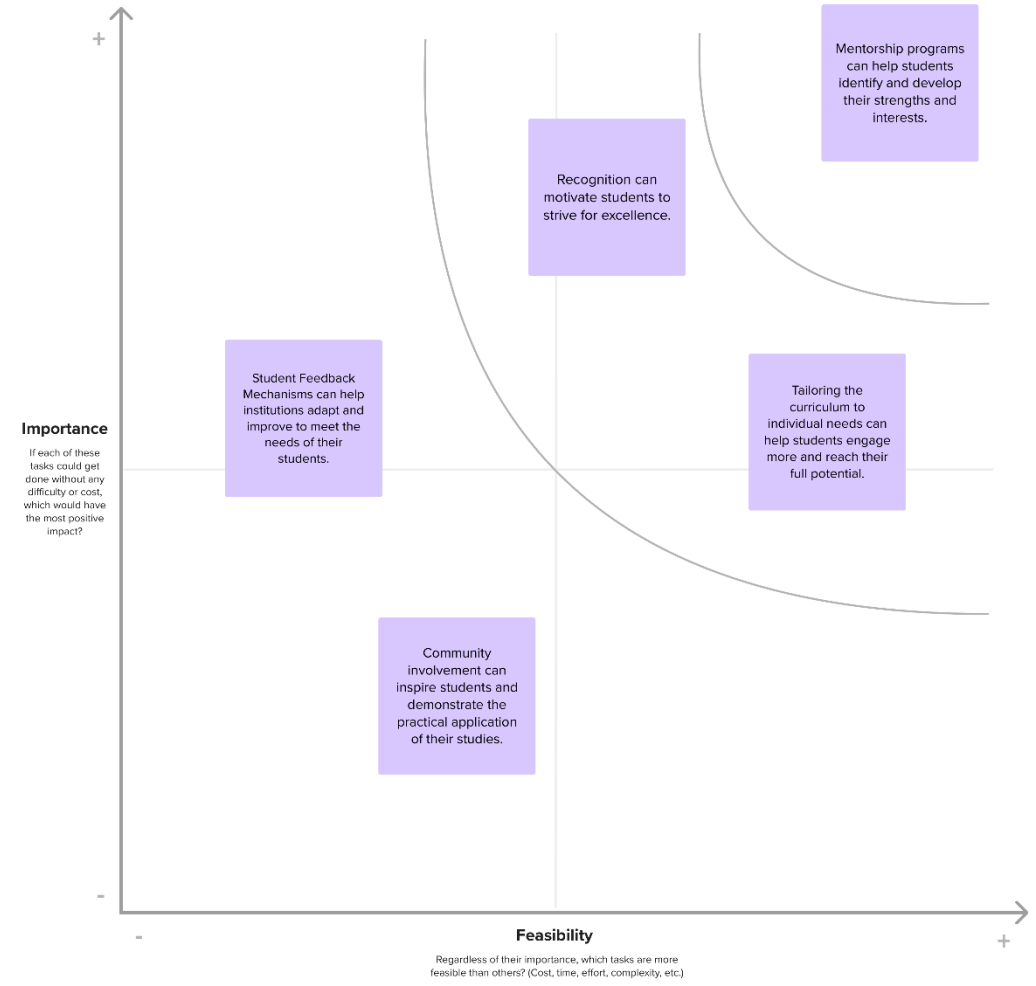
Prioritize

Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

20 minutes

TIP

Participants can use their cursors to point at where sticky notes should go on the grid. The facilitator can confirm the spot by using the laser pointer holding the **H key** on the keyboard.



2.4 Proposed solution

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	The problem to be solved is the underutilization of youth potential in educational institutions, resulting in limited student performance and growth opportunities.
2.	Idea / Solution description	Our proposed solution is to implement personalized learning programs and mentoring systems that cater to individual student needs, allowing them to unlock their full potential and excel academically.
3.	Novelty / Uniqueness	Our solution stands out by leveraging advanced technologies such as artificial intelligence and data analytics to create customized learning experiences tailored to each student's strengths and weaknesses.
4.	Social Impact / Customer Satisfaction	By unleashing the potential of our youth, our solution aims to empower students, increase their academic achievements, and enhance their overall personal and professional development, leading to higher customer satisfaction and a positive impact on society.
5.	Business Model (Revenue Model)	Our revenue model involves partnering with educational institutions and offering our personalized learning platform as a subscription-based service, providing schools with comprehensive student performance analysis tools and ongoing support.
6.	Scalability of the Solution	Our solution is highly scalable as it can be easily replicated across multiple educational institutions, accommodating varying student populations and educational curricula.

3.REQUIREMENT ANALYSIS

3.1 Functional requirement

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form Registration through Gmail Registration through LinkedIN
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	User Login	Login using Email and Password Login using Social Media Accounts
FR-4	Personalized Learning Programs	Individualized Learning Paths Adaptive Learning Content
FR-5	Performance Analysis	Tracking Student Progress Assessing Academic Achievements Identifying Strengths and Weaknesses
FR-6	Collaboration and Communication	Student-Teacher Collaboration Tools Parent-Teacher Communication Channels

3.2 Non-functional Requirement

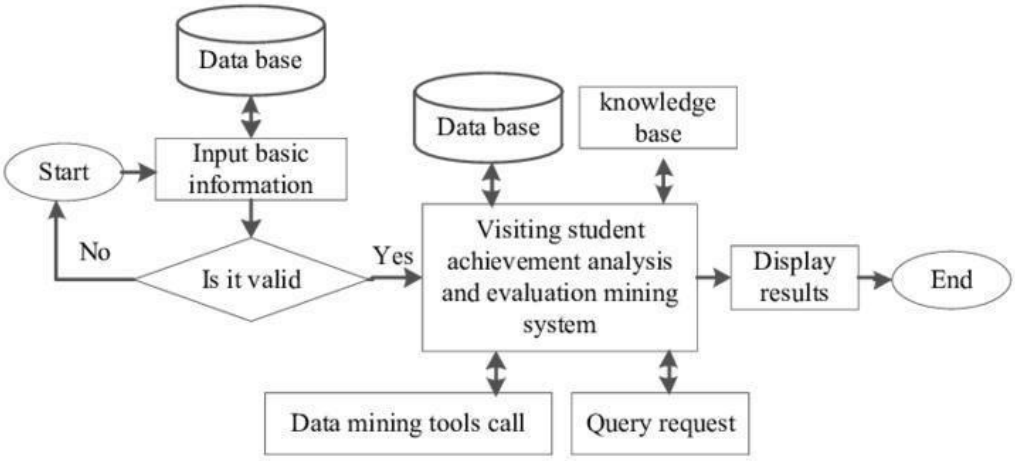
Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	The solution should have a user-friendly interface, intuitive navigation, and clear instructions to ensure ease of use for students, teachers, and administrators, promoting efficient and effective interaction with the system.
NFR-2	**Security**	The solution should employ robust security measures, including encryption, access controls, and data privacy protocols, to safeguard student data and protect against unauthorized access, ensuring the trust and confidentiality of sensitive information.
NFR-3	**Reliability**	The solution should be reliable, with minimal downtime and system failures, ensuring consistent availability and uninterrupted access to the platform for students, teachers, and administrators.
NFR-4	**Performance**	The solution should deliver high performance, with fast response times, smooth functionality, and the ability to handle multiple concurrent users, providing a seamless user experience and minimizing disruptions.
NFR-5	**Availability**	The solution should have high availability, with minimal scheduled maintenance and downtime, ensuring that students, teachers, and administrators can access the system whenever they need it, without interruption.
NFR-6	**Scalability**	The solution should be scalable, capable of handling increasing numbers of users and growing data volumes, accommodating the needs of educational institutions of various sizes and student populations, without compromising performance or usability.

4. PROJECT DESIGN

4.1 DATA FLOW DIAGRAMS

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored



4.2 Solution and Technical Architecture

Technical Architecture:

The Deliverable shall include the architectural diagram as below and the information as per the table1 & table 2

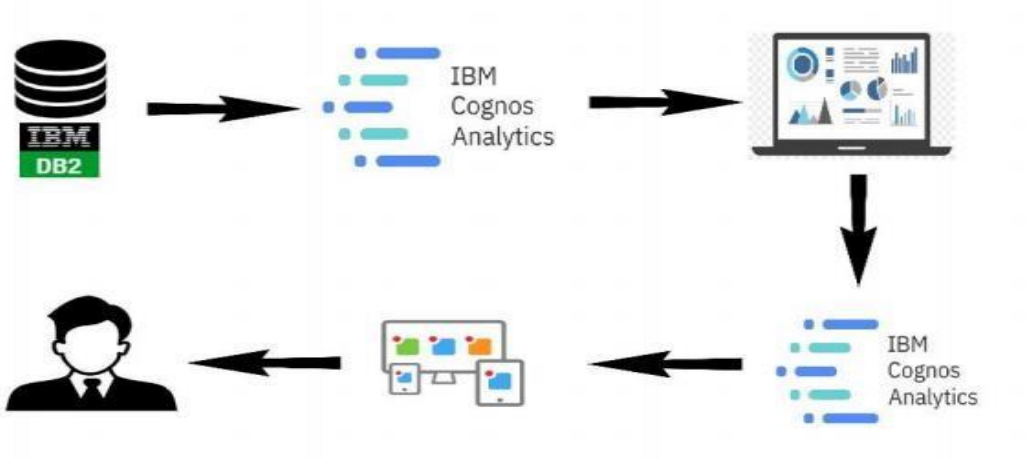


Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	How user interacts with application e.g. Web UI, Mobile App, Chatbot etc.	HTML, CSS, JavaScript / Angular Js / React Js etc.
2.	Application Logic-1	Logic for a process in the application	Java / Python
3.	Application Logic-2	Logic for a process in the application	IBM Watson STT service
4.	Application Logic-3	Logic for a process in the application	IBM Watson Assistant
5.	Database	Data Type, Configurations etc.	MySQL, NoSQL, etc.
6.	Cloud Database	Database Service on Cloud	IBM DB2, IBM Cloudant etc.
7.	File Storage	File storage requirements	IBM Block Storage or Other Storage Service or Local Filesystem
8.	External API-1	Purpose of External API used in the application	IBM Weather API, etc.
9.	External API-2	Purpose of External API used in the application	Aadhar API, etc.
10.	Machine Learning Model	Purpose of Machine Learning Model	Object Recognition Model, etc.
11.	Infrastructure (Server / Cloud)	Application Deployment on Local System / Cloud Local Server Configuration: Cloud Server Configuration :	Local, Cloud Foundry, Kubernetes, etc.

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	List the open-source frameworks used	Technology of Opensource framework
2.	Security Implementations	List all the security / access controls implemented, use of firewalls etc.	e.g. SHA-256, Encryptions, IAM Controls, OWASP etc.
3.	Scalable Architecture	Justify the scalability of architecture (3 – tier, Micro-services)	Technology used
4.	Availability	Justify the availability of application (e.g. use of load balancers, distributed servers etc.)	Technology used
5.	Performance	Design consideration for the performance of the application (number of requests per sec, use of Cache, use of CDN's) etc.	Technology used

4.2 User Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Team Member
Customer (Mobile user)	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Harini.K
		USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email & click confirm	High	Swathi.V
		USN-3	As a user, I can register for the application through Facebook	I can register & access the dashboard with Facebook Login	Low	Hema.S
		USN-4	As a user, I can register for the application through Gmail		Medium	Swathy.R
	Login	USN-5	As a user, I can log into the application by entering email & password		High	Harini.K
	Dashboard					
Customer (Web user)						
Customer Care Executive						
Administrator						

5. CODING AND SOLUTIONING

5.1 Feature 1

The features of the existing system are including a user login creator to provide user interface, student performance analyser, student development card, achieved credit, passing criteria card and wise student performance attribute card. Providing the online interface for students, faculty etc. Increasing the efficiency of school record management. Decrease time required to access and deliver student records. To make the system more secure. Decrease time spent on non-value-added tasks.

The proposed system that we are going to develop will be used as the chief performance system for helping the organization in managing the whole database of the student studying in the organization. Therefore, it is expected that the database would perform functionally all the requirements that are specified.

5.2 Feature 2

The proposed system provides the student an easy and accurate data about projects and academic percentages. Students can view all the information in just one click which saves a lot of time and effort. The proposed system maintains a database to store all the information. In this system, there is no chance of losing data. Adding and searching the information is very easy which does not take much time and physical effort.

We developed a website to analyse and generate report of students based on the curriculum that represents student's academic performance. We have developed the system such that, it will automatically parse data onto the database from excel file, which will in return reduce time consumption of analysis of data.

For these we used HTML, CSS, PHP, my SQL and java script. After teacher logins into system, data is been fetched dynamically through the database. For here, parsing is done using PHP Excel. It is an inbuilt library for PHP to fetch data from excel files over or within network. We hope to accelerate the analysis by developing the analysis system. It provides assistance to teachers and administrator to track record of each student, subject and department by using various techniques such sort.

6. RESULTS

6.1 Performance Metrices

When analysing student performance, various metrics can be used to evaluate and assess their progress and achievements. Here are some common performance metrics used in education:

Grades: The traditional measure of student performance is through grades or marks assigned to individual assignments, tests, or courses.
Grade Point Average (GPA): GPA is a cumulative measure of a student's overall academic performance, calculated by assigning numerical values to different grades and averaging them.
Standardized Test Scores: Scores obtained from standardized tests like SAT, ACT, GRE, or state-mandated exams provide a standardized measure of a student's academic abilities and knowledge.
Attendance: Monitoring student attendance rates helps assess their engagement and involvement in classroom activities and learning opportunities. **Completion Rate:** This metric indicates the percentage of courses or assignments completed by a student within a specific time frame or academic year.
Formative Assessment Results: Formative assessments, including quizzes, classwork, or homework, provide ongoing feedback on student learning and progress.
Summative Assessment Results: Summative assessments, such as final exams or end-of-course projects, evaluate student knowledge and skills at the end of a unit, semester, or academic year.
Performance Rubrics: Rubrics assess student work based on specific criteria, providing detailed feedback on their performance in areas such as critical thinking, problem-solving, creativity, or communication skills.
Personalized Learning Growth: Tracking individual student growth and progress over time, considering their starting point and comparing it to current performance levels, enables educators to understand the rate of improvement.
Student Surveys: Gathering feedback from students through surveys allows for self-assessment, satisfaction levels, and insights into their perceived learning experience.

It's important to note that the selection of specific metrics may vary based on educational level (e.g., primary, secondary, higher education) and the goals of the analysis.

7. ADVANTAGES AND DISADVANTAGES

Advantages

- It helps in maintaining students' records • It helps teacher to get their assigned work
- Easy way of displaying notice.
- Graphical user interface is user friendly.
- Easy for faculty to manage student data.
- Easy for student to view his academic records.
- Academic records and performance analysis can be stored in image format.
- Pie chart for enrolments in each course is displayed.
- Machine learning regression algorithm is used to predict marks for upcoming test.

Disadvantages

- It only works on internet
- Single student cannot enrol for multiple courses using same student id.
- Graphical user interface is user friendly but not fascinating.
- Student cannot analyse his grip over subtopics of same subject

8. CONCLUSION

The goal of the system is achieved and difficulties are solved.

“Student Performance with Graph & Academic Project Work

Reporting System” Java project satisfies all the requirements of students in searching the projects and finding details about his\her attendance and marks. This project also satisfies the requirement of admin in find the progress of student’s attendance and marks.

9.FUTURE SCOPE

Previously, data used to be inserted manually to analyse result. But currently the project supports excel(.xlsx) files for extraction of data. The future scope is that data can be fetched, parsed in other formats like doc, csv, odt, etc. Visualization can be provided to represent data in graphical format. Various representation like pie chart, graph, etc.

10. APPENDIX

Data Dictionary

- school - student’s school (binary: ‘GP’ - Gabriel Pereira or ‘MS’ - Mousinho da Silveira)
- sex - student’s sex (binary: ‘F’ - female or ‘M’ - male)
- age - student’s age (numeric: from 15 to 22)
- address - student’s home address type (binary: ‘U’ - urban or ‘R’ - rural)
- Medu - mother’s education (numeric: 0 - none, 1 - primary education (4th grade), 2 â€“ 5th to 9th grade, 3 â€“ secondary education or 4 â€“ higher education)
- Fedu - father’s education (numeric: 0 - none, 1 - primary education (4th grade), 2 â€“ 5th to 9th grade, 3 â€“ secondary education or 4 â€“ higher education)
- traveltime - home to school travel time (numeric: 1 - <15 min., 2 - 15 to 30 min., 3 - 30 min. to 1 hour, or 4 - >1 hour)

- studytime - weekly study time (numeric: 1 - <2 hours, 2 - 2 to 5 hours, 3 - 5 to 10 hours, or 4 - >10 hours)
- failures - number of past class failures (numeric: n if 1<=n<3, else 4)
- schoolsup - extra educational support (binary: yes or no)
- famsup - family educational support (binary: yes or no)
- paid - extra paid classes within the course subject (Math or Portuguese) (binary: yes or no)
- activities - extra-curricular activities (binary: yes or no)
- nursery - attended nursery school (binary: yes or no)
- higher - wants to take higher education (binary: yes or no)
- internet - Internet access at home (binary: yes or no)
- romantic - with a romantic relationship (binary: yes or no)
- famrel - quality of family relationships (numeric: from 1 - very bad to 5 - excellent)
- freetime - free time after school (numeric: from 1 - very low to 5 - very high)
- goout - going out with friends (numeric: from 1 - very low to 5 - very high)
- Dalc - workday alcohol consumption (numeric: from 1 - very low to 5 - very high)
- Walc - weekend alcohol consumption (numeric: from 1 - very low to 5 - very high)
- health - current health status (numeric: from 1 - very bad to 5 - very good)
- absences - number of school absences (numeric: from 0 to 93)
- G1 - first period grade (numeric: from 0 to 20)
- G2 - second period grade (numeric: from 0 to 20)
- G3 - final grade (numeric: from 0 to 20, output target)

SOURCE CODE

```
 class Student:     def _init_(self,
name, grades):         self.name =
name
        self.grades = grades

    def calculate_average_grade(self):
total = sum(self.grades)
        return total / len(self.grades)


def analyze_student_performance(students):
for student in students:
        average_grade = student.calculate_average_grade()
print(f"Student: {student.name}")
        print(f"Average Grade: {average_grade}")
print("-----------")


# Example usage
student1 = Student("John", [85, 90, 92, 88, 95])
student2 = Student("Jane", [78, 86, 92, 79, 88]) student3
= Student("Sam", [90, 92, 88, 85, 87])

students = [student1, student2, student3]

analyze_student_performance(students)
```

Github and Project Video Demo Link
Project video link : https://youtu.be/myvyOo41xas
Github Link : https://github.com/Harini2803/A-Student-performance-analysis