

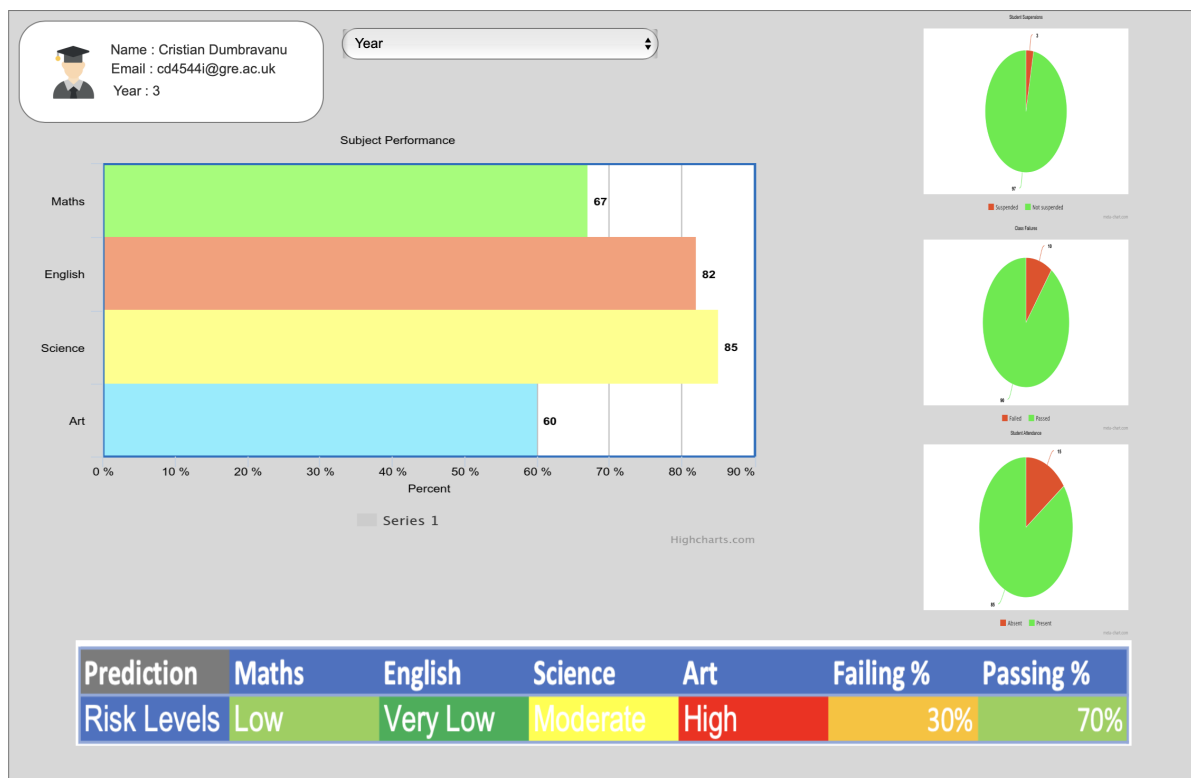


Roadmap

▼ How the project will look like :

Inspiration

First Draft :



▼ How does it work :

The project will be used by : teachers, students, parents and academic institutes.

1. Teachers / Lecturers :

- They can use the models to identify students that are risk of failing behind in their academic career. They can then prevent this by providing a specific intervention in the form of extra tutoring, advising and developing a learning plan that is optimised to mitigate the risk of failure.
- The models can help develop personal instructions for each student. The model can help find strengths and weaknesses, and knowing those weaknesses it can allow the teacher to communicate the student on how to specifically improve on those weaknesses.
- The teachers then will understand how to allocate their time more efficiently on students that need it the most. For instance, if the model identifies a group of students who are likely to excel in a particular subject, the teacher can focus on challenging them with advanced material.

2. Students :

- Getting an insight into academic performance can allow for self awareness which presents potential areas for improvement by motivating the student to set goals, seek the necessary help and to develop necessary study habits.
- Awareness of potential academic performance allows for course planning by making informed decisions about course selection and potential study habits.
- If a student is aware of their strengths and weaknesses they can allocate time appropriate and effectively.

3. Parents :

- It can also help parents understand their kids strengths and weaknesses to provide the support they need efficiently for example specific tutoring sessions or extracurricular activities that work on the weaknesses.
- The insight into student performance can allow for meaningful conversations with teachers. This can encourage strategic communication that helps the educational journey.
- Having an understanding of how your kid performs can enable the parents to take into account their mental health.

4. Academic Institutions :

- Universities and schools can use the models to allocate resources efficiently whether its teaching staff, educational resources, infrastructure or support services.
- It can enable institutes to developed a extra curriculum activities to maximise learning outcomes of students by targeting the most common areas of weakness between students.
- An understanding of how students perform can enable to change the strategic approach of teaching a course. An example could be introducing new academic support programs, mentoring, the rate at which the information is presents or the ratio between assignments and teaching intensity.

▼ How will it be demonstrated

How I will showcase the functionality and effectiveness of project.

1. Presentation where I will explain the objectives of project, the algorithmic methodologies used, database, database preprocessing, metrics, UI, its functionality, metrics, results and discussion.
2. Live demonstration where the Machine Learning model is running and the results.
3. Graphs and charts to indicate key patterns and findings with the code and data to make the results and conclusions more understandable to the teachers and potential future users.
4. The evaluation metrics that will be used to evaluate and compare the models are :
 - Confusion Matrix
 - True Positives
 - True Negatives
 - False Positives
 - False Negatives
 - Accuracy

- Precision
 - Recall
 - F1 Measures
 - Area under the precision recall curve
5. A user interface prototype to ensure the project is user friendly and intuitive to use while also being able to present the results of the ML models in a user friendly manner. A prototype can also be used as a demonstration and a proof of concept of the functionality and capabilities of the being able to predict the student performance.

▼ Brain Storm of project

1. Problem and objectives : The objective is to predict student performance by finding patterns and understanding the factors influencing academic success and prevent student failing or dropping out.
2. Data : the data will be open public academic data which will contain information about student demographic : age and sex, attendance records, grades in : exams, quizzes, assignments and homework, any extra curricular activities, socioeconomical position.
3. Data Preprocessing : fill in missing values (if any), handle outliers or inconsistencies in the database. Feature scaling : normalisation (fit the data into a specific range between 0 to 1 to prevent any biases in datatypes) or standardisation (rescaling to have the mean of the data as 0 and the standard deviation of 1)
4. Testing and Evaluation :
 - Unit testing to each individual component to ensure the quality.
 - Integration testing of testing the entire system to ensure all components work together seamlessly.
 - Performance evaluation using metrics by comparing the predictions to the existing targets of features.

5. Evaluation and discussion of all the models to then select the most optimal and accurate model to ensure the accuracy of predictions.

▼ Ethical, Social, Professional and legal considerations

1. Ethical Considerations : there is always a concern about the student privacy, data protection and anonymity when it comes to collecting data to train and test the model and the potential lack of transparency.
 - The data I will be using is open source databases which comply with the regular regulations that prioritises anonymity as no real name, address or other personal data is mentioned.
 - The functionality and the predictions made by the models will