



PROJECT REPORT — Student Performance Predictor

1. Problem Statement

Educational institutions often face difficulty in **identifying students who are likely to underperform early**.

Traditional evaluation methods rely mainly on **final exam marks**, which **ignore important academic and behavioral factors** such as:

- Attendance
- Study habits
- Internal assessments
- Assignment completion
- Co-curricular involvement

As a result, teachers cannot accurately predict risk levels or provide timely interventions.

This project aims to solve this challenge by developing an **ML-powered web application** that predicts:

- **Final performance score**
- **Pass / Fail status**
- **Risk category** (Low / Medium / High)
- **Model confidence**

The objective is to provide a **quick, reliable, data-driven decision support tool** that helps faculty identify at-risk students early and guide them effectively.

2. Tech Stack

Frontend

- **HTML** – Structure of the UI
- **CSS** – Styling, layout, responsive design
- **JavaScript** – Logic & dynamic UI updates
- **Chart.js** – Graphs & visual analytics
- **Netlify** – Frontend deployment

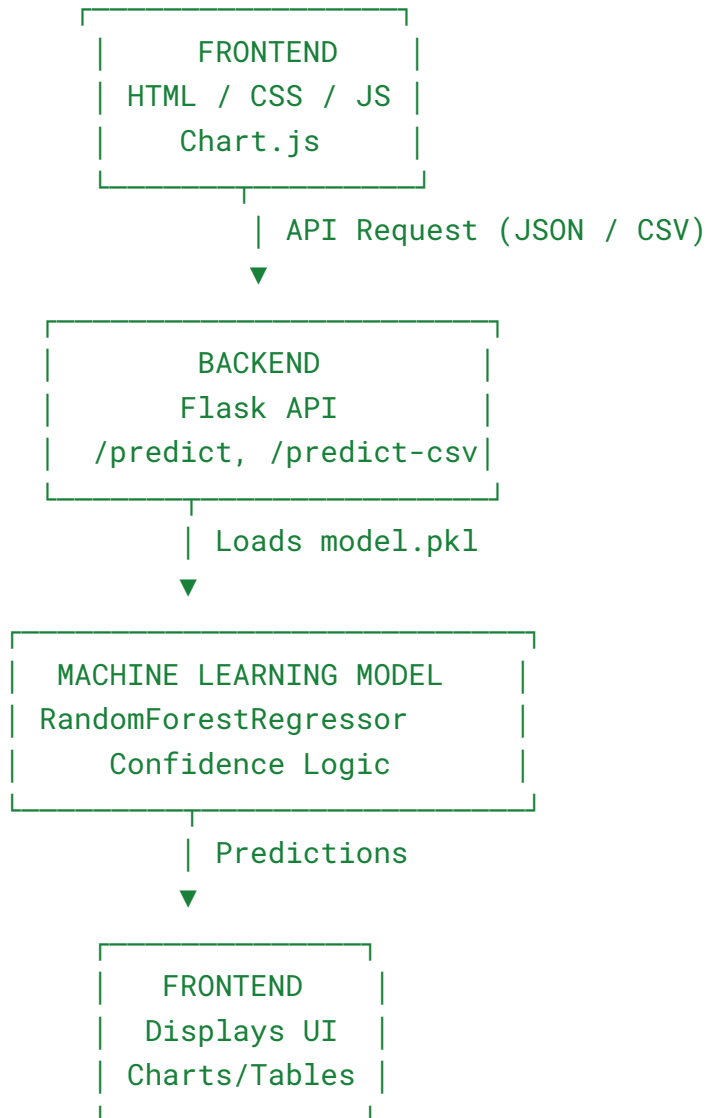
Backend

- **Python** – Core programming language
- **Flask** – REST API framework
- **Flask-CORS** – Enables frontend–backend communication
- **Scikit-learn** – ML model (Random Forest)
- **NumPy** – Numerical operations
- **Pandas** – Data handling & CSV processing
- **Render** – Backend hosting & API deployment

Version Control

- **Git** – Code tracking & collaboration
 - **GitHub** – Repository hosting & CI-ready structure
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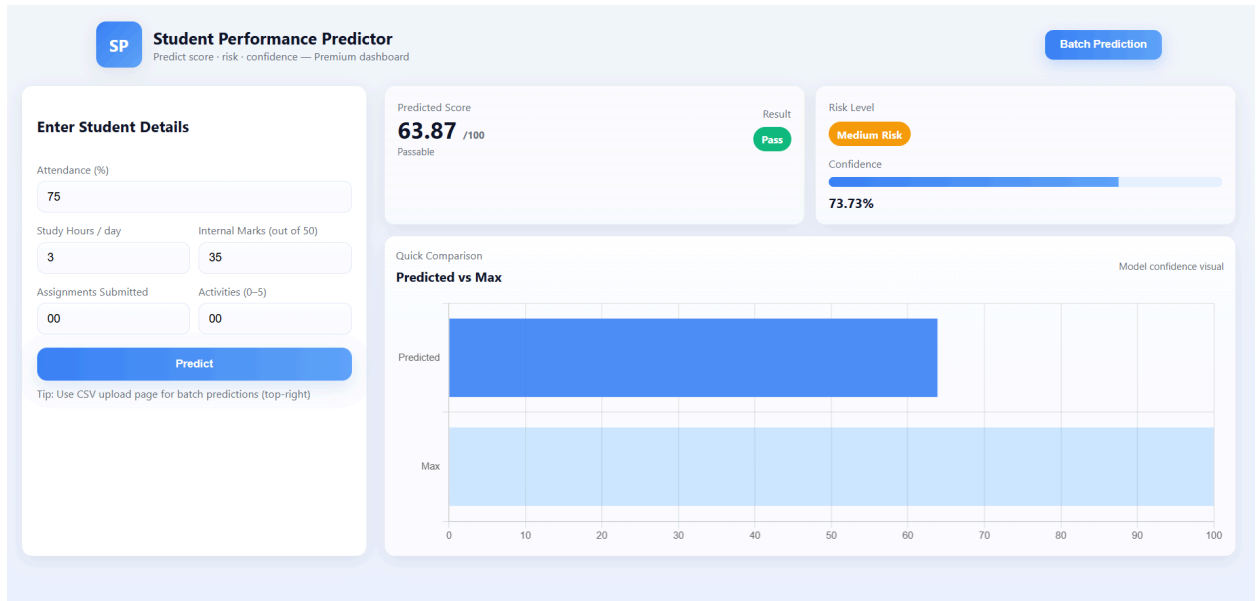
3. Architecture Diagram



4. Screenshots of the Working App

📌 Include these screenshots (you can take them manually):

- Home page



The screenshot shows the 'Student Performance Predictor' dashboard. It features a 'Batch Prediction' button in the top right. The main section is divided into three columns. The left column, titled 'Enter Student Details', contains input fields for Attendance (%), Study Hours / day, Internal Marks (out of 50), Assignments Submitted, and Activities (0-5), along with a 'Predict' button and a tip about CSV uploads. The middle column displays the 'Predicted Score' as 63.87 /100, labeled 'Passable', with a 'Result' status of 'Pass'. The right column shows the 'Risk Level' as 'Medium Risk' and 'Confidence' as 73.73%. A 'Quick Comparison' bar chart titled 'Predicted vs Max' compares the predicted score (63.87) against the maximum score (100). The chart shows the predicted score as a blue bar and the maximum as a light blue bar.

Student Performance Predictor
Predict score · risk · confidence — Premium dashboard

Enter Student Details

Attendance (%)
75

Study Hours / day
3

Internal Marks (out of 50)
35

Assignments Submitted
00

Activities (0-5)
00

Predict

Tip: Use CSV upload page for batch predictions (top-right)

Predicted Score
63.87 /100
Passable

Result
Pass

Risk Level
Medium Risk

Confidence
73.73%

Quick Comparison
Predicted vs Max

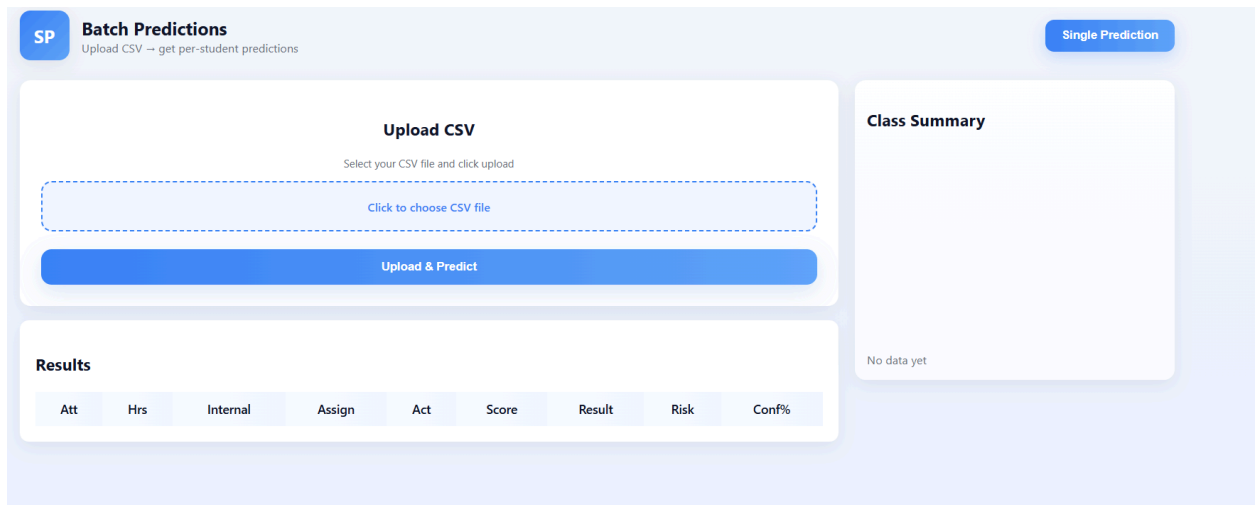
Model confidence visual

Predicted

Max

0 10 20 30 40 50 60 70 80 90 100

- Batch prediction



The screenshot shows the 'Batch Predictions' page. It features a 'Single Prediction' button in the top right. The main section is divided into two columns. The left column, titled 'Upload CSV', contains a text input field for the CSV file, a 'Click to choose CSV file' button, and an 'Upload & Predict' button. The right column, titled 'Class Summary', displays 'No data yet'. Below the upload section is a 'Results' table with columns for Att, Hrs, Internal, Assign, Act, Score, Result, Risk, and Conf%.

Batch Predictions
Upload CSV → get per-student predictions

Upload CSV
Select your CSV file and click upload

Click to choose CSV file

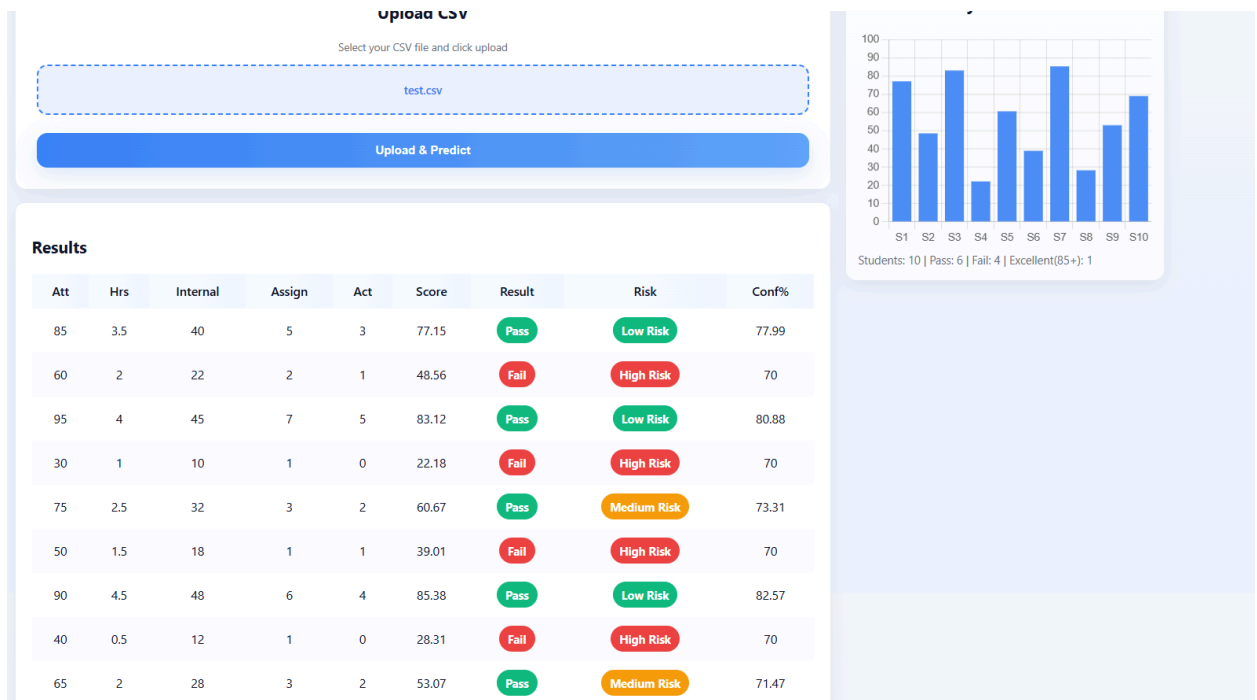
Upload & Predict

Class Summary
No data yet

Results

Att	Hrs	Internal	Assign	Act	Score	Result	Risk	Conf%
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- Batch prediction



5. Sample Predictions & Observations

Example Input

Attendance: 85
 Study Hours: 3.5
 Internal Marks: 40
 Assignments: 5
 Activities: 3

ML Output

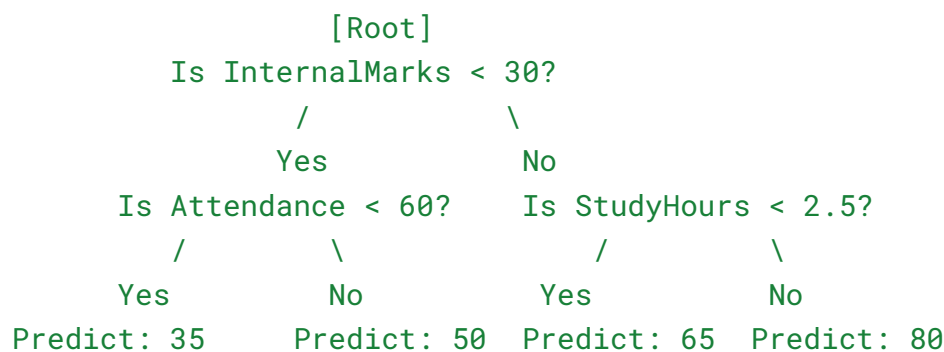
Predicted Score: 77.15
 Result: Pass
 Risk Level: Low Risk
 Confidence: 77.9%

Observations

- Higher attendance + higher study hours → significantly increases score
- Low assignments or internal marks increases **risk level**
- ML confidence improves with stable input behavior
- Batch prediction allows evaluation of multiple students at once
- System can help teachers prioritize students needing attention

Visual Example of a Decision Tree (Simple)

Here is how a small decision tree would look



Future Improvements

- Student & Faculty Login System
- Save prediction history in database
- Student-wise performance trends
- Real dataset integration
- Explainable AI (feature importance graph)