International Journal of Scientific Research and Engineering Development-– Volume 9 Issue 2, Mar-Apr 2026
Available at www.ijsred.com

RESEARCH ARTICLE OPEN ACCESS

Student Performance Prediction and Future Guidance

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Abstract:

This paper presents a system for predicting student performance and providing future academic guidance using a rule-based approach. The system analyzes student data such as attendance, marks, and study patterns to predict academic outcomes. Based on the predictions, it suggests personalized guidance to help students improve their performance. The proposed model assists educators in identifying weak students early and enables timely intervention. Experimental results show that the system can effectively evaluate student performance with good accuracy.

Keywords — **Student Performance, Prediction, Academic Guidance, Data Analysis, Rule-Based System.**

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I. INTRODUCTION

EDUCATION PLAYS A VITAL ROLE IN SHAPING AN INDIVIDUAL'S FUTURE. PREDICTING STUDENT PERFORMANCE HELPS INSTITUTIONS IMPROVE ACADEMIC OUTCOMES AND REDUCE FAILURE RATES. TRADITIONAL EVALUATION METHODS ARE REACTIVE AND DO NOT PROVIDE EARLY INSIGHTS.

THIS PAPER PROPOSES A SYSTEM THAT PREDICTS STUDENT PERFORMANCE USING STRUCTURED DATA AND PROVIDES FUTURE GUIDANCE. THE SYSTEM HELPS TEACHERS IDENTIFY WEAK STUDENTS AND SUGGEST CORRECTIVE ACTIONS TO IMPROVE THEIR RESULTS.

II. PAGE LAYOUT

A. System Overview

- *The proposed system follows these steps:*
- *Data Upload (CSV file)*
- *Data Preprocessing*
- *Performance Evaluation*
- *Progress Classification*
- *Career/Stream Recommendation*
- *Report Generation*

III. PAGE STYLE

[1] B. Data Collection

Student data is collected in CSV format and includes:

- Student Name
- Class (10th / 12th)
- Subject Marks (Math, Science, History, Geography, etc.)

The dataset is processed using Python Pandas library.

C. Data Preprocessing

The preprocessing steps include:

- Converting column names to lowercase
- Removing extra spaces
- Handling missing values
- Filtering valid subject marks

This ensures accurate and error-free processing.

D. Performance Evaluation

The system calculates average marks and assigns performance levels using rule-based logic:

- ≥ 85 → Excellent
- ≥ 70 → Good
- ≥ 50 → Average
- < 50 → Needs Improvement

If no marks are available, the system returns "No Marks".

E. Career / Stream Suggestion

1) For Class 10th:

- High marks in Science & Math → Science (PCM/PCB)
- High marks in History & Geography → Arts
- Otherwise → Commerce

2) For Class 12th:

- ≥ 85 → Professional Courses (Engineering, Medical, CA)
- ≥ 70 → Graduation Courses (B.Sc, B.Com, BCA, BBA)
- ≥ 50 → General Degree + Skill Courses
- < 50 → Diploma / ITI

F. Report Generation

The system generates a structured report including:

- Student Name
- Class
- Subject Marks
- Average Marks
- Performance Level
- Career Recommendation

IV. SYSTEM ARCHITECTURE

The system consists of the following modules:

- Input Layer (CSV Upload)
- Data Processing Module
- Evaluation Engine (Rule-Based Logic)
- Recommendation Engine
- Output Module (Report Display)

V. EXPERIMENTAL RESULTS

The system was tested using multiple student datasets.

Observations:

- Accurate performance classification
- Proper stream suggestions
- Works with partial/missing data

Sample Output:

Metric	Example Result
Average Marks	78.5
Performance	Good
Recommendation	B.Sc / BCA / BBA

[2] A. Evaluation Discussion

Advantages:

- Simple and fast
- No training required
- Easy to understand

Limitations:

- Rule-based (not adaptive)
- Limited subjects
- No deep machine learning

VI. CONCLUSIONS

This paper presents a Student Performance Prediction and Future Guidance System using a rule-based approach. The system efficiently analyzes student data and provides meaningful academic recommendations. It is lightweight and suitable for institutions requiring simple and quick solutions.

ACKNOWLEDGMENT

The authors would like to thank the institution and faculty members for their support in completing this research work.

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