© JUL 2026 | IRE Journals | Volume 10 Issue 1 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV10I1-1719369

AI-Based Student Performance Prediction System Dissertation Synopsis Submitted to Centre for Distance and Online Education Jamia Hamdard for The Partial Fulfillment of The Degree Of MCA

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I. INTRODUCTION

Educational institutions generate a significant amount of student-related data, including attendance records, examination scores, assignment performance, and participation in academic activities. However, much of this data remains underutilized in identifying students who may face academic difficulties in the future.

With the rapid advancement of Artificial Intelligence and Machine Learning technologies, educational institutions can leverage data-driven approaches to improve academic outcomes. Predictive analytics enables the identification of students at risk of poor academic performance by analyzing historical and current educational data.

The proposed AI-Based Student Performance Prediction System aims to develop an intelligent platform capable of predicting student academic performance using machine learning techniques. The system will assist teachers and educational administrators in identifying weak students at an early stage and taking corrective measures to improve their academic achievements.

II. PROBLEM STATEMENT

Traditional methods of evaluating student performance primarily rely on periodic examinations and manual assessment techniques. These approaches often identify academic issues only after poor results have occurred, leaving limited opportunity for timely intervention.

Educational institutions require a proactive mechanism that can analyze various academic indicators and predict future student performance. The absence of such predictive systems can lead to increased failure rates, reduced academic success, and inefficient utilization of educational resources.

Therefore, there is a need for an intelligent system capable of predicting student performance accurately using Artificial Intelligence and Machine Learning techniques.

III. RESEARCH QUESTIONS

1. How can Artificial Intelligence assist in predicting student academic performance?
2. Which academic factors significantly influence student performance?
3. Can machine learning algorithms accurately predict students who are at risk of poor academic outcomes?
4. How can predictive insights help educators improve student success rates?
5. What benefits can educational institutions gain from implementing an AI-based prediction system?

IV. OBJECTIVES OF THE PROPOSED STUDY

Primary Objective

To design and develop an AI-Based Student Performance Prediction System that can analyze

student data and predict future academic performance.

Specific Objectives

1. To study the factors affecting student academic performance.
2. To collect and analyze educational data such as attendance, assignments, internal assessments, and examination scores.
3. To develop a centralized database for managing student records.
4. To implement machine learning algorithms for performance prediction.
5. To classify students according to expected academic outcomes.
6. To generate analytical reports and performance insights for educators.
7. To evaluate the effectiveness and accuracy of the proposed prediction model.

V. REVIEW OF LITERATURE

Recent developments in Artificial Intelligence and Educational Data Mining have introduced innovative methods for analyzing student performance.

Researchers have applied machine learning techniques such as Decision Trees, Random Forests, Naïve Bayes, Logistic Regression, and Support Vector Machines to predict academic outcomes.

Several studies indicate that attendance percentage, assignment completion, classroom participation, and previous examination performance are among the most significant factors influencing student success.

Predictive models have demonstrated considerable accuracy in identifying students who may require academic support.

Educational institutions worldwide have increasingly adopted learning analytics systems to enhance student retention and improve academic performance. However, many existing systems focus primarily on data visualization and reporting rather than intelligent prediction and early intervention.

The present study aims to bridge this gap by developing an integrated AI-based prediction system capable of providing actionable insights to educators and administrators.

VI. PROPOSED SOLUTION

The proposed system will utilize Artificial Intelligence and Machine Learning techniques to analyze student-related data and predict academic performance.

The system will consist of the following modules:

- Student Information Management Module
- Academic Records Management Module
- Attendance Tracking Module
- Assignment and Assessment Module
- Machine Learning Prediction Engine
- Performance Analysis Dashboard
- Report Generation Module

Student data including attendance, assignment marks, internal assessments, and examination results will be collected and stored in a centralized database. Machine learning algorithms will process this data to identify patterns and generate performance predictions.

The system will classify students into different performance categories such as Excellent, Good, Average, and At-Risk. These predictions will help educators implement timely interventions and personalized support strategies.

VII. SCOPE OF THE PROPOSED STUDY

The scope of this research includes:

- Collection and management of student academic data.
- Application of machine learning algorithms for prediction purposes.
- Development of a web-based prediction platform.
- Analysis of factors affecting student performance.
- Generation of performance reports and visual analytics.
- Evaluation of prediction accuracy using sample educational datasets.

The study is limited to academic performance prediction and does not include psychological, social, or behavioral assessments outside the available educational data.

VIII. EXPECTED OUTCOMES OF THE PROPOSED STUDY

The proposed research is expected to achieve the following outcomes:

1. Development of an intelligent student performance prediction system.
2. Early identification of academically weak students.
3. Improved decision-making for teachers and administrators.
4. Enhanced student success rates through timely interventions.
5. Increased utilization of educational data for academic planning.
6. Improved understanding of factors affecting student performance.
7. A scalable framework that can be adopted by schools, colleges, and universities.

IX. LIMITATIONS OF THE STUDY

1. The prediction accuracy depends on the quality and completeness of the available student data.
2. The study will utilize sample or institutional datasets for evaluation.
3. Human behavioral and personal factors may not be fully represented in the dataset.
4. Results may vary across different educational institutions.
5. Time and resource limitations may restrict large-scale implementation.

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