# PERFORMANCE ANALYSIS AND PREDICTION OF STUDENT RESULT USING MACHINE LEARNING

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*Abstract :* Student performance predictions are essential for understanding progress, adhering to the adage "Prevention is better than cure." This study aims to comprehend a student's current situation and forecast their future performance. Upon revealing the results, the teacher can offer necessary advice and guidance to steer the student away from poor outcomes. By identifying dependencies for the final test, recommendations for courses to take in the next year can be made, assuming the role of advisor or instructor. Each year, numerous students lag due to insufficient guidance and supervision. Given that teachers cannot attend to all students simultaneously, imagine a system that assists teachers in understanding individual student needs. Such a system could provide invaluable aid to both teachers and students, employing artificial intelligence to help students sidestep negative consequences. Armed with predictions of their future grades and tailored recommendations to avoid poor performance, students could take proactive measures to excel.

*Index Terms* - **Students performance predictions, Training students& Artificial intelligence.**

## I. INTRODUCTION

Machine learning plays a pivotal role in education, particularly in prediction tasks crucial for both students and teachers. Within a Learning Management System, algorithms are crafted to process data, train models, and yield desired outcomes. While predicting students' final grades traditionally hinges solely on study time, it's recognized that other factors significantly influence academic performance. This article advocates for considering students' past performance alongside other relevant factors to enhance the accuracy of grade predictions.

Performance evaluation serves as a vital instrument for teachers in aiding students to attain their objectives. Through thorough performance analysis, educators can pinpoint areas requiring the most attention, dispense advice and guidance, and acknowledge and reward accomplishments. Machine learning offers an array of algorithms to evaluate for this task, with discussions focusing on identifying the most effective ones for prediction work. This approach not only empowers educators to pinpoint areas necessitating improvement but also enables personalized learning experiences and targeted support for struggling students. Moreover, the analysis and prediction of student performance can inform decision-making processes for school administrators and policymakers, optimizing resource allocation. The article delves into the advantages of utilizing datasets for student performance analysis and prediction, along with exploring various methods and tools employed in this domain.

## II. LITERATURE REVIEW

### A. *Educational data mining:*

Prediction of students by Mustafa Yağcı:
Machine learning algorithms were utilized to predict student performance by analyzing various factors, including demographic information, historical grades, and attendance records. The results of this research demonstrated that the machine learning models achieved a high level of accuracy in predicting student outcomes. This predictive capability is valuable as it allows for early intervention strategies to be implemented, potentially helping struggling students before their performance worsens..

### B. *Predicting student performance and its influential factors Alshanqiti, A., & Namoun, A :*

Employed educational data mining techniques to delve into student data, with a specific focus on identifying the factors that influence academic performance. Their research findings indicated that attendance, study habits, and student engagement played significant roles in determining academic achievement. This insight can guide educators and institutions in designing interventions to improve these critical aspects of student success.

### C. *A density-based clustering algorithm and experiments on student dataset with noises using Rough set theory by Chakraborty, B., Chakma, K., & Mukherjee, A. :*

Emphasized the importance of personalized learning through the use of adaptive technologies and differentiated instruction. Their research highlighted that personalized approaches positively impact both student engagement and achievement. This underscores the value of tailoring educational experiences to individual student needs, which can enhance overall learning outcomes.

*D. Student Performance Analysis And Prediction Of Employable Domains by Ankit Patel, Savio Mascarenha, Akhil Thomas, Ditty Varghese :*

Reinforces the significance of personalized learning approaches, particularly through the use of adaptive technologies and differentiated instructions. The findings align with in emphasizing that personalized strategies can have a positive influence on student engagement and achievement, suggesting a growing consensus in the educational research community on this topic.

*E. Educational data mining: prediction of students' academic performance using machine learning algorithms:*

Explored the effects of mentoring and counseling programs in higher education institutions. The research found that mentorship programs led to higher retention rates and improved student performance. This underscores the importance of providing support and guidance to students, especially in higher education settings, as it can have a significant impact on both their persistence and academic success.

## III. PROBLEM STATEMENT

In today's rapidly evolving educational landscape, the lack of comprehensive data-driven insights poses a significant challenge to achieving improved student outcomes and enhancing the overall quality of education. Traditional educational methods often lack the means to harness the vast amount of data generated within educational institutions. This data, if properly collected and analyzed, has the potential to revolutionize the educational experience for students, educators, and institutions. However, the absence of an efficient Student Performance Analysis System (SPAS) hampers the realization of this potential, thereby limiting the ability of educational stakeholders to make informed decisions and implement effective strategies.

This problem statement seeks to address the following key challenges:

- Educational institutions generate a wealth of data from various sources, including student assessments, attendance records, classroom activities, and more. However, this data is often stored in disconnected silos, making it difficult to derive meaningful insights and draw correlations that can enhance the educational experience.
- Lack of Predictive Analytics: The absence of a sophisticated analytics system prevents educators from effectively predicting student performance trends, identifying at-risk students, and tailoring interventions to support individual learning needs.
- Inefficient Resource Allocation: Without a robust SPAS, institutions struggle to allocate resources effectively, whether in terms of faculty support, infrastructure enhancements, or curriculum improvements. This leads to suboptimal resource allocation and potential inefficiencies.
- Limited Student Engagement: Students are often left in the dark about their own progress and areas of improvement. This lack of feedback and engagement can hinder their motivation and overall learning experience.
- Ineffective Educational Decision-Making: Educational policymakers and administrators lack the insights needed to make data-driven decisions that can enhance the quality of education and foster continuous improvement.

In light of these challenges, the development and implementation of a comprehensive Student Performance Analysis System have become imperative. This system should leverage modern technology, data analytics, and predictive modelling to integrate and analyze educational data effectively. By doing so, it will empower stakeholders to make informed decisions, support students at risk, allocate resources efficiently, and ultimately transform the educational experience for all involved.
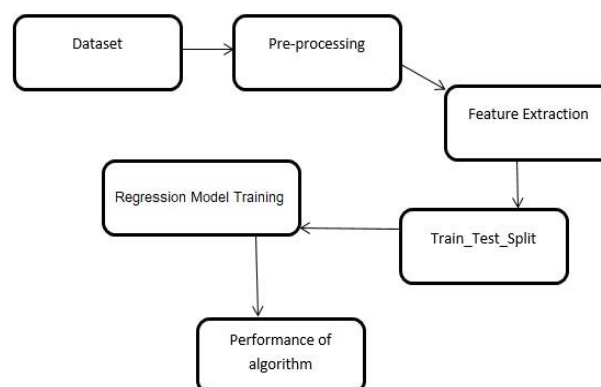
## IV. METHODOLOGY



**FIG. 1:** STEPS FOLLOWED FOR OBTAINING RESULTS.

### A. Dataset

To achieve these goals, the project employs the following methodologies: Student data is collected from academic records, teacher evaluations, extracurricular participation, and other relevant sources. Machine learning algorithms are applied to this

dataset to identify patterns, correlations, and predictive factors that influence a student's academic performance. A recommendation engine is developed to provide personalized career suggestions based on the student's academic performance and interests. The project's findings indicate a strong correlation between academic performance and future career prospects. By harnessing the power of machine learning, it becomes possible to offer timely and relevant career guidance to each student. The personalized nature of these recommendations empowers students to make informed choices about their educational and professional journeys, ultimately leading to more successful and fulfilling careers. Enhancing Student Performance Analysis Using Machine Learning for Future Career Prospects" represents a transformative approach to student support in education. By amalgamating data analysis and machine learning, this project empowers students to navigate their academic journeys with a clearer vision of their future career paths. The implications of such personalized guidance extend beyond the classroom, fostering a generation of students who are better equipped to make informed decisions about their future and contribute to society as knowledgeable and confident individuals.

### B. Data Pre-processing

First, we'll check for potential null or nun values in our dataset. Our machine learning model needs data to be present in numerical form. So, we need to transform categorical values into numerical values, for this purpose we have used ordinal Encoding.

Since our dataset is already clean, no null values or missing values present in the dataset. So, we leave out the data cleaning phase and directly proceed with the data Pre-processing phase.

### V. Conclusion

After assessing all the calculations on diverse parameters, we have overseen to propose and demonstrate that can foresee the review more precisely utilizing angle boosting relapse calculation. This show makes a difference both the teacher and scholastic educate to analyse understudy execution with the assistance of different charts through which they can effortlessly choose around the students' performance and recommend an improved strategy for making strides their scholastics. Addition of AI chatbot helps in assisting them for better results. Within the future, an end-to-end site can be created utilizing which the end-user can come to check the forecasts more effortlessly. The execution of the show will change as per the highlight's changes. We have proposed a model that can deliver consistent and exact comes about to the end-user, which satisfies their require by appearing the right yield and makes a difference to require superior steps toward the consider. Within the future, more highlights and diverse relapse calculations can be utilized to move forward the demonstrate precision.

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