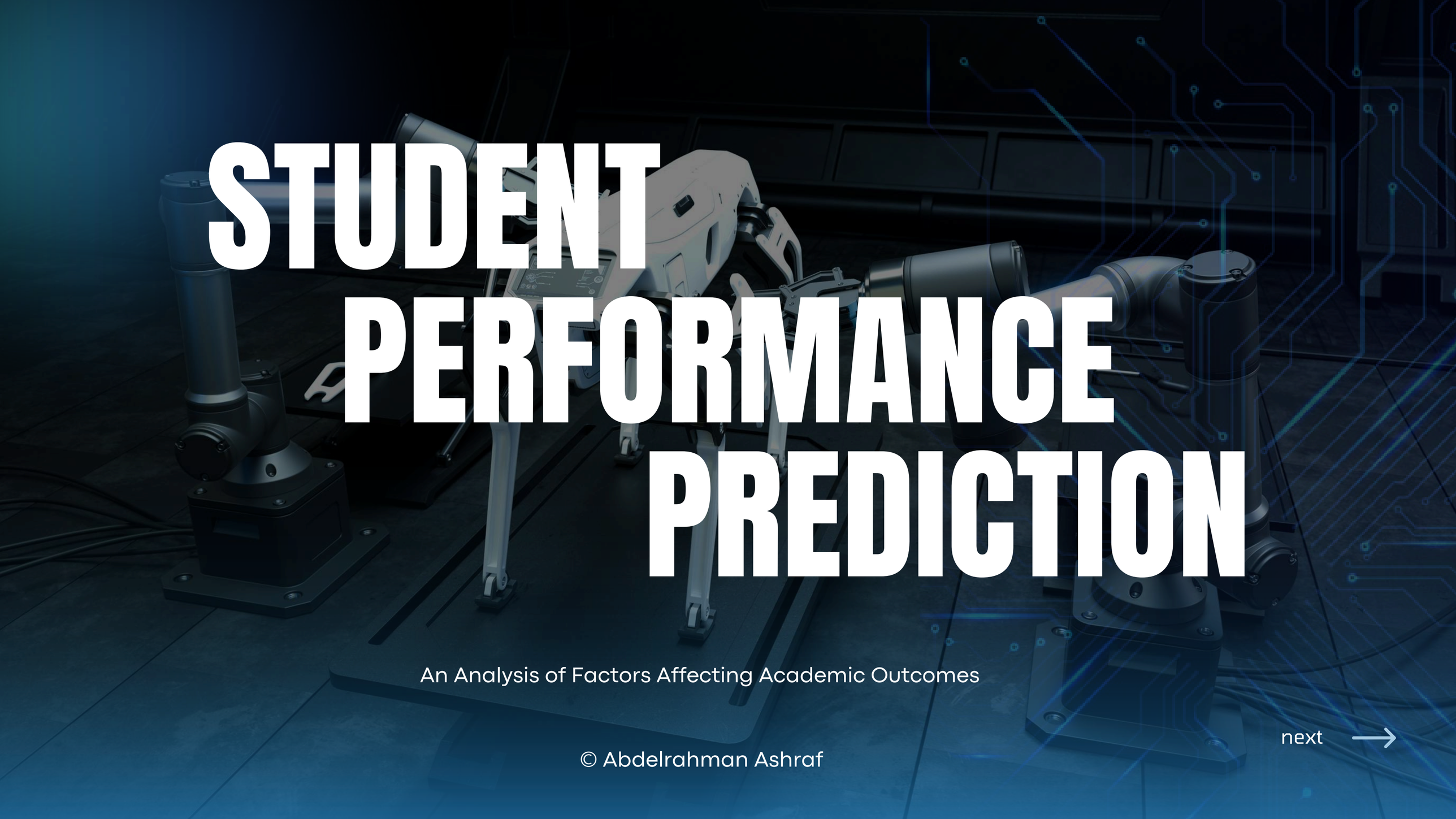

STUDENT PERFORMANCE PREDICTION

An Analysis of Factors Affecting Academic Outcomes

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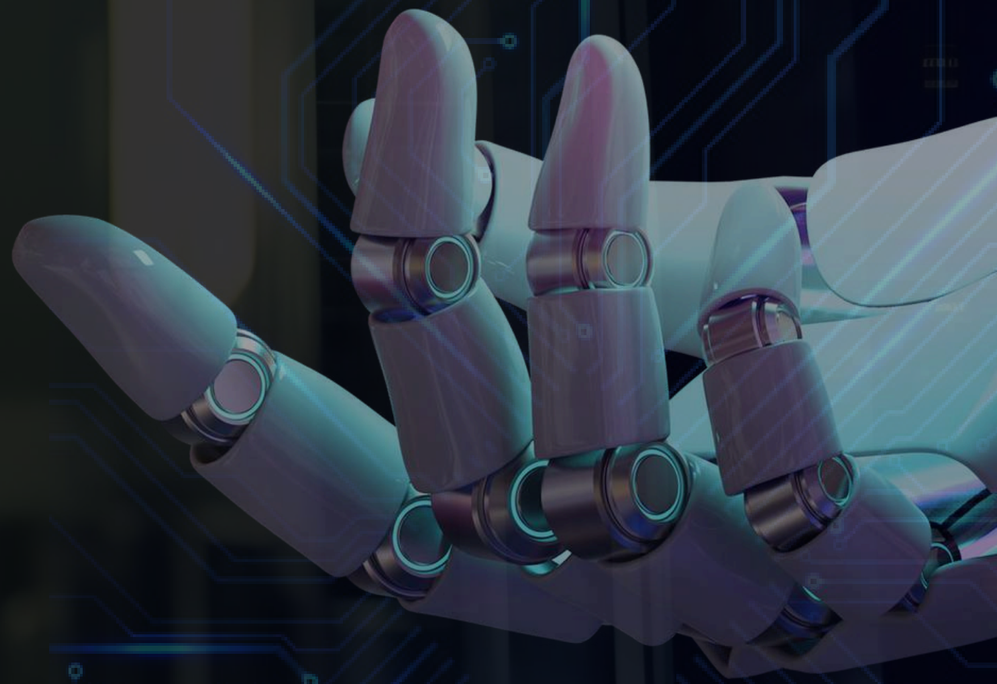
INTRODUCTION

The academic success of students is influenced by various factors such as study habits, prior performance, extracurricular activities, and lifestyle choices. Predicting student performance is crucial for academic institutions to identify students who may require additional support, optimize resources, and improve learning outcomes. This project aims to develop a machine learning model that can predict a student's performance based on several input features, such as hours studied, previous academic scores, participation in extracurricular activities, sleep hours, and the number of practice question papers attempted.

next →

PROBLEM STATEMENT

Educational institutions struggle with identifying students at risk of underperforming in their exams or coursework, which may affect their academic future. Early identification of such students can enable institutions to provide timely intervention, improving their chances of success. However, manually tracking and predicting each student's performance based on various factors is not scalable. Thus, an automated system capable of predicting student performance is necessary to assist educators in making data-driven decisions.



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RELATED WORKS

PERFORMANCE PREDICTION USING ACADEMIC DATA

Researchers have applied machine learning techniques such as decision trees, neural networks, and regression models to predict student grades and academic success. One study found that factors like study hours and prior grades were the most significant predictors of future academic performance (Al-Dahash et al., 2020).

FACTORS AFFECTING STUDENT PERFORMANCE

Other works have identified a broad range of factors influencing student success, including personal factors (e.g., sleep, extracurricular involvement) and academic factors (e.g., previous scores, practice attempts). A study by Pérez et al. (2019) concluded that students with more balanced lifestyles, including sufficient sleep and extracurricular participation, tended to perform better academically.

PREDICTIVE MODELS IN EDUCATION

Machine learning-based systems have been developed to predict dropout rates, student satisfaction, and overall academic performance. These models rely on historical data from students, including demographic and behavioral data, to predict future outcomes (Mujtaba et al., 2021).

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PROPOSED METHODOLOGY

Data Collection and Preprocessing

Data cleaning, handling missing values, and encoding categorical features.

Feature normalization using MinMaxScaler.

Exploratory Data Analysis (EDA)

Visualizing relationships between factors like study hours and performance.

Analyzing correlation between features.

Model Development

Splitting the data (80% training, 20% testing).

Training multiple models (Linear Regression, SVR, Decision Tree, KNN).

Evaluation and Optimization

Metrics: Mean Absolute Error, Mean Squared Error, R^2 Score.

Hyperparameter tuning for the best model.

Deployment

Packaging the model for real-world use

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RESULTS

06

MODEL NAME	MAE	MSE	R^2
LINEAR REGRESSION	0.01952	0.00059	98.68022
SVM	0.02995	0.00143	95.99872
DECISION TREE	0.02451	0.00093	97.95126
KNN	0.02184	0.00074	98.34977

BEST PERFORMING MODEL	ACCURACY
LINEAR REGRESSION	98.68%

INSIGHTS	
STONGEST IMPACT	WEAKEST IMPACT
PREVIOUS SCORES	Extracurricular activities

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CONCLUSION

This project aims to develop an effective machine learning-based system to predict student performance. By analyzing various factors, we hope to provide insights that can help academic institutions intervene early and support at-risk students. The expected outcome is an accurate predictive model that can be used as a decision-making tool for educators.

THANK YOU!