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Student Performance Analysis Using Machine Learning

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Abstract: *Educational institutions generate large volumes of academic data, but most existing systems use it only for record management rather than intelligent analysis. This paper presents* ***EPIC (Educational Performance Intelligence and Career Guidance System)****, an AI-powered web application that predicts student academic performance using Machine Learning techniques. The system integrates attendance management, academic analytics, performance prediction, career guidance, ATS-based resume evaluation, and AI-assisted academic support into a single platform. Developed using* ***Next.js, React.js, Python Flask, MongoDB, Firebase Authentication, and Scikit-learn****, the proposed system enables early identification of academically at-risk students, supports data-driven decision-making, and enhances students' academic performance and career development*

Keywords: Student Performance Analysis, Machine Learning, Artificial Intelligence, Academic Analytics, Career Guidance, Educational Data Mining

I. INTRODUCTION

Educational institutions generate large volumes of academic data, including attendance records, internal assessment marks, assignment scores, semester examination results, and student participation details. However, most existing academic management systems primarily use this data for record maintenance rather than intelligent analysis and decision-making. As student populations continue to grow, manually monitoring academic performance and identifying students who require additional support becomes increasingly difficult and time-consuming. This creates a need for an intelligent system that can analyze academic data and provide meaningful insights.

Machine Learning (ML) and Artificial Intelligence (AI) have become valuable technologies for predicting student performance by identifying hidden patterns in historical academic data. Early prediction of academic outcomes enables educators to identify at-risk students, provide timely guidance, and improve overall educational quality.

This paper presents the **Educational Performance Intelligence and Career Guidance (EPIC)** system, an AI-powered web application designed to predict student academic performance and provide personalized career guidance. The system integrates attendance management, academic analytics, performance prediction, ATS-based resume evaluation, study material management, and AI-assisted academic support into a single platform. Developed using **Next.js, React.js, Python Flask, MongoDB, Firebase Authentication, and Scikit-learn**, EPIC offers a secure, scalable, and user-friendly solution. The proposed system enhances academic decision-making, reduces manual effort, and supports students in improving both their academic performance and career readiness through data-driven insights and personalized recommendations.

METHODOLOGY

The proposed **Educational Performance Intelligence and Career Guidance (EPIC)** system follows a structured methodology to predict student academic performance and provide intelligent academic support. The process begins with the **collection of academic data**, including attendance records, internal assessment marks, assignment scores, semester examination results, and student profiles from institutional databases. The collected data is then **preprocessed** by

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removing duplicate records, handling missing values, and converting categorical information into numerical values to improve data quality and model performance.The cleaned dataset is divided into training and testing sets for machine learning model development. Suitable machine learning algorithms are trained using historical student data to identify patterns and predict future academic performance. The trained model is evaluated using appropriate performance metrics to ensure reliable and accurate predictions before deployment.

The prediction model is integrated with a web application developed using **Next.js, React.js, Python Flask, MongoDB, Firebase Authentication, and Scikit-learn**. The system offers attendance management, academic analytics, performance prediction, AI-based career guidance, ATS resume evaluation, and an interactive dashboard. This methodology supports data-driven academic decision-making, enables early identification of academically at-risk students, reduces manual effort, and enhances overall educational outcomes and career readiness.

MODELING AND ANALYSIS

The **Educational Performance Intelligence and Career Guidance (EPIC)** system uses machine learning to analyze student academic data and predict future performance. Academic records, including attendance, internal assessment marks, assignment scores, and semester results, are preprocessed to improve data quality before training the model. The trained model identifies patterns that influence academic performance and generates accurate predictions. It is integrated into a **Python Flask** backend for real-time analysis. The system also provides interactive dashboards displaying performance trends, attendance summaries, and academic reports. These insights help faculty identify academically at-risk students and enable students to improve their academic performance through personalized recommendations and data-driven guidance.

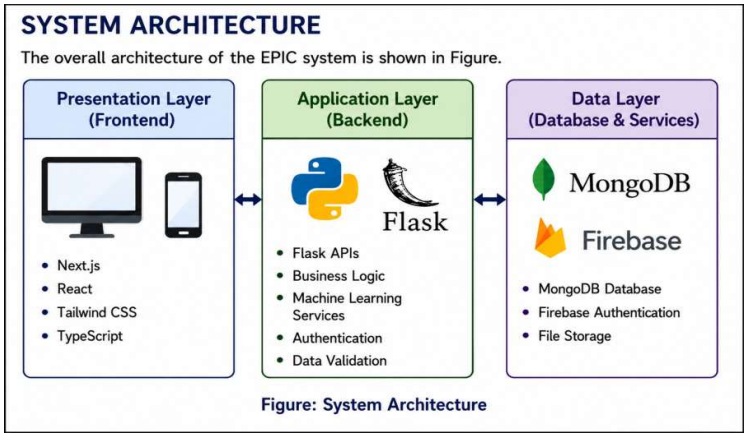

Figure1: System Architecture

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DATAFLOW DIGRAM

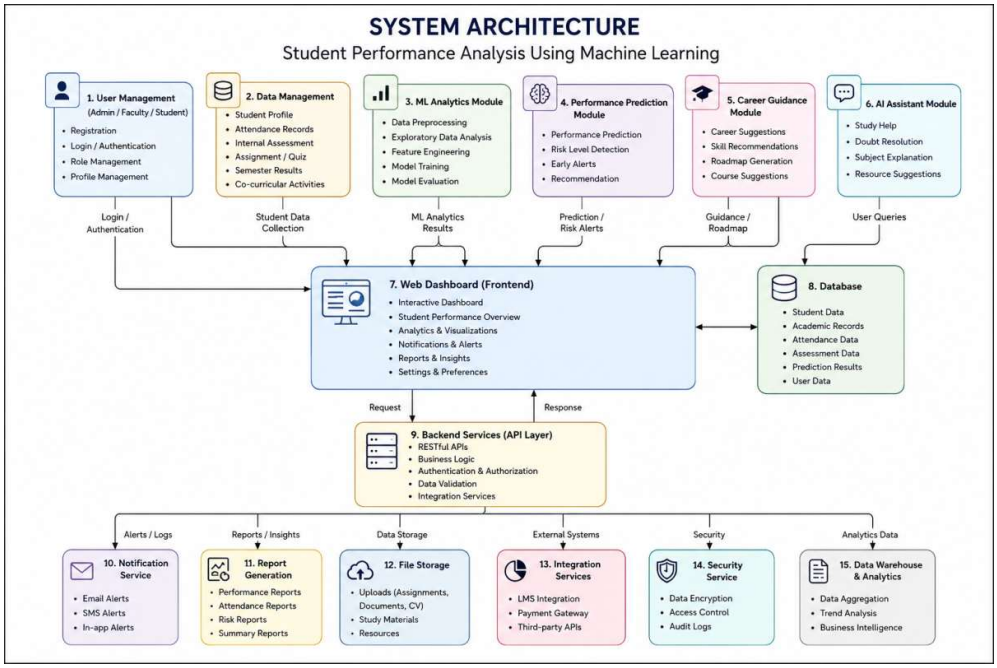
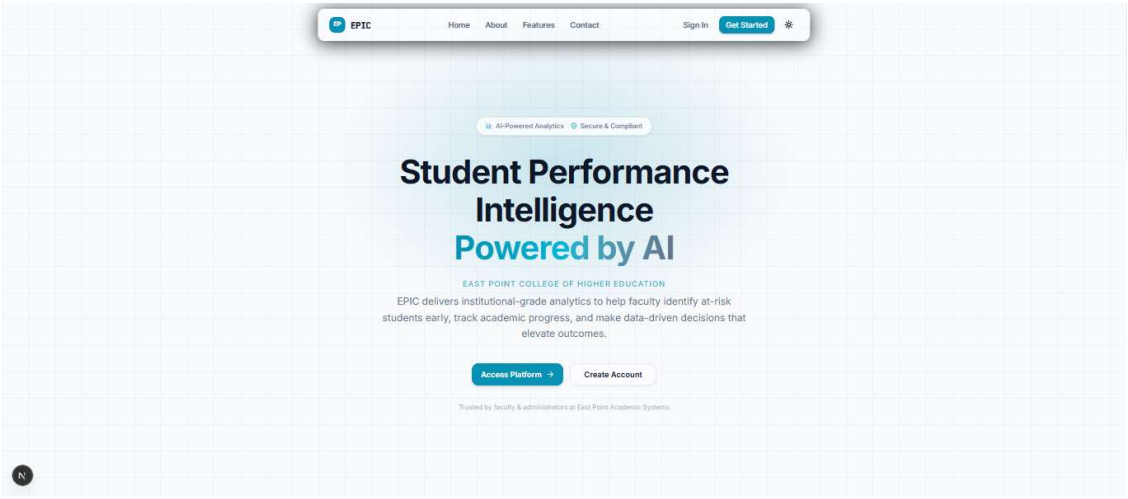


Figure 1: Dataflow Diagram

SNAPSHOTS



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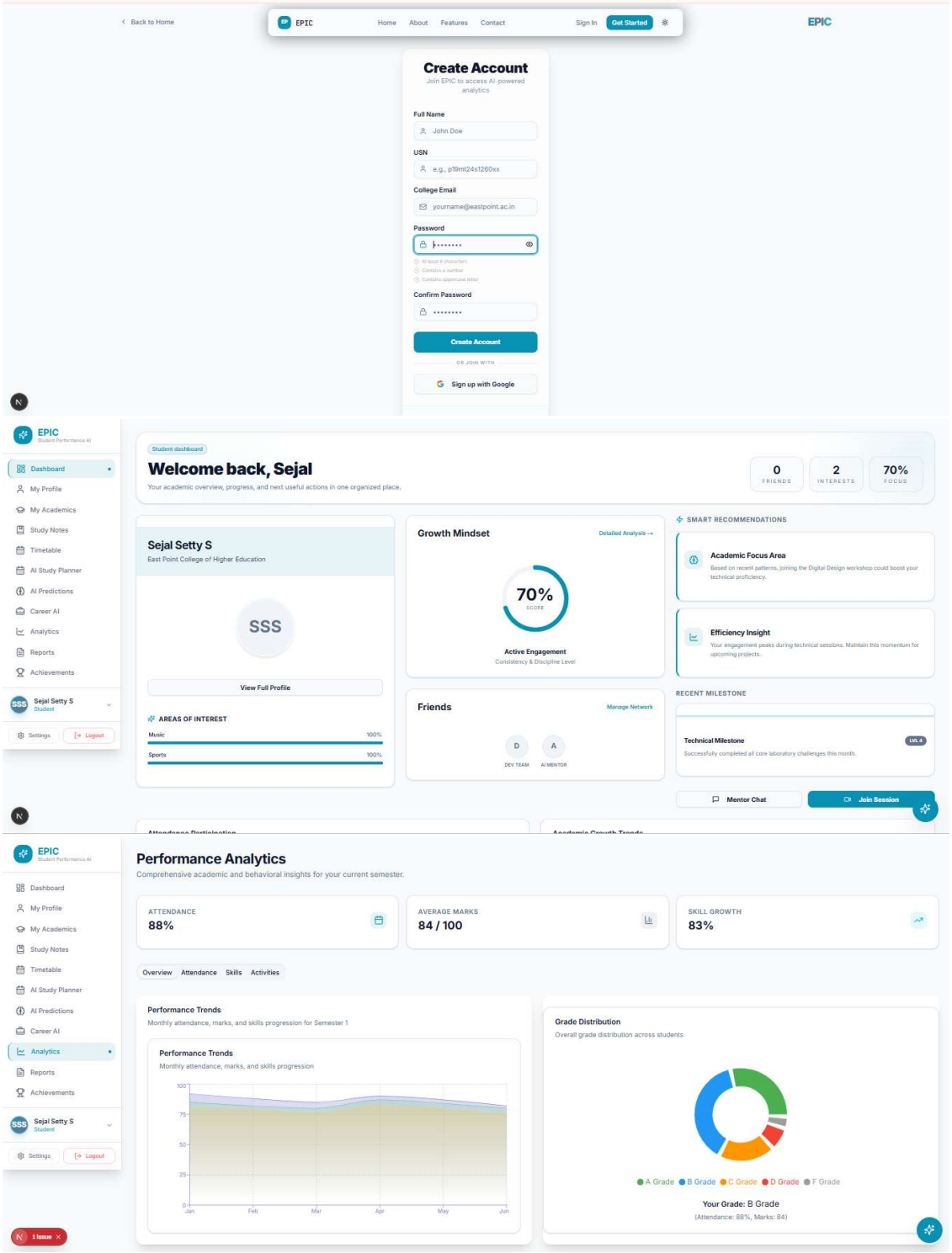

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II. RESULTS AND DISCUSSION

The proposed **Educational Performance Intelligence and Career Guidance (EPIC)** system was successfully developed and tested using real-world student academic data. The machine learning model effectively analyzed attendance, internal assessment marks, assignment scores, and semester examination results to predict student academic performance with satisfactory accuracy. The web application provided real-time performance prediction through an interactive dashboard, allowing faculty members to monitor student progress and identify academically at-risk students at an early stage. Students received personalized academic insights, career guidance, and ATS-based resume evaluation to improve their overall development. The integration of **Next.js, React.js, Python Flask, MongoDB, Firebase Authentication, and Scikit-learn** ensured a secure, scalable, and user-friendly platform. The experimental results demonstrate that the proposed system reduces manual effort, improves academic decision-making, enhances student engagement, and supports educational institutions in adopting a data-driven approach to academic performance monitoring and career development.

III. CONCLUSION

The **Educational Performance Intelligence and Career Guidance (EPIC)** system demonstrates the effective use of Machine Learning and Artificial Intelligence to improve academic management and student success. By analyzing historical academic data, the system accurately predicts student performance and provides valuable insights for both students and faculty members. Its integrated features, including attendance management, academic analytics, AI-based career guidance, ATS resume evaluation, and performance prediction, create a comprehensive educational support platform. Developed using **Next.js, React.js, Python Flask, MongoDB, Firebase Authentication, and Scikit-learn**, the system offers a secure, scalable, and user-friendly solution. The proposed approach reduces manual effort, enables data-driven decision-making, supports early identification of academically at-risk students, and enhances overall educational outcomes. Future enhancements may include advanced deep learning models, real-time learning analytics, and personalized recommendation systems to further improve prediction accuracy and student career development.

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REFERENCES

[1] P. Cortez and A. Silva, "Using Data Mining to Predict Secondary School Student Performance," *Proceedings of the 5th Annual Future Business Technology Conference*, Porto, Portugal, 2008.
[2] C. Romero and S. Ventura, "Educational Data Mining: A Review of the State of the Art," *IEEE Transactions on Systems, Man, and Cybernetics, Part C: Applications and Reviews*, vol. 40, no. 6, pp. 601–618, 2010.
[3] G. Siemens and P. Long, "Penetrating the Fog: Analytics in Learning and Education," *EDUCAUSE Review*, vol. 46, no. 5, pp. 30–40, 2011.
[4] B. P. Woolf, *Building Intelligent Interactive Tutors: Student-Centered Strategies for Revolutionizing E-Learning*, Morgan Kaufmann, Burlington, MA, USA, 2009.
[5] A. Sharma and R. Gupta, "Machine Learning Based Student Performance Prediction System," *International Journal of Advanced Research in Computer Science*, vol. 10, no. 2, pp. 45–50, 2019.
[6] S. Kumar and M. Patel, "Student Academic Performance Prediction Using Machine Learning Algorithms," *International Journal of Computer Applications*, vol. 177, no. 20, pp. 20–25, 2020.

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[7] F. Pedregosa et al., "Scikit-learn: Machine Learning in Python," *Journal of Machine Learning Research*, vol. 12, pp. 2825–2830, 2011.
[8] W. McKinney, "Data Structures for Statistical Computing in Python," *Proceedings of the 9th Python in Science Conference (SciPy)*, pp. 56–61, 2010.
[9] Google LLC, "Firebase Authentication Documentation," Available: https://firebase.google.com/docs/auth.
[10] Next.js, "Next.js Documentation," Available: https://nextjs.org/docs.