

Secure and AI Based Student Contrivance System

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Abstract—In the current academic world, blending Artificial Intelligence (AI) with cyber security is essential for making smart decisions and keeping data safe. This paper introduces the "Secure and AI-Based Student Contrivance System," a thorough academic support platform that uses machine learning and secure communication to boost student performance, transparency, and data privacy. The system is built around three key components: (1) an AI-driven prediction module that examines important academic metrics to anticipate student outcomes; (2) a dynamic policy-making and voting module that allows stakeholders to work together on educational strategies like grading systems and performance criteria; and (3) a secure, cloud-based document storage and expert guidance system that features key-based access control and encrypted communications. This solution not only gives students valuable insights into their performance and mentorship but also guarantees the confidentiality of academic data. Experimental results and user feedback show that the system is effective in enhancing engagement, academic planning, and data security.

Index Terms—AI-Based Student Performance Prediction, Machine Learning in Education, Secure Communication in Academia, Cloud-Based Secure Document Storage, Academic Policy Voting System, Student-Expert Interaction Platform.

I.INTRODUCTION

This project brings together a variety of cutting-edge technologies to create a powerful platform that offers valuable insights into student outcomes. It encourages secure communication between students and academic experts while also facilitating the development and implementation of academic policies through secure voting systems. The cloud storage module ensures that all student documents are kept safe and can only be accessed by those with the right permissions, protecting sensitive academic information. The secure communication protocol allows students to engage with experts, guaranteeing that responses and feedback are shared in a safe environment. This not only makes the system effective but also robust against

potential security threats and unauthorized access. Ultimately, this project serves as a practical tool for academic institutions and paves the way for future advancements in AI-driven academic support systems, enhancing the experiences of both students and faculty within the educational landscape access and productivity. As the time goes on,

Destiny reforms such as AR and VR conferences will also increase digital interactions, making them more engrossing and increasingly.

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The system is built on a labeled dataset and utilizes classification algorithms like Decision Trees, Random Forest, and Logistic Regression. Once the training is complete, the model is saved and integrated into the backend, allowing it to deliver real-time predictions through an easy-to-use interface. This setup enables students to evaluate their performance risks early on and make necessary adjustments, while also helping educator's spot students who may be at risk. All voting activities are stored with timestamps and user

identifiers (while preserving privacy), ensuring transparency and accountability. This democratic approach fosters inclusivity and gives students a say in how academic systems affect them.

II. SECURE EXPERT COMMUNICATION

Encrypted Document Upload and Access: Students can safely upload their academic documents, like mark sheets and performance reports, to the cloud. To ensure that only authorized users can upload and retrieve these files, a secret key is needed. The files are stored securely, and the keys are hashed for verification.

Expert Query and Reply System: Students can post academic queries to experts (teachers or mentors). Each query includes a title, message, and timestamp. Experts can view these queries, respond with advice, and mark them as resolved. All communication is logged securely, and students are notified when their query is answered. These features play a crucial role in training a supervised learning model, often using classification algorithms like Random Forest or Decision Tree, which depend on the quality of the dataset and the accuracy of the model. Before diving into the machine learning pipeline, the dataset undergoes preprocessing to tackle missing values and to encode categorical variables. After the model is trained and validated, it gets saved as a serialized .pkl file and is integrated into the backend API. This setup allows it to process new student data and make pass/fail predictions. The results are then presented to users through a sleek, interactive frontend interface, giving both students and faculty valuable insights. This early alert system not only promotes academic intervention but also encourages students to step up their efforts before final exams or evaluations.

Policy Creation and Voting Mechanism Module:

This module brings a fresh, decentralized, and democratic twist to how we govern academic matters, inviting both students and experts to have a say in shaping academic policies. The whole system is built around the principles of transparency, collaboration, and accountability. Any verified user—whether a student or an expert—can suggest a new policy or tweak existing academic rules, like grading systems, credit distribution, passing standards, attendance policies, or even bonus points for extracurricular activities. Once a proposal is in, it goes into a public

voting phase where everyone on the platform can check it out, weigh in, and vote—either for or against it. The voting interface is user-friendly, displaying the current vote count, a brief description of the policy, and a progress bar showing how things are shaping up. Behind the scenes, every vote is time stamped and linked to the user’s account to prevent duplicate votes while keeping user identities private. When the voting period wraps up, the system counts the votes and makes a decision based on a set majority rule. Accepted policies can be saved in a versioned policy ledger, creating a clear record of the decisions made. This approach not only empowers users but also ensures that academic rules are more inclusive and needs of the students.

Expert Consultation and Query Resolution Module:

This module acts as a vital link between students and domain experts, like faculty, academic mentors, or external advisors, all through a secure and organized communication platform. Students can reach out with academic questions, whether they're seeking clarity on their performance, understanding of a subject, or even advice on academic matters. Each question they submit comes with a title, a description, a timestamp, and the option to attach any relevant documents. On the expert side, registered professionals can log into a special dashboard where they can see all incoming queries, prioritize them by urgency or date, and respond directly through the platform. Each reply is timestamped and linked to the original question, creating a seamless conversation thread. When the expert believes the student has received sufficient guidance, they can mark the query as “resolved,” which updates its status for both parties. All queries and responses are securely stored in a JSON or database format, ensuring they are preserved and traceable. When the expert believes the student has received sufficient guidance, they can mark the query as “resolved,” which updates its status for both parties. All queries and responses are securely stored in a JSON or database format, ensuring they are preserved and traceable. This module not only boosts student engagement but also formalizes academic mentorship by offering a structured platform for expert feedback and support.

III. OVERALL SYSTEM DESCRIPTION

A. Existing System

In traditional academic systems, managing student performance, regulating policies, and consulting with experts often happens in a disjointed, manual, or outdated manner. Typically, student assessments rely on static metrics like semester grades and attendance, missing out on the potential of predictive analytics to anticipate performance outcomes or spot students who might be struggling. In many educational institutions, academic support tends to be reactive rather than proactive, meaning that interventions only kick in after poor results, leaving little room for preventive action. Additionally, student feedback or involvement in academic decision-making—like grading policies, attendance rules, or curriculum suggestions—is quite rare. The hierarchical structure of these systems often silences students’ voices and lacks transparency in how decisions are made and put into practice. It’s important to point out that there isn’t a voting system in place for students and faculty to work together in suggesting or defining changes to academic policies, which really goes against the idea of inclusive governance.

To sum it up, the current systems are pretty rigid and disconnected, lacking the tech backbone needed for smart academic decision-making, secure communication, and inclusive participation. We really need a modern, AI-driven academic management platform that focuses on security and can tackle these issues, bringing transparency, efficiency, and intelligence to our educational institutions.

Proposed System:

The proposed system, called the “Secure and AI-Based Student Contrivance System,” is an innovative academic platform designed to fill the gaps found in traditional academic management. It does this by incorporating AI-driven performance predictions, policy voting features, and secure communication with experts, all while providing encrypted access to documents in the cloud. With a modular and scalable design, this system tackles the key challenges that both students and educators face in current academic setups. It delivers predictive insights, ensures data security, supports collaborative policy-making, and

offers seamless expert guidance—all through a single web-based application.

At the heart of this system is an AI-powered prediction engine that leverages historical academic data and behavioral indicators to forecast student performance. The model is trained using machine learning algorithms that analyze factors like attendance, assignment scores, internal marks, and demographic information. By providing early predictions on whether a student is likely to pass or fail, the system sends timely alerts that empower both students and mentors to take proactive measures. This data-driven approach shifts academic assessment from a reactive stance to a proactive one, ensuring that students who are struggling receive the help they need before it’s too late. Once a policy proposal is submitted, it opens up for voting by all registered users. The results of the voting are displayed transparently and stored for future reference, promoting collective governance. This feature fosters a sense of ownership and inclusion among students, who often feel overlooked in traditional academic settings. It also makes academic policies more adaptable, allowing them to reflect current needs and feedback.

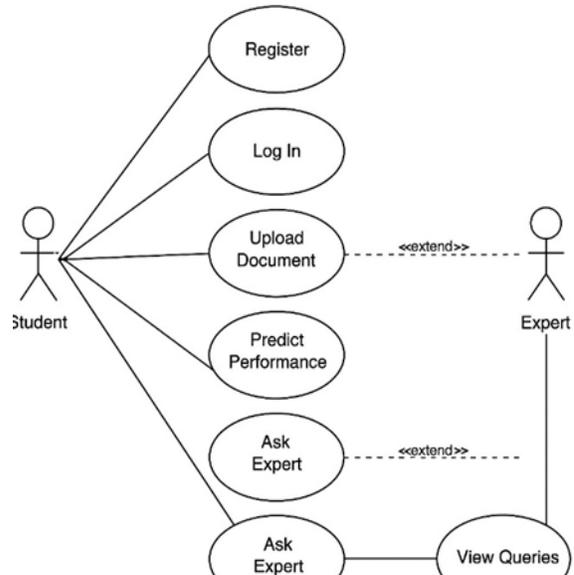


Fig.2. Architecture Diagram

This diagram represents the architecture of our project, let’s break it down:

Key Components: -

1. Student Register

Registering is the first step for any student. This module helps new students set up their accounts by

entering essential details like their name, email, and password.

2. Student login

This system lets registered students log in securely with their credentials. It also offers session-based access control to keep data safe.

3. Upload Document

Students have the ability to upload their academic documents, such as assignments, reports, or plans for improving their grades.

4. Predict Performance:

This AI-driven tool helps students forecast their academic performance. It takes into account factors like attendance, assignment grades, and internal assessments to determine the likelihood of passing or failing.

5. Ask Expert

This feature allows students to ask academic questions or get assistance from subject matter experts. They can describe their issues and send in their requests through a form.

6. View Queries

Experts have the ability to see all the student questions that come in through the "Ask Expert" module. They can respond to these queries and mark them as resolved.

IV. METHODOLOGY

The approach taken in this project is both systematic and well-organized, blending traditional software development methods with cutting-edge AI techniques. This combination aims to create a functional, secure, and smart academic management system. The methodology is divided into several key phases that align with the software development life cycle (SDLC) while integrating elements of artificial intelligence and cyber security.

1. Requirement Analysis

The initial phase focuses on gathering and analyzing both functional and non-functional requirements of the system. We held detailed discussions with potential users, including students, faculty, and academic advisors, to get a clear picture of their needs and challenges. The main goal was to pinpoint issues in existing academic systems, such as the lack of predictive support, poor communication with

academic experts, insecure document sharing, and the absence of performance monitoring. These insights laid the groundwork for defining the major modules: AI-driven predictions, secure document uploads and access, expert panel interactions, and user role-based dashboards.

2. System Design

During this phase, we developed both high-level and low-level architectural designs. The system architecture is split into two main panels: the Student Panel and the Expert Panel. Each panel features its own login and registration functionality, complete with session-based role management. We utilized UML diagrams, including use case, class, sequence, and data flow diagrams (DFDs), to illustrate the interaction flow and data processing. For backend development, we opted for Flask (Python), while Tailwind CSS was chosen for the user interface, ensuring a sleek and responsive front-end experience.

Module-Wise Development

Each part of the project was crafted separately, sticking to the principles of modular programming. Take the Student Performance Predictor module, for instance—it was trained on a labeled dataset (student_data.csv) using a machine learning model built with Scikit-learn. Then there's the Secure Document Upload module, which utilized encryption for file storage and key-based access. The Ask Expert module facilitated real-time communication with experts, keeping track of student questions and expert answers in JSON format. We made sure to test each module on its own before bringing them all together into a cohesive system.

AI Model Training and Integration

We used a specialized dataset to train an AI model that predicts whether a student is likely to pass or fail, based on factors like attendance, assignment scores, test preparation, and internal scores. The model was saved using joblib as model.pkl and loaded in the backend for real-time predictions. This AI integration allows for dynamic analysis and forecasting of academic performance, providing students with valuable insights for improvement and alerting experts about students who may be at risk.

Secure Cloud Storage & Key Sharing

To tackle security concerns, we developed a cloud-like file storage system where students can upload their academic documents. These files are encrypted and safeguarded by a secret key, which must be provided for access. This setup mirrors real-world secure document handling, ensuring that only authorized individuals can view sensitive academic files. The system prioritizes privacy and adheres to best practices for file management in educational technology.

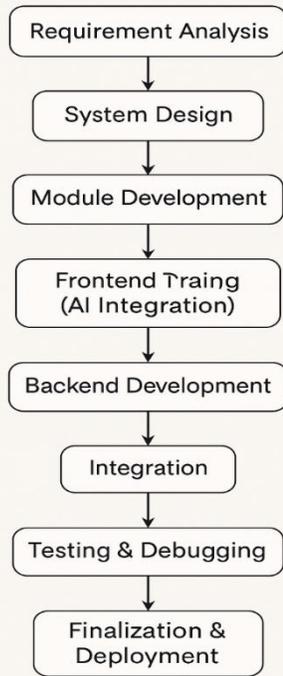


Fig.3 Development Stages.

V. RESULT

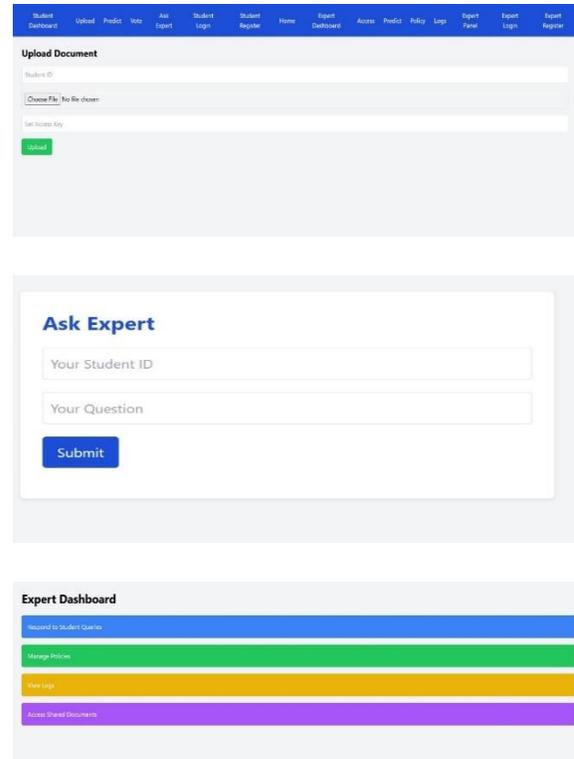
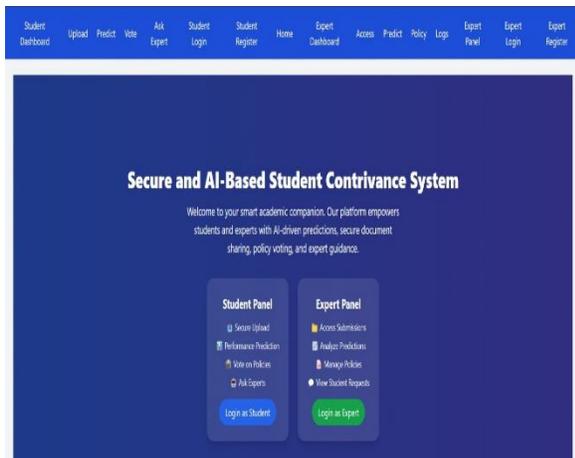


Fig.5 Comparative analysis of API

VI. DISCUSSION

The creation and rollout of the Secure and AI-Based Student Contrivance System mark a significant advancement in blending artificial intelligence with cybersecurity in the realm of academic management. This initiative effectively connects students with academic professionals by offering a comprehensive platform for predicting performance, sharing data securely, and facilitating expert consultations. One of the standout features noted during testing is the system's capability to deliver real-time feedback on student performance through trained machine learning models. This allows students to grasp their academic standing in a more dynamic way, rather than just waiting for final grades.

Future Scope

****Block chain Integration for Voting and Logs****

Bringing block chain technology into the voting process can really enhance both immutability and transparency in the voting module and activity logs. This approach would bolster the integrity of policy decisions and expert communications by establishing a tamper-proof record.

****Advanced Predictive Models****

While the current AI model offers basic pass/fail predictions, future versions could leverage deep learning algorithms to forecast GPA trends, pinpoint subject-specific weaknesses, and even suggest personalized learning paths or resources. This would significantly boost personalization and academic support.

****Real-Time Chat with Experts****

The current ask-and-reply system could be enhanced by incorporating real-time chat or video conferencing features using WebRTC or Firebase. This upgrade would foster interactive and timely support, especially for pressing academic issues.

****Mobile Application Support****

Given the increasing reliance on smartphones among students, transforming the system into a hybrid mobile application with tools like React Native or Flutter could greatly improve accessibility and usage. revolution in virtually meetings, making them more productive, inclusive, and insightful.

- [2] Romero, C., & Ventura, S. (2020). Educational data mining and learning analytics: An updated survey. *Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery*, 10(3), e1355.
- [3] Kotsiantis, S. B., Pierrakeas, C. J., & Pintelas, P. E. (2004). Predicting students' performance in distance learning using machine learning techniques. *Applied Artificial Intelligence*, 18(5), 411–426.
- [4] Siraj, F., & Abdoulha, M. (2019). A review on secure cloud storage architecture for educational institutions. *International Journal of Advanced Computer Science and Applications*, 10(6), 241–248.
- [5] Jain, R., & Singh, R. (2021). Student Performance Prediction Using Machine Learning Techniques. *Procedia Computer Science*, 173, 43–50.
- [6] Wang, Y., & Wang, Y. (2019). Big data and education: Adaptive learning and feedback systems. *Computers & Education*, 136, 1–4.

VII. CONCLUSION

The Secure and AI-Based Student Contrivance System is an exciting blend of Artificial Intelligence, cybersecurity, and educational data management, designed to meet the changing needs of today's academic institutions. This innovative project tackles several significant issues that traditional education faces, like the lack of predictive academic support, insecure information sharing, limited communication between students and experts, and the absence of systems that make decisions based on performance. By carefully combining predictive modeling, secure file management, expert guidance systems, and an easy-to-use interface, this platform is set to enhance the academic experience, making it more personalized, secure, and intelligent.

REFERENCES

- [1] Almarzouqi, H., & Khan, A. I. (2019). Predicting students' academic performance using AI techniques: A review. *Education and Information Technologies*, 24(4), 3043–3063.