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Eduera: Empowering Parents With Smart School Choices

[1]Lawanya Khawate, [2]Harsh Kadam, [3]Priya Khandare, [4]Ayushman Mishra, [5]Supriya Survase

[1]Student, [2] Student, [3] Student, [4] Student, [5] Assistant Professor

[1]Department of Artificial Intelligence & Data Science,

[1]Ajeenkya DY Patil School of Engineering, Pune, India

Abstract: EduEra is a centralized, AI-powered platform that provides personalized, data-driven insights to help parents make informed and affordable school choices. It features integrated interfaces for both schools and governments, highlighting internal/external scholarships and schemes, often unknown to families, thereby promoting transparency and access to quality education.

Index Terms – School Comparison, AI Recommendation System, Educational Data Analytics, Sentiment Analysis.

I. INTRODUCTION

Parents today face significant challenges in choosing the best school for their children. Information about school performance, fees, extracurriculars, and environment is often fragmented or biased. The proposed School Comparison and Recommendation Platform provide a centralized, transparent solution for comparing schools using authentic and data-driven insights.

The system empowers parents to view verified details, explore virtual school tours, calculate fee-to-value ratios, and access available scholarships all in one application.

EduEra is a centralized, AI-powered platform designed to assist parents in choosing the right primary school for their children. It provides data-driven insights and transparent comparisons of schools based on fees, facilities, quality, and location. The platform integrates government and private schemes, helping parents discover scholarships and financial aid opportunities. With AI-based recommendations, real-time updates, and stakeholder-specific portals, EduEra ensures smarter, faster, and more affordable school decisions.

II. METHODOLOGIES OF PROBLEM SOLVING

The project follows a Waterfall SDLC model, including:

1. Requirement Analysis – Understanding user needs.
2. System Design – Architecture, DFDs, UML.
3. Implementation – Coding frontend, backend, AI models.
4. Testing – Unit, integration, and user acceptance.
5. Deployment – Hosting and public access.
6. Maintenance – Regular updates and improvements.

III. SOFTWARE REQUIREMENTS & SPECIFICATIONS

3.1 USER REQUIREMNETS

- Easy signup/login for parents and schools.
- Compare schools by multiple criteria.
- View government schemes and eligibility.
- Submit and view parent reviews.
- Get AI-based personalized school recommendations.

3.2 FUCTIONAL REQUIREMENTS

3.2.1 User Features

- Registration and authentication.
- Search and filter schools by parameters.
- Review submission and viewing.
- Fee calculator and comparison tool.

3.2.2 Model Training

- AI model trained using collaborative and content-based filtering.
- Sentiment analysis model trained on parent reviews using NLP.

3.3 EXTERNAL INTERFACE REQUIREMENTS

3.3.1 User Interfaces (UI)

· Mobile-friendly UI using Flutter/React Native.
· Admin dashboard for school and scheme management.

3.3.2 Hardware / Software Interfaces

- Backend via Node.js / Firebase.
- Database via Firestore / MongoDB.
- Integration with Google Maps API and Firebase Cloud Messaging.

3.4 NON-FUNCTIONAL REQUIREMENTS

3.4.1 Performance

- Fast load times with optimized queries.

3.4.2 Safety

- Automated backups and encryption.

3.4.3 Security

- Role-based authentication, Firebase Auth, SSL encryption.

3.4.4 Software Quality

- Reliability, scalability, and maintainability.

3.5 SYSTEM REQUIREMENTS

3.5.1 Database Requirements

Firestore/MongoDB with structured school and user data.

3.5.2 Software Requirements

- Node.js, Firebase, Flutter/React Native
- Python (for AI models)
- Google Cloud APIs

3.5.3 Hardware Requirements

- Minimum 8 GB RAM, Intel i5 / Ryzen 7
- 512 GB SSD, Internet connection

IV. PHASES OF WATERFALL MODEL

- **Requirement Analysis**:

In this initial phase, we gather and document all the requirements of the CBMSD system. This includes understanding the need for multilingual spam detection, defining the software and hardware requirements, and identifying the scope of the project.

- **System Design**:

Based on the requirements, we create a detailed system design. This encompasses the architecture of the application, database schema, selection of appropriate algorithms for spam detection, and the integration of frontend (Streamlit) and backend (Flask) components.

- **Implementation**:

In this phase, the actual coding of the CBMSD system takes place. The frontend is developed using Streamlit to ensure user-friendly interaction, while Flask is used for the backend to handle the core processing and integration with the database. Hardware configurations, such as the 8 GB i7 and 16 GB AMD Ryzen 5700 machines, are set up to support development and testing.

- **Integration and Testing**:

After implementation, individual components and modules are integrated into a complete system. Rigorous testing is performed to identify and fix any bugs or issues. This ensures that the system works as intended and meets all specified requirements. Special attention is given to ensuring the accuracy and efficiency of the spam detection models and the seamless operation of the frontend and backend integration.

- **Deployment**:

Once testing is completed and the system is deemed stable, the CBMSD system is deployed in a live environment. This phase involves setting up the production environment, configuring servers, and ensuring that the hardware meets the necessary specifications for optimal performance.

- **Maintenance**:

Post-deployment, the system enters the maintenance phase, where it is monitored for performance and any issues are addressed as they arise. Regular updates and patches are applied to enhance the system's functionality, security, and efficiency, ensuring it continues to meet user needs and adapts to new spam detection challenges.

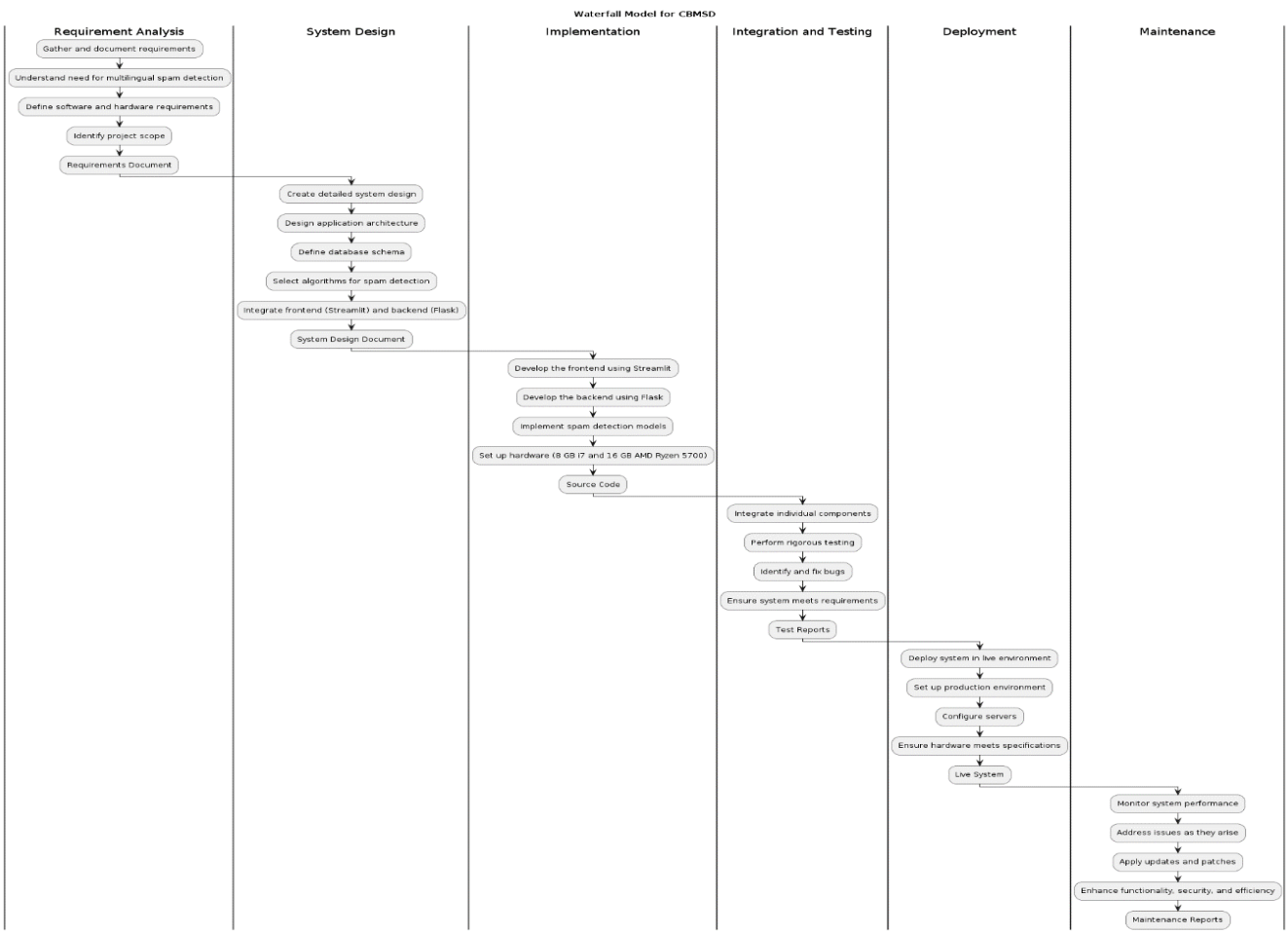

Figure 1: Waterfall Model

V. IMPLEMENTING USER INTERFACE

The User Interface (UI) serves as the bridge between users and the system, ensuring an engaging, intuitive, and seamless experience for all stakeholders — Parents, School Administrators, and Developers/Admins. The UI implementation focuses on simplicity, accessibility, and interactivity while maintaining consistency across mobile and web platforms.

Technology Stack and Frameworks

The UI is developed using modern cross-platform technologies to provide scalability and responsiveness:

- Frontend Frameworks: Flutter (for Android/iOS) and React Native (for Web compatibility)
- UI Design Tools: Figma and Adobe XD (for wireframing and prototyping)
- Integration: Communication with backend APIs via RESTful services and Firebase SDKs
- Authentication: Firebase Authentication for secure user login and registration
- Notification Service: Firebase Cloud Messaging for real-time alerts and updates.
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Library / Tool	Purpose
Flutter	Cross-platform mobile app UI development
React Native	Cross-platform mobile app development using JavaScript
Node.js (Express.js)	Backend server and API handling
Firebase Authentication	User authentication and sign-in services
Firestore / MongoDB	NoSQL databases for storing user and school data
Firebase Cloud Messaging (FCM)	Push notification service

Table 1: Libraries Used

Technology	Purpose
Python	Used for developing the AI and Machine Learning models, implementing recommendation algorithms, and performing sentiment analysis on reviews.
JavaScript (Node.js)	Used for backend development, handling APIs, server logic, and communication between the frontend and database.
Dart (Flutter)	Used for developing the cross-platform mobile application interface to ensure a smooth and responsive user experience.
HTML / CSS	Used for structuring and styling the web-based frontend components.
SQL / NoSQL Queries	Used for data retrieval, manipulation, and storage in Firestore and MongoDB databases.
JSON	Used for data exchange between frontend, backend, and AI model APIs.

Table 2: Programming Languages Used

VI. OUTCOMES

The developed school recommendation website efficiently connects parents with suitable schools based on personalized preferences, leveraging advanced recommendation algorithms. Parents gain access to comprehensive information, including school details, reviews, fee analysis, and available scholarships, enabling informed decision-making. The system's content-based and collaborative filtering algorithms provide accurate and tailored school suggestions, enhancing user satisfaction.

Sentiment analysis of user reviews offers valuable insights into school quality and user experience, adding an extra layer of trust and transparency. The platform facilitates schools in managing their profiles, posting updates, and interacting with prospective students, fostering greater engagement. Real-time notifications and analytics empower users to stay updated with relevant information and trends.

Overall, the solution streamlines the process of school discovery and selection, reducing the time and effort required by parents while promoting data-driven, user-centric educational choices. The scalable cloud-based infrastructure and modular architecture ensure robustness, ease of maintenance, and future feature expansions. This project demonstrates the effective application of AI and full-stack development techniques in solving real-world educational challenges.

VII. RESULT

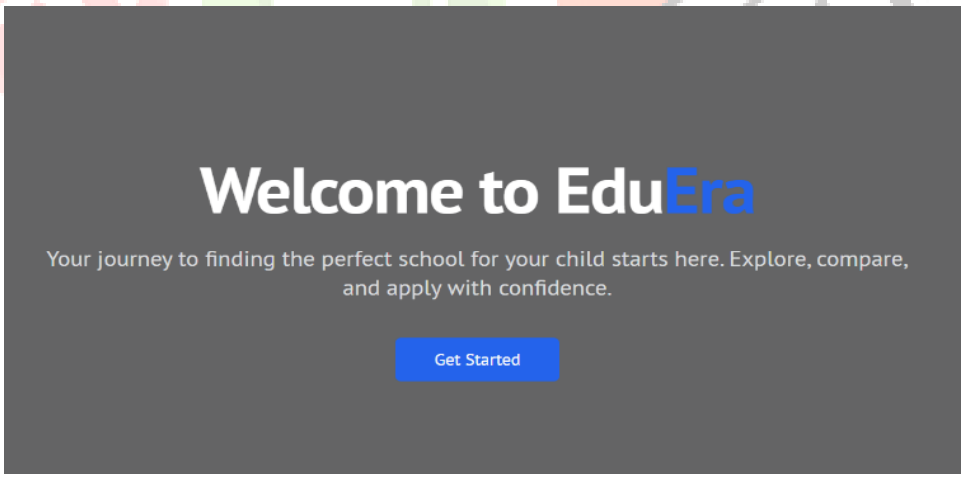

Figure 2: Welcome Page

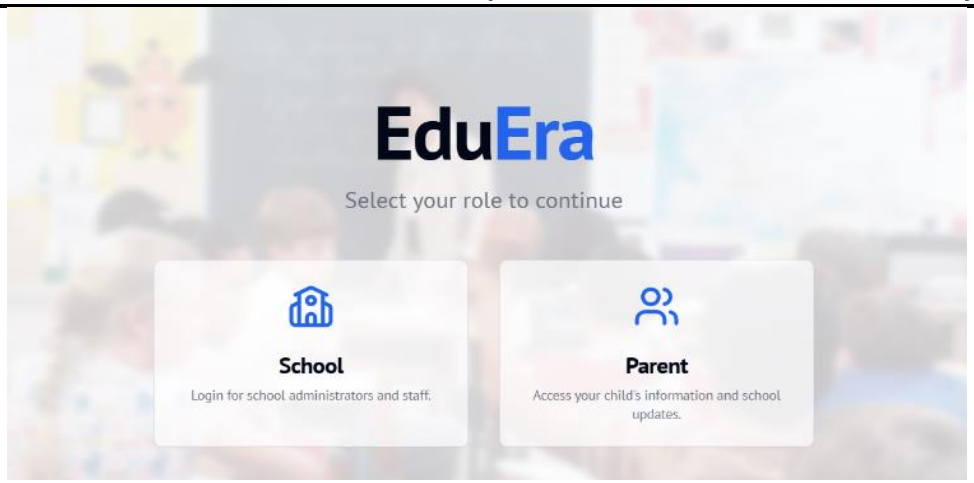

Figure 3: Login Selection Page

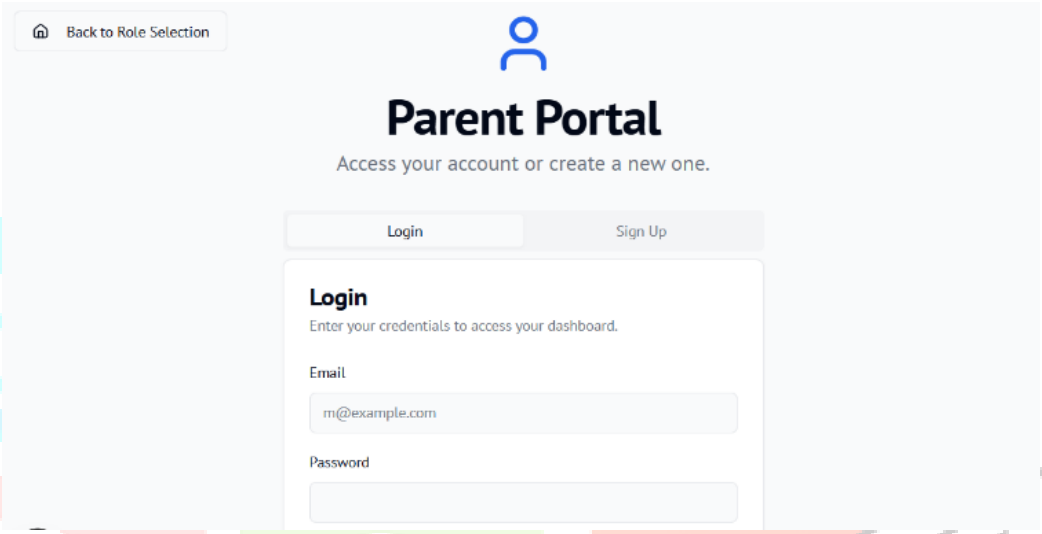

Figure 4: Parent Sign/Login Page

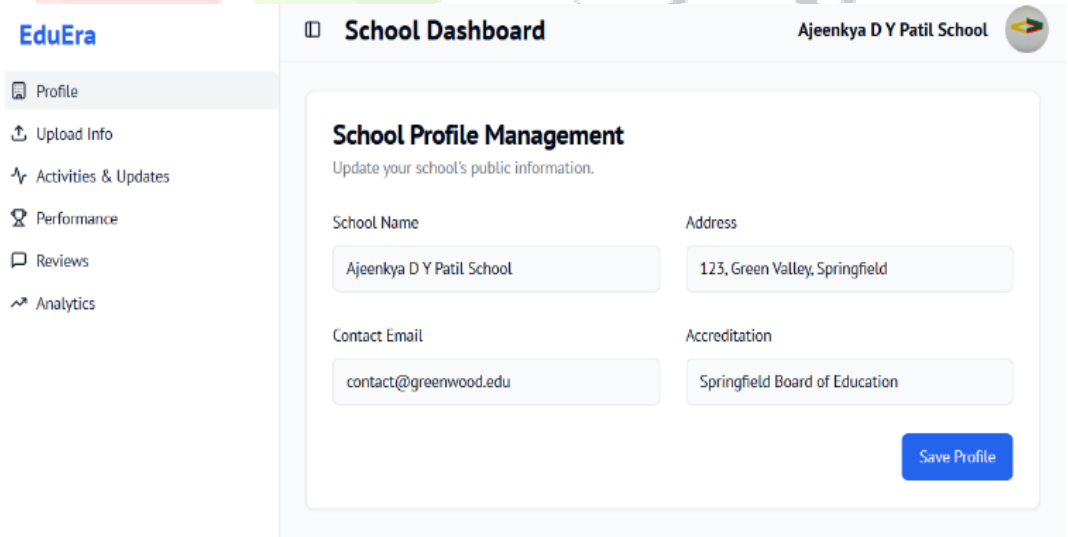

Figure 5: Dashboard Page

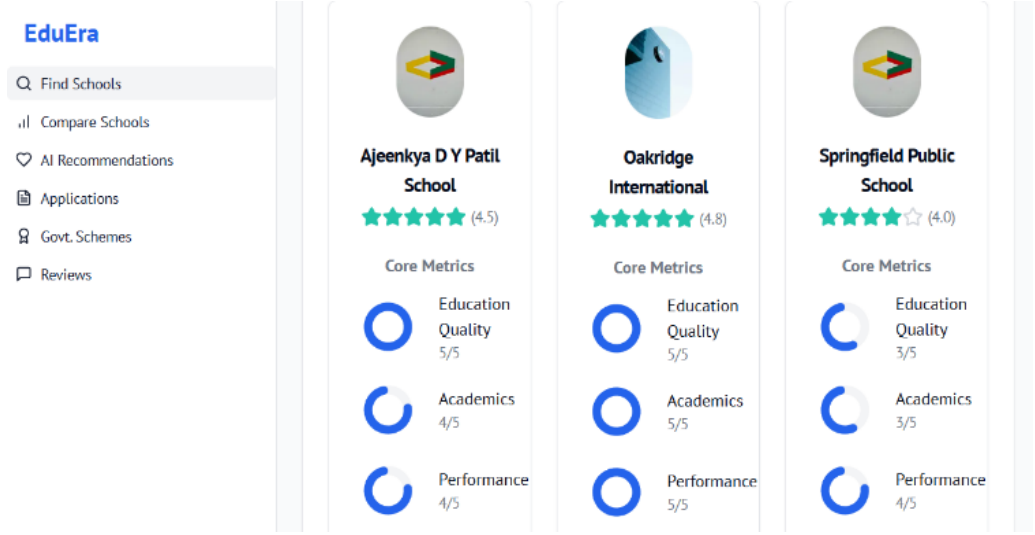

Figure 6: School Find/Comparison Page

VIII. Conclusion

The school recommendation website project successfully demonstrates the power of combining modern web technologies with AI-driven algorithms to solve significant real-world challenges. By integrating content-based and collaborative filtering alongside sentiment analysis, the platform provides personalized, accurate, and trustworthy school recommendations for parents. The user-centric design and robust backend infrastructure ensure a seamless experience across devices while maintaining scalability and performance.

This project not only enhances decision-making for parents but also fosters transparency and engagement between schools and the community. The modular architecture and usage of cloud services facilitate maintainability and future growth, allowing the system to evolve with changing educational needs. Overall, this application exemplifies an effective approach to leveraging technology for improving educational access and empowering informed choices in the digital age.

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