

Edusolar AI - Ai-powered Scholarship Recommendation System

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Abstract - In many educational institutions, students often struggle to find suitable scholarships because information is spread across multiple sources, eligibility conditions are complex, and personalized guidance is limited. EduScholar AI is a web-based scholarship recommendation system designed to address these challenges by simplifying and automating the scholarship search process. The platform allows students to create an account, log in, and enter relevant academic, financial, and personal details such as their course of study, category, family income, and achievements. Using this information, the system evaluates eligibility requirements and suggests scholarships that best match each student's profile.

Machine learning techniques are used to compare student data with available scholarship schemes, improving recommendation accuracy while reducing manual effort. The system also includes an administrative module through which authorities can manage scholarship records, track user activity, and update eligibility criteria using a centralised dashboard. Analytical tools such as charts and reports provide insights into application patterns and student participation. Through providing tailored suggestions and maintaining transparency in accessing information, EduScholar AI enhances awareness, equity, and efficiency in the distribution of scholarships, which will provide equity and equality in education and governance through digital means.

Keywords: Scholarship Recommendation System, Artificial Intelligence, Machine Learning, Personalized Learning, Educational Technology, Digital Governance

I. INTRODUCTION

Finding the right scholarship is a common challenge for students in many educational institutions. Information about scholarships is often spread across different platforms, eligibility rules can be difficult to understand, and there is very little personalized guidance available. Most students still depend on manual methods such as browsing multiple websites, checking notice boards, or visiting college offices. These approaches are timeconsuming and sometimes confusing, which can cause deserving students to miss out on scholarships that suit their academic profile or financial situation.

With the increasing use of digital platforms in education, there is a growing need for smarter systems that can simplify the scholarship search process. EduScholar AI has been developed to meet this requirement by offering a web-based solution that provides personalized scholarship recommendations. Students can enter their academic details, financial background, and personal information, allowing the system to accurately assess eligibility and suggest relevant scholarship options. This reduces the effort required for manual searching and improves decision-making.

The system is built around three main user roles: Student, Administrator, and Scholarship Authority. Students keep their profiles and get personalized suggestions of scholarships, administrators control the work of the system and data correctness, and scholarship authorities update the information about scholarships and their requirements. Analysis of student information and corresponding it to appropriate scholarship programs is done using machine learning methods to enhance accuracy and relevance.

Overall, this approach reduces manual work while promoting transparency, accessibility, and

fairness in scholarship distribution. By integrating automated analysis, centralized management, and data-driven insights, EduScholar AI provides a reliable and scalable solution that supports inclusive education and effective digital governance.

II. RELATED WORK

Over the past few years, a number of webbased and mobile platforms have been developed to help students access scholarship information more easily. Government initiatives such as the National Scholarship Portal, along with various state-level and private educational websites, allow students to view available scholarship schemes and submit applications online. These platforms have reduced dependency on offline procedures and have made scholarship information more accessible to a wider group of students.

However, most of the existing systems still require students to manually search through multiple scholarship options and carefully read eligibility conditions on their own. Since the criteria are often lengthy and complex, students may apply for schemes for which they are not eligible or overlook scholarships that actually suit their background. This manualized process is time-consuming, as well as it also likely to cause errors, duplication, and lost chances.

Other scholarly research and university system has tried to enhance management of scholarship through the utilization of databases and rule-based filters. These methods ensure the basic support, but they are mostly based on pre-suppositions and human checks. Such systems have a limit to scalability and flexibility as the pool of students and scholarship programs just keeps expanding. Without intelligent analysis, personalized advice with regard to different profiles of students is hard to come by.

EduScholar AI is intended to address these limitations by providing an AI-driven recommendation platform that processes the data concerning the students and finds the appropriate scholarship on its own. Using the method of machine learning, the system reduces human labor, enhances the accuracy of the recommendations and makes the application process more simplistic. This solution enables transparency, efficiency, and fairness and proves to be a better solution in addressing scholarships in the new digital education context.

III. DATASET

The data in the EduScholar AI system is a formatted data of student and scholarship data gathered by various sources in the education and government. Student information entails academic information like course, year of study, grades, category, family income and achievements. The data on scholarship includes details associated with the eligibility requirements, income restrictions, academic conditions, category reservations, and application period.

To train and evaluate the model, the dataset is categorized into 2 major datatypes, namely Student Profiles and Scholarship Schemes. These are further subdivided into training and validation sets which is used to facilitate supervised learning. Categorical data is coded and all numerical values are normalized in order to ensure uniformity across data records. Such structured data facilitates the system to compare the profile of students with appropriate scholarships well and enhances consistency of the recommendation process. The records of the dataset are represented as a sample in Fig. 1.

Sample Datasets for EduScholar AI – AI Scholarship Recommendation System

Student Profile Dataset

Student ID	Age	Gender	Education Level	Mark/ GPA	Income Category	Category
S0001	17	Female	Class 12	85%	Below 2 Lakhs	OBC
S0002	19	Male	2nd Year BSc	78%	2-3 Lakhs	General
S0003	20	Female	3rd Year B.Tech	85.50%	5-8 Lakhs	Urban
S0004	16	Male	Class 11	92%	Below 2 Lakhs	Rural
S0005	18	Female	Class 10	90%	General	General
S0006	21	Male	1st Year BA	82.00%	Below 2 Lakhs	Urban
S0007	22	Female	4th Year B.E	87.00%	8-10 Lakhs	Urban
S0008	24	Male	B.D CPA	90%	10+ Lakhs	Urban

Scholarship Dataset

Scholarship Name	Eligibility Criteria	Income Limit	Category	Scholarship Amount
Merit-Based Scholarship	10th-12th Students	> 95%	All	₹50,000/yr
Engineering Excellence Grant	B.Tech Students	> 75%	Nationwide	₹75,000/yr
Rural Development Award	Below 5 Lakhs	> 75 GPa	OBC, SC, ST	₹75,000/yr
Women in Science Scholarship	Female B.Sc/M.Sc Students	> 80%	Nationwide	₹30,000/yr
SC/ST Technical Scholarship	12th, B.Sc, B.Tech	> 70%	Nationwide	₹60,000/yr
SC/ST Technical	Below 5 Lakhs	> 70%	SC, ST	₹40,000/yr

Students ID

Age

Gender

Education Level

Mark/ GPA

Income Category

Category

Field of Study

Student ID

Age

GPA/ Marks

Income Category

Category

Location, Rural

Fig. 1. Images from dataset

IV. SYSTEM ARCHITECTURE AND DESIGN

EduScholar AI system is based on three-tier architecture with Frontend Layer, Backend Layer, and Database Layer. The design guarantees easy interaction between students, administrators, and scholarship authorities as well as data security, scalability as well as efficient processing.

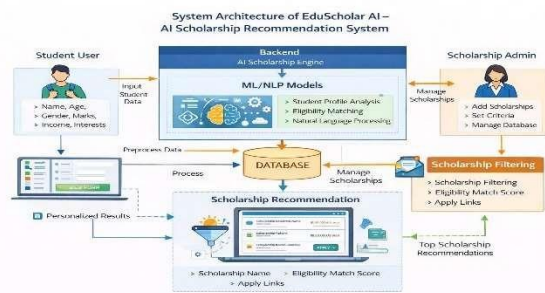


Fig. 1. System Architecture of EduScholar AI Scholarship Recommendation System
 A. Overall Architecture

The Frontend Layer is the main interface in the interaction with the user which is made simple and access-friendly. A clean and user-friendly interface allows the students to register, log in, and input their academic and financial information. According to the presented data, the system will show individualized scholarship offers and enable students to check the status of eligibility and updates on the application.

Backend Layer is the part of the system that does the processing and logic. It receives user inputs and analyzes eligibility using machine learning algorithms and comes up with scholarship recommendations. This layer handles authentication, role access and communication between the frontend and the database as well.

Student profiles, scholarship information, eligibility regulations and logs of the system are safely stored in the Database Layer. The administrators can fully monitor the activity of the system, control the scholarship information, and revise the conditions of eligibility. There is the possibility of adding or changing scholarship schemes by the scholarship authorities and this makes sure that the recommendations are accurate and up to date.

This hierarchical structure will minimize manual work, enhance the stability of the system, and enable the effective management of massive scholarly data and provide students with an open and customized experience.

B. Data Flow

1) User Registration and Login:

The students, administration, and scholarship officials sign in to the platform with their individual logins. The verification of users is also done safely with encrypted passwords and OTP. Administrators check and authorize the accounts of scholarship authority, so that only authorized personnel could deal with the scholarship data. 2) Student Profile Submission:

Once a student logs in, she provides her academic, financial and personal information, including course,

year of study, category, family income and achievements. This information is not only validated by the system, but is safely stored to be further processed.

3) AI-Based Eligibility Analysis:

The profile provided by the student is sent into the AI recommendation module. Machine learning algorithms process the information and contrast it with the existing scholarship eligibility criteria. Depending on the similarity of accuracy and relevance, the shortlisting of suitable scholarships is done to each individual student.

4) Scholarship Recommendation Generation: Upon the analysis, the system will produce a customized list of scholarships to the student. These suggestions are shown on the student dashboard in addition to simple eligibility status and application information.

5) Scholarship Authority Management: The dashboard enables scholarship authorities to add new scholarship schemes, revise the eligibility conditions and alter deadlines. The changes that are to be made are reflected instantly to the recommendation system to ensure accuracy.

6) Admin Monitoring and Control:

The administrator can fully control system operations such as users, data validation, and activity monitoring. The admin is able to monitor the system performance, handle the feedback and fix the discrepancies in regards to the scholarship recommendations.

7) Data Storage and Analytics:

The MySQL database has stored all profiles of the students, as well as scholarship data and recommendation outcomes in a secure place. Data about analytics report and a visual insight allow administrators to see the trends in applications, popular schemes, and student participation hence making continuous improvements to the system.

V. IMPLEMENTATION

A. Frontend layer

The frontend layer is the core interface of the EduScholar AI system and the interface offers individual dashboards to the Students, Scholarship Authorities, and the Admin.

- Students will be able to create an account, log in, add or update their profiles, and see customized scholarship recommendations. Eligibility information and opportunities are easily presented on the interface with the details being presented in a userfriendly format.

- Scholarship Authorities can add and manage scholarship schemes, update eligibility criteria, and monitor student interest in different programs.
- Administrators have full access to oversee all system activities, manage user accounts, approve authorities, and monitor overall platform performance.

Scholarship Authorities may create and maintain scholarship schemes, revision of eligibility criteria and The front end is created on responsive web technologies to allow smooth navigation, clarity, and accessibility to various devices.

B. Backend Layer

The backend is the central processing unit of the system and is developed with the help of Node.js and Express framework. It manages user authentication, role-based access control, data validation and frontend and database communication.

Upon the submission of profile information, a student, the backend receives it and transfers the data to the AI recommendation engine. The machine learning model compares the profile with scholarship criteria and provides pertinent recommendations. The automated method is very helpful in saving a lot of manual work and enhances the accuracy of the recommendations with a secure data management method.

C. Database Layer

All information on the system is stored in a MySQL database on a secure basis. These are student profiles, scholarship information, eligibility regulations, recommendation outcomes, and system logs. The database design enables to facilitate effective querying, scalability and integrity of the data, both with a large number of users and with a high degree of reliability of the system.

VI. RESULTS AND DISCUSSION

The EduScholar AI system proved to be a stable system in the course of testing, being able to generate the correct and personalized scholarship recommendations according to the profile of the students. The matching accuracy of the recommendation model was very high, and it helped small scholarship according to the academic qualifications, category and financial background of the students. The system saved a lot of manual labor and also minimized the number of errors, which is a

common occurrence with the conventional system of searching scholarships.

The application of machine learning to enhance the efficiency of the recommendation processing and consistency of various user profiles were guaranteed. The system architecture that was modular enhanced quick response time, high scalability and the ability to support many users at a given time. Generally, the findings reveal that EduScholar AI is a viable and sustainable way of streamlining the process of scholarship discovery in order to enhance transparency and accessibility.

A. User Interface and Experience

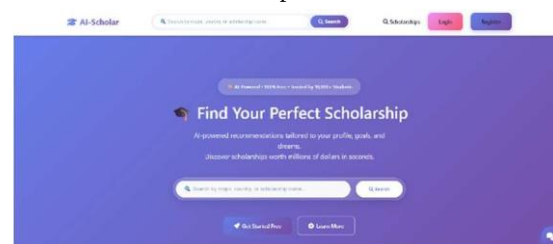


Fig. 2. Home Page of EduScholar AI Scholarship Recommendation System

The EduScholar AI interface is simple and clear-cut to make sure that students with different backgrounds can use it easily. The home page offers easy solutions to registering, logging in and filling out the profile. Students are able to easily access sections and see suggested scholarships and monitor their eligibility. The dashboard design is clear and responsive and enables easy interaction with both desktops and mobile devices even to those who are not familiar with it.

B. Student Profile and Recommendation Module

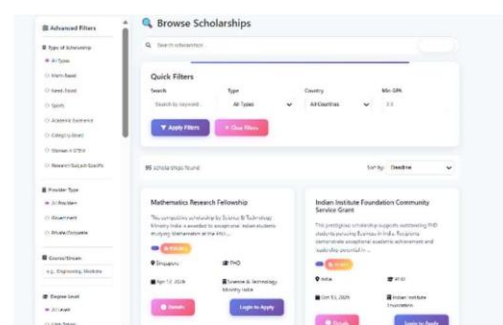


Fig. 3. Student Profile and Recommendation Interface

The profile submission module enables students to input the academic, financial and personal information in a systematic way. After the

information is provided, the system runs data and comes up with a list of recommendations on suitable scholarships. The suggested scholarships are presented with the corresponding eligibility indicators so that students could see why a certain scheme is recommended. The module minimizes confusion and enhances trust on the application process.

C. Admin Dashboard

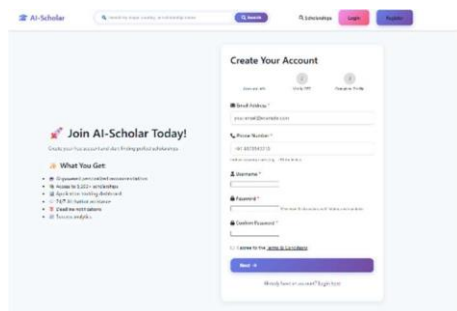


Fig. 4. Admin Dashboard

The administrative dashboard provides the full overview of the activity in the system, such as student enrollments, scholarship records, and recommendations records. Administrators will be able to administer user accounts, grant access to scholarship authority and track system performance. The structured design assists the administrators to manage substantial amounts of data effectively and maintain the integrity and precision of the system.

D. AI-Based Recommendation Engine

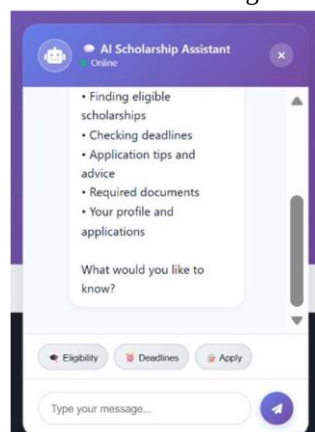


Fig. 5 Recommendation Model Performance Analysis

The AI recommendation engine uses machine learning to match the student profiles to suitable scholarship schemes. The model performed well during testing with stable convergence which means that the model is successfully learning and

there is little overfitting. The system also fits well into different student data, which makes it relevant and meaningful in terms of its recommendations. Such automation lowers the reliance on the manual filtering process and increases the accuracy of the system.

E. Monitoring and Analytics

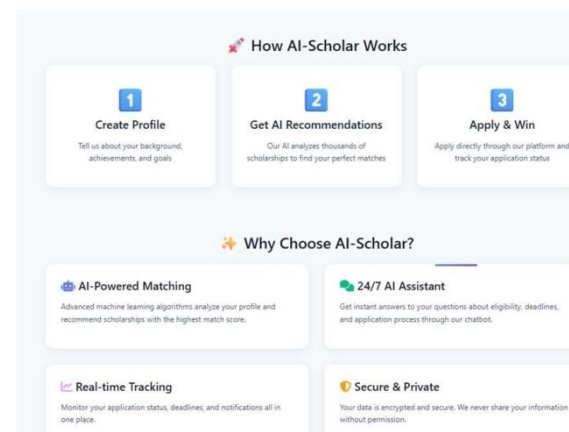


Fig. 6 Scholarship Analytics and Reporting Panel

The analytics module is used to get insights on student engagement, popular scholarship programs and trends in application in the form of graphical representations. Such observations assist administrators and authorities determining scholarship schemes to gauge the efficacy of schemes and the areas of enhancement. Data-driven analysis will help the system to make decisions and improve on the distribution of scholarships.

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