AI-Driven Scholarship Finder

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Abstract—In an increasingly competitive academic landscape, scholarship management systems play a critical role in facilitating access to educational opportunities. This paper explores theintegration of artificial intelligence (AI) into scholarship management systems, highlighting how AI can streamline application processes, enhance decision-making, and improve the overall experience for applicants, institutions, and funders. By analyzing existing systems and proposing a framework for an AI- driven scholarship management system, this paper aims to contributeto the discourse on equitable access to education through technological innovation.

Index Terms-Al-Driven Scholarship Finder, Data verification, Financial aid, Machine learning, Scholarships, Student profiles.

I. INTRODUCTION

In educational institutions, students often face significant challenges in identifying and applying for scholarships that align with their academic, financial, and personal backgrounds. With the overwhelming variety of scholarship opportunities available and varying eligibility requirements, many students miss out onvaluable financial aid simply because they are unaware of theiroptions or find the search process too complex. Traditional scholarship management systems rely heavily on manual searches and repetitive document submissions, leading to inefficiencies that hinder students and overburden administrative staff. The *AI-Driven Scholarship Finder* aims toaddress these challenges by providing a centralized platform that uses machine learning to personalize scholarship recommendations for students based on their profiles. This project offers a streamlined, accessible, and efficient way to enhance scholarship access for students and alleviate administrative workloads.

The Scholarships play a vital role in supporting students financially, enabling them to pursue higher education without significant financial strain. Despite this, many students face difficulties in navigating the scholarship landscape due to the decentralized nature of scholarship information and complex eligibility criteria. For scholarship departments, manually verifying eligibility and processing applications for large numbers of students can be both time-consuming and resource- intensive. This project addresses these issues by developing the AI-Driven Scholarship Finder, a platform that centralizes the scholarship discovery and application process and integrates machine learning to match students with suitable scholarships.

II. PROBLEM STATEMENT

Students often struggle to identify scholarships they are eligible for due to the overwhelming number of options and varying eligibility criteria. This project aims to develop a system that predicts suitable scholarships based on students' details and scholarship requirements, simplifying the process of matching students with the right opportunities. The scholarship sections in colleges face significant challenges each year with the time-consuming process of verifying student documents for eligibility.

III. PROPOSED METHODOLOGY

1. Data collection:

The AI-Driven Scholarship Finder begins with collecting comprehensive data on available scholarships, sourced from government, state, and private organizations. This data includes scholarship eligibility criteria, application deadlines, award amounts, and links to official websites. Additionally, data on past applications and outcomes is gathered to support machinelearning model training, helping to improve the accuracy and relevance of scholarship matches.

2. Algorithm Development:

Machine learning algorithms such as Naive Bayes (for supervised learning) and content-based filtering (CBF) and collaborative filtering (CF) are developed to handle student data inputs and match them to the most relevant scholarships. The system uses this combination of techniques to analyze each student’s

profile details—such as caste category, merit, income level, and course information—against scholarship requirements, enabling personalized scholarship recommendations. Content-based filtering helps recommend scholarships based on a student's specific profile attributes, while collaborative filtering identifies scholarships that students with similar profiles have applied to.

3. Data verification module:

To ensure the accuracy of submitted information, a verification module runs algorithms that detect inconsistenciesor errors in a student's initial profile data. If discrepancies arefound, the system notifies the student, requesting updated information to prevent mistakes that could affects scholarshipeligibility. This verification process reduces application errors and improves data integrity, supporting a smoother applicationexperience.

4. User testing:

The system undergoes initial testing with a selected group of users to evaluate its performance, usability, and accuracy in matching students to scholarships. Feedback gathered during this testing phase helps identify any issues in the recommendation and data verification processes, allowing for necessary improvements and fine-tuning of the algorithms before a full-scale launch.

5. Full scale launch and continuous improvement:

After successful user testing and refinement, the AI-Driven Scholarship Finder is launched at scale. Ongoing monitoring, support, and updates are provided to enhance the system over time. As the platform collects more data, machine learning models are retrained to ensure the system continues to provide accurate, personalized scholarship recommendations.

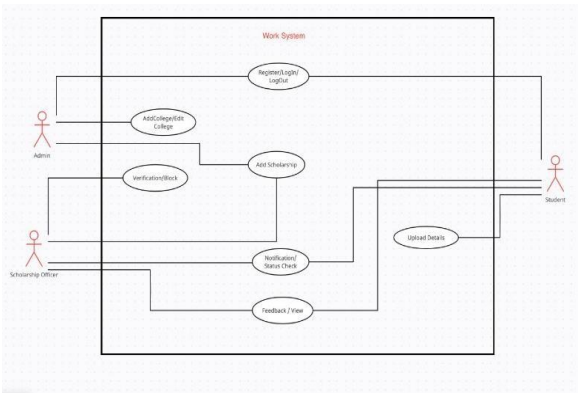

Fig.1. Use case diagram

Through this methodology, the AI-Driven ScholarshipFinder aims to streamline the scholarship discovery and application process, increase access to financial aid, and make higher education more attainable for students from diverse backgrounds collaborative methods, as it does not leverage the interactions of other users.

IV. SYSTEM ARCHITECTURE

The "AI-driven Scholarship Finder" is designed to help students find and apply for scholarships by using advanced technology to simplify the process. The system has several keycomponents that work together to collect information, check eligibility, process applications, and interact with users. Here's a detailed look at how it all works:

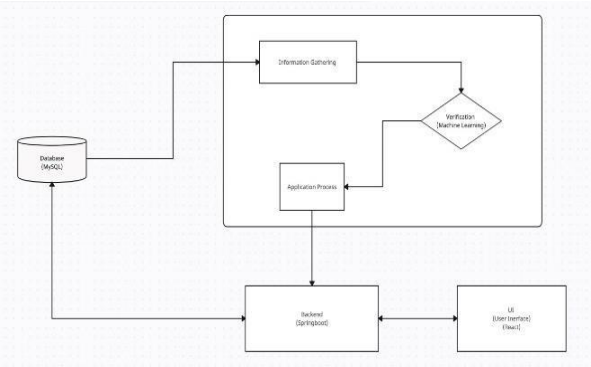

Fig.2. Architecture Diagram

1. Database (MySQL): The heart of the system is a MySQL database. This is where all the important data is stored, including information about students (such as grades and personal details) and available scholarships. The database helps keep everything organized and makes it easy for the system to access and updateinformation when needed.

2. Information Gathering Module: The first step in the processis gathering information from students. This module collects data like academic records, extracurricular achievements, and any other relevant details needed to determine scholarship eligibility. Once the data is collected, it is stored in the MySQL database for later use.

3. The Verification Module (Machine Learning): uses severalalgorithms to confirm student data and determine scholarship eligibility. K-Mapping aligns student data with specific scholarship criteria to find the best matches. Supervised Learning trains the system using historical data to recognize patterns that suggest a student's eligibility, allowing for accurate predictions about qualifying candidates. Collaborative

Filtering identifies patterns among similar users to recommend scholarships based on what others with similar profiles have applied for or received. Content-Based Filtering utilizes student-specific data, such as GPA and achievements, to match them with scholarships tailored to their unique characteristics.

4. Application Process Module: Once the verification is complete, the system moves to the application process. Here, the system organizes and prepares the data for submission to various scholarship programs. This module communicates withthe backend to make sure all the information is ready and sent to the right places.

5. Backend (Spring Boot): The backend of the system is powered by Spring Boot, a popular Java framework that handles all the complex processes behind the scenes. The backend acts as the middleman between the database, the machine learning module, and the user interface. It manages all the logic and makes sure data moves smoothly between different parts of thesystem.

6. User Interface (React): The front end of the system is built using React, a powerful tool for creating interactive web pages. This user interface allows students to easily input their data, seethe status of their applications, and get updates on their eligibility. The interface talks to the backend to get and show information in real-time, making the whole process user- friendly and straightforward.

V. TECHNOLOGY

1. K-Mapping:

K-Mapping, or Knowledge Mapping, organizes and structures scholarship information, making it easy to search through and match with students' needs. This algorithm works by creating a map of each scholarship's attributes, such as eligibility criteria (academic level, nationality, field of study) and unique requirements (e.g., community service, specific skills). K-Mapping acts like a structured roadmap, categorizing scholarships into detailed sections that make searching and sorting faster and more precise. In the AI scholarship finder, K-Mapping ensures that each scholarship listing is well- organized and easy to access. By structuring the database withK-Mapping, the system can pull the most relevant scholarships based on students' backgrounds, saving them time by focusing only on options that directly match their profile. This organized structure reduces confusion, ensures clarity, and helps students navigate the large volume of available scholarships to find the best match.

2. Content-Based Filtering (CBF):

Content-Based Filtering (CBF) is a personalized recommendation technique that suggests scholarships based on each student's individual qualifications and preferences. This algorithm analyzes specific attributes of both the student's profile (like academic achievements, major, interests) and the scholarships themselves (such as study field, minimum GPA, location). By examining these attributes, CBF can identify scholarships that align closely with what the student is looking for. In the scholarship finder, CBF tailors recommendations by comparing the features of scholarships with the student's personal information. This helps students avoid irrelevant options and focus only on scholarships they're eligible for, making the process smoother and more effective. For example, if a student has a high GPA and is studying environmental science, CBF will prioritize scholarships that match these details, providing a custom list that meets the student's unique qualifications.

3. Collaborative Filtering:

Collaborative Filtering (CF) is a recommendation approach that leverages data from similar users to suggest scholarships that might be relevant. Instead of focusing only on a student's profile, CF looks at patterns among students with similar backgrounds or interests to find scholarships they've applied for or found useful. In the scholarship finder, CF recommends scholarships that were popular with students who have similarqualifications, increasing the likelihood that the suggestions are relevant. For example, if many students in a specific field, suchas computer science, apply for certain scholarships, CF uses this pattern to suggest these options to other students in computer science. By using collaborative data, CF introduces students to new opportunities that they might not have considered on their own, broadening their choices while keeping them relevant.

4. Supervised Learning:

Supervised Learning is a powerful algorithm that learns from past data to predict which scholarships a student is likelyto be eligible for. In the AI-driven scholarship finder, supervised learning models are trained on data from previousscholarship applications, including profiles of successful applicants and the requirements of each scholarship. This algorithm

analyzes the patterns in this data to classify scholarships based on a student's unique profile and predict the likelihood of their eligibility. For instance, it might analyze a student's GPA, extracurriculars, and field of study to recommend scholarships that others with similar profiles havepreviously won. This predictive ability means students receive a more targeted set of scholarship options, improving their chances of finding opportunities they're likely to qualify for. Supervised learning not only saves students time but also offers a higher degree of confidence in matching them with scholarships they can realistically apply for and win.

VI. LITERATURE SURVEY

The study by Hegde et al. (2022) focuses on a Machine Learning-Based Scholarship and Credit Pre-Assessment System. This research utilizes the Naïve Bayes algorithm, a supervised learning technique, to predict scholarship eligibilitybased on various student attributes such as academic performance, communication skills, time management, and income level. The system, which achieved an accuracy rate of 96.7%, demonstrates how machine learning can automate and improve the accuracy of scholarship decisions. The study highlights the importance of using probabilistic classifiers in analyzing students' profiles and providing a systematic approach to scholarship allocation, which is traditionally manual andsubjective [1]

Jain and Mundra's (2022) research on a Scholarship Web Portal provides insight into the development of a centralized platform that consolidates information on scholarships provided by government and private organizations. The study addresses the challenges students face in identifying suitable scholarships due to scattered and often incomplete information. The proposed web portal categorizes scholarshipsbased on factors like eligibility criteria, location, and scholarship type. Additionally, the authors discuss future plansto incorporate a recommendation system that suggests scholarships to users based on their registration details. This centralized approach is particularly relevant to your project asit underscores the need for an all-encompassing platform that simplifies the scholarship search process for students and increases accessibility to various funding sources [2]

In another study, Chaudhari et al. (2022) explore Student Scholarship Prediction Using Machine Learning Algorithms. This research compares various ML algorithms, including Naïve Bayes, Decision Trees, and K-Nearest Neighbors (KNN), for predicting student eligibility for scholarships basedon academic records and other criteria. The findings indicate that different algorithms perform with varying degrees of accuracy depending on the dataset characteristics. For instance, Naïve Bayes demonstrated high accuracy with smaller datasets, while Decision Trees and KNN provided better scalability for larger datasets. This study underscores the importance of selecting appropriate algorithms based on data volume and highlights the potential of ML in efficiently handling large-scale scholarship applications. By using ML techniques, the study provides a foundation for developing automated scholarship systems that can reduce administrative workload and deliver faster, data-driven results [3]

In another paper Lovenoor Aulck1, Dev Nambi , Jevin West (2020) presents a data-driven approach to enhance university enrollment rates by optimizing scholarship disbursement. The authors developed a system that combines machine learning models with genetic algorithms to predict student enrollment decisions and allocate financial aid accordingly. Using data from a large public university, they first employed machine learning classifiers to predict enrollment likelihood for first- year, out-of-state students, achieving strong accuracy. Then, they applied genetic algorithms to maximize enrollment by strategically allocating merit-based scholarships. This optimized allocation approach led to a 23.3% increase in enrollment yield and a substantial rise in annual tuition revenue, demonstrating the effectiveness of machine learning and optimization techniques in higher education financial aid management.[4]

In another paper T. Sowndhariyaa and T.M. Nithya (2021) describes a scholarship management system that leverages content-based filtering to streamline scholarship allocation and support for students from various socioeconomic backgrounds. This system categorizes scholarship applicants based on criteria like caste, academicperformance, and financial need, using filtering algorithms to match students with the most suitable scholarship opportunities. The authors highlight the system's user- friendly interface and features, such as automated notifications and reminders, designed to keep students informed and engaged throughout the application process. By reducing administrative burdens and improving accessibility, this system aims to provide a

transparent, equitable way for students to obtain financial support while helping educational institutions manage scholarships efficiently. [5]

VII. CONCLUSION

In conclusion, this project demonstrates how AI technology can greatly improve how students find and apply for scholarships. By using machine learning methods and data verification tools, the AI-Driven Scholarship Finder matches students with scholarships based on their unique profiles, such as academic achievements, financial needs, and other personal details. This system makes it easier for students to find the scholarships they qualify for and also helps them avoid mistakes by checking their information and alerting them to correct any issues.

The platform solves problems with traditional scholarship search methods, which are often time-consuming and lack personalization. By offering an easy-to-use, automated solution, the AI-Driven Scholarship Finder helps students connect with financial aid opportunities that suit their needs, making higher education more accessible to everyone. By streamlining the search and application process, the platform gives students a better chance of securing financial support fortheir studies.

VIII. FUTURE WORK

In the future, this project could be improved by adding even more personalized scholarship recommendations and expanding its range to include more scholarship types. Adding advanced machine learning models could also help the systemstay up-to-date with new scholarship requirements, ensuring it remains accurate and helpful. Ultimately, the AI-Driven Scholarship Finder supports students from all backgrounds in reaching their academic goals by making scholarships easier to find and apply for.

IX. ACKNOWLEDGMENT

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