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AI-Powered NGO Subsidy Allocation & Document Management System

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Abstract - This paper presents ScholarAid, a digital platform designed to help NGOs manage educational fee subsidies and scholarships efficiently, transparently, and fairly. The platform supports both online student self-registration and NGO-assisted applications for students who rely on offline or paper-based processes. It includes document upload and verification, OCR-based data extraction, duplicate and fraud-risk checks, applicant priority scoring, and budget-based scholarship allocation recommendations. Priority scores are generated using factors such as family income, academic performance, special circumstances, and document-risk indicators. To ensure fairness and accountability, the system follows a human-in-the-loop model in which AI provides recommendations, while NGO staff and administrators make the final decisions. The platform also provides verification dashboards, notifications, token and cheque-distribution support, and a complete audit trail. ScholarAid aims to reduce manual errors, improve processing speed, strengthen document verification, and make scholarship distribution more accountable for NGOs and eligible students.

Key Words: scholarship management, document verification, FastAPI, AIML

1. INTRODUCTION

Education enables social mobility and economic opportunity, but students from low-income families often struggle to continue their studies because of tuition fees, transport costs, examination charges, and learning-material expenses. NGOs and charitable organizations provide scholarships and fee subsidies to support such students; however, selecting beneficiaries fairly and managing limited funds remain major challenges. Many NGOs still use paper forms, photocopied documents, spreadsheets, and manual verification for scholarship management. This can result in incomplete applications, duplicate records, document loss, delayed verification, inconsistent decisions, and limited tracking of fund distribution. Although digital systems can improve efficiency, transparency, and fraud prevention, a fully online process may exclude students with poor internet access or limited digital literacy.

ScholarAid is an AI-enabled scholarship and educational fee subsidy management platform for NGOs. It supports both student self-service applications and NGO-assisted applications for offline students. The system provides document upload, validation, OCR-based data extraction, version control, duplicate detection, fraud-risk checks, and application-status tracking. ScholarAid also uses priority scoring based on income, academic performance, special conditions, and risk indicators. A budget-based allocation module recommends suitable beneficiaries and scholarship amounts. However, AI does not make final decisions. NGO staff review AI recommendations, and authorized administrators approve the final result. The platform also includes role-based dashboards, notifications, cheque-distribution support, and audit trails to ensure transparency, accountability, and fair scholarship distribution.

2. PROBLEM STATEMENT

Many NGOs that provide educational scholarships and fee subsidies still rely on paper-based applications, manual document verification, spreadsheets, and physical approval processes. These methods are time-consuming and can lead to incomplete applications, duplicate records, document loss, delayed verification, inconsistent beneficiary selection, and limited transparency in fund allocation.

Existing digital systems may not adequately support offline applicants, document fraud detection, fair priority evaluation, or auditable approval workflows. Therefore, there is a need for an integrated scholarship management platform that supports both online and NGO-assisted applications, automates document verification and applicant prioritization, recommends budget-based fund allocation, and maintains human control over final decisions.

3. OBJECTIVES AND SCOPE

Objectives:

The main objective of ScholarAid is to develop an AI-enabled platform that helps NGOs manage educational scholarships and fee subsidies efficiently, fairly, and transparently.

1. To digitize scholarship applications through student self-service and NGO-assisted registration.
2. To reduce paperwork, manual errors, duplicate applications, and document loss.
3. To verify uploaded documents using OCR, validation rules, and fraud-risk checks.
4. To recommend eligible scholarships based on student profile details and eligibility criteria.
5. To prioritize applicants using factors such as family income, academic performance, special conditions, and risk indicators.
6. To recommend scholarship amounts based on applicant priority and available NGO budget.
7. To ensure that NGO staff and administrators make the final approval decisions.
8. To provide notifications, application tracking, cheque-distribution support, and audit logs.

Scope:
The proposed system is intended for NGOs, charitable trusts, and educational support organizations that distribute scholarships or educational fee subsidies. It supports student registration, staff-assisted application entry, document upload and verification, eligibility checking, priority scoring, scholarship allocation recommendations, approval workflows, and beneficiary tracking.
The system includes separate dashboards for students, NGO staff, and administrators. It uses a web-based frontend, Flask/FastAPI backend, MySQL database, OCR-based document processing, AI-based recommendation and fraud-risk modules, and email/SMS notification services.
The system does not completely replace NGO decision-making. AI is used only to provide recommendations, identify possible errors or risks, and support faster processing. Final beneficiary selection, scholarship approval, and fund disbursement remain under the control of authorized NGO personnel.

4. LITERATURE REVIEW

[1] *Scholarship Eligibility and Application Portal 2025,* developed a centralized online portal for managing scholarship applications in educational institutions. The system enables students to explore available scholarships, submit applications, upload required documents, and track their application status. Administrators can create scholarship schemes, define eligibility conditions, verify submitted documents, and approve or reject applications. The authors show that automating these activities reduces manual paperwork, improves data accuracy, supports real-time tracking, and makes scholarship distribution more transparent. However, the system is mainly designed for online student applicants and institutional administrators. The proposed ScholarAid system extends this work by supporting NGO-assisted applications for students who have limited internet access or digital literacy, along with AI-based verification and priority scoring.

[2] *Crypto Scholar Chain: Revolutionizing Scholarship Management Framework with Blockchain Technology 2023,* proposed an Ethereum-based scholarship-management framework using blockchain, smart contracts, Solidity, and a ReactJS frontend. Their work addresses common problems in traditional scholarship processes, including insufficient transparency, inefficient communication, difficulty in verifying applications, lack of secure document storage, and weak audit mechanisms. The proposed system records scholarship activities through blockchain transactions, thereby supporting secure monitoring of applications, payments, fund allocation, and scholarship disbursement. The study demonstrates the importance of traceability and transparent financial records in scholarship distribution. However, the framework focuses strongly on blockchain-based transactions and does not emphasize OCR-based document extraction, NGO-assisted offline entry, AI fraud-risk analysis, or human-reviewed priority scoring. ScholarAid addresses these additional NGO operational requirements.

[3] *Advancing Scholarship Management: A Blockchain-Enhanced Platform With Privacy-Secure Identities and AI-Driven Recommendations 2024,* introduced a scholarship-management platform that combines blockchain, self-sovereign identity, zero-knowledge proofs, zk-rollups, and machine learning. The system focuses on secure scholarship applications, privacy-preserving identity verification, transparent fund management, and AI-based qualification prediction. The authors reported that their machine-learning model achieved 86.75% balanced accuracy and 91.68% mean average precision for scholarship-qualification prediction. They also reported that zk-rollups reduced transaction-confirmation time by approximately 63.6% and transaction costs by nearly 90%. This paper is highly relevant because it demonstrates the value of AI-based recommendation and secure auditability in scholarship management. ScholarAid follows a simpler web-based NGO architecture while focusing more on document OCR, fraud-risk flags, assisted offline applications, need-based priority scoring, and human approval.

[4] *Classification Models for Higher Learning Scholarship Award Decisions 2018,* studied the use of data-mining techniques for predicting whether a student should be considered eligible for a scholarship. The study used historical applicant data and evaluated five classification algorithms: J48, Support Vector Machine (SVM), Naïve Bayes, Artificial Neural Network, and Random Tree. The findings showed that the SVM model obtained 86.45% accuracy in classifying applicants as eligible, while Naïve Bayes performed best for identifying not-eligible applicants. The research demonstrates that machine-learning models can support scholarship selection by processing multiple applicant characteristics in a systematic manner. However, automated eligibility predictions should not replace human judgement, especially when decisions affect financially vulnerable students. ScholarAid therefore uses AI priority scoring and recommendations only as decision-support tools, while final approval remains with NGO staff and administrators.

[5] *TEduChain: A Blockchain-Based Platform for Crowdfunding Tertiary Education 2020,* proposed a blockchain-based platform for arranging financial support for higher-education students. The platform creates and stores digital contracts between students and sponsors, where the support can take the form of scholarships, donations, or educational loans. Fundraisers act as intermediary entities that manage financial contributions and maintain distributed ledger records. The study highlights the importance of transparency, security, sponsor confidence, and traceable fund utilization in educational funding. Although TEduChain concentrates on crowdfunding and sponsor–student contracts, its approach is relevant to NGO scholarship programs that need transparent fund allocation and disbursement records. ScholarAid differs by concentrating on the complete application-to-approval workflow, including document verification, applicant scoring, NGO review, budget allocation, and audit logging.

5. PROPOSED METHODOLOGY

ScholarAid follows an AI-assisted and human-controlled methodology to digitize the complete scholarship and educational fee-subsidy process for NGOs.
First, students can register and apply through a self-service portal. Students without internet access or digital knowledge can apply through NGO staff, who create profiles and submit applications on their behalf. The system collects personal, academic, financial, and bank details along with required documents.

Next, the system checks student details against scholarship eligibility criteria such as income, marks, course, category, location, gender, disability status, and special conditions. Eligible scholarship schemes are recommended to the applicant.

Applicants upload documents such as identity proof, income certificate, mark sheet, bank details, and fee receipt. The document module validates file format and completeness, performs OCR-based text extraction, and compares extracted details with the submitted profile. It also supports document versioning and re-uploading when a document is rejected.

The system uses AI-assisted checks to identify duplicate applications, repeated documents, incorrect formats, mismatched information, and suspicious values. Each application receives a fraud-risk flag, such as low, medium, or high risk. These flags are reviewed by NGO staff and do not automatically reject any applicant.

After verification, the system calculates an applicant priority score based on family income, academic performance, special conditions, document status, and fraud-risk indicators. Applicants are categorized as high, medium, or low priority. Based on the available NGO budget, the allocation module recommends eligible beneficiaries and suitable scholarship amounts.

NGO staff and administrators make the final decision. The system also provides notifications, cheque/token-distribution support, role-based dashboards, and audit logs for tracking applications, documents, decisions, allocations, and disbursement status.

6. SYSTEM ARCHITECTURE

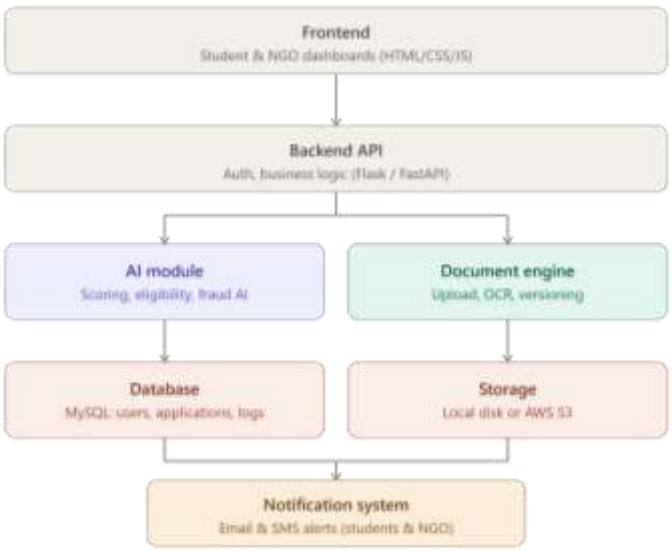


Fig-1: System Architecture

7. RESOURCES REQUIRED

Table -1: Hardware Requirements

Resource	Minimum Requirement	Purpose
Development laptop/desktop	Intel i5 or equivalent, 8 GB RAM, 256 GB storage	Frontend, backend, database, and AI-module development
Recommended system	Intel i5/i7 or equivalent, 16 GB RAM, 512 GB SSD	Faster development, OCR processing, testing, and local deployment
Server or cloud instance	2 CPU cores, 4–8 GB RAM, 50 GB storage	Hosting backend API, database, and application services
Internet connection	Stable broadband connection	Cloud storage, email/SMS integration, deployment, and testing

Table -2: Software Requirements

Category	Technology/Tool	Purpose
Operating system	Windows, Linux, or macOS	Development environment
Frontend	HTML, CSS, JavaScript, Bootstrap	Student, NGO, and administrator dashboards
Backend	Python, Flask or FastAPI	REST APIs, application workflow, and business logic
Database	MySQL	Storing user profiles, applications, documents, scores, and audit logs
Database management	MySQL Workbench or phpMyAdmin	Database design and administration
OCR engine	Tesseract OCR	Extracting text from uploaded documents

Category	Technology/Tool	Purpose
AI/ML tools	Python, Scikit-learn, Pandas, NumPy	Priority scoring, eligibility matching, duplicate detection, and fraud-risk analysis

8. FUTURE SCOPE

ScholarAid can be improved by adding a mobile app, multilingual support, advanced fraud detection, and AI-based document verification. Future versions may integrate with government portals, DigiLocker, bank APIs, UPI, and direct payment systems.

The platform can also include donor dashboards, chatbots, personalized scholarship recommendations, predictive budget analysis, blockchain-based audit records, and offline data collection. It can be expanded into a multi-NGO platform for transparent and efficient scholarship distribution.

9. CONCLUSION

ScholarAid is an AI-enabled platform designed to improve the management of educational scholarships and fee subsidies by NGOs. It replaces manual paper-based processes with a centralized digital system for student registration, document upload, eligibility checking, verification, priority scoring, fund allocation, and application tracking.

The platform supports both online student applications and NGO-assisted applications for students with limited internet access or digital literacy. OCR-based document processing, duplicate detection, fraud-risk checks, and budget-aware allocation recommendations help reduce errors and improve efficiency. However, AI only provides recommendations, while NGO staff and administrators retain final decision-making authority.

By combining digital accessibility, AI assistance, transparent approval workflows, notifications, and audit logs, ScholarAid can help NGOs distribute educational financial support more fairly, securely, and efficiently.

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