

CSE-400

FINAL YEAR RESEARCH AND DESIGN PROJECT

**A Hybrid Framework Using
Explainable AI and Blockchain
for Transparent Digital
Document Verification**

Group: B13

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INTRODUCTION

- 01. Digital certificates, IDs, and academic records are widely used, but they are increasingly exposed to forgery, tampering, and unauthorized changes.
- 02. Current systems struggle to provide both strong security and clear trust, creating a demand for solutions that make documents trustworthy, traceable, and tamper-evident.

RELATED WORK

Paper Title	Objective	Methodology	Findings
Defying the Certification Diploma Forgery with Blockchain Platform. [1]	<ul style="list-style-type: none"> To discuss the best blockchain model for the university level. To eradicate diploma certification forgery in the university setting 	<ul style="list-style-type: none"> Student Registration : genesis block chain → Course Registration and Academic Activities Recorded on Blockchain → Student Activities (Extracurricular) → Verified on Blockchain → Diploma Certification Workflow 	<ul style="list-style-type: none"> Focuses only on certificate forgery No explanation for rejection beyond data mismatch
Development and Evaluation of Blockchain based Secure Application for Verification and Validation of Academic Certificates. [2]	<ul style="list-style-type: none"> To address the widespread issue of fake degrees and certificates To store, distribute, and verify academic certificates. To make the process faster, efficient, and more secure for students, universities, and employers. 	<p>Validates Universities → University Creates and Encrypts Certificate Data --> Blockchain Deployment of Certificate → Student Receives Encryption Key & Certificate Details → Verifier Uses Verification Application → IPFS for Storing Photos, IDs, Biometrics → System Verification</p>	<ul style="list-style-type: none"> Only detects certificate forgery The verification is a simple, binary hash match (Yes/No). No explainataion mechanism

RELATED WORK

Paper Title	Objective	Methodology	Findings
The application of blockchain algorithms for management of education certificates. [3]	<ul style="list-style-type: none"> To present the implementation of a blockchain-based title certificate solution To demonstrate how blockchain technology can solve problems related to certificate verification, security, and accessibility in educational institutions 	Built on EuropeChain network (derived from EOS) → : create-cert (for registering certific\cates) → verify-cert (for verification) → enables students to access and verify their diplomas through a prole interface	<ul style="list-style-type: none"> Only Detects certificate forgery Lack of visual analysis No explainataion mechanism
Explainable Authorship Identification in Cultural Heritage Applications. [4]	<ul style="list-style-type: none"> To explore the applicability of existing general-purpose eXplainable Artificial Intelligence (XAI) techniques to Authorship Identification (AId) tasks. 	Data preparation workflow → Training of classification models → applying XIA methods → Analysis and interpretation workflow	<ul style="list-style-type: none"> High Dimensionality of Feature Space Diffuse Contribution to Prediction Need for Further Integration

RELATED WORK

Paper Title	Objective	Methodology	Findings
Validify – Certificate Validation using Blockchain and AI. [5]	<ul style="list-style-type: none"> To prevent forgery and maintain certificate authenticity To design a secure blockchain system for certificate validation 	User/Organization Registration → Certificate Issuance Request → AI-Based Anomaly Detection → Decentralized Storage on IPFS → Blockchain Storage → smart Contract → Controlled Certificate Issuance → Blockchain checks integrity and matching previous stored record	<ul style="list-style-type: none"> VaLiDiFy's AI does not generate explanations — it only scores anomaly likelihood. It cannot detect fake signatures , edited text
Harnessing Blockchain and Generative AI to Prevent Certificate Forgery and Enhance Educational Integrity. [6]	<ul style="list-style-type: none"> To analyze how blockchain technology can prevent diploma/certificate forgery To explore the combined potential of blockchain and generative AI to improve data validation ,transparency ,security, administrative efficiency in educational institutions 	Identify search keywords → Remove duplicates, non-academic source and final selection → Descriptive analysis of selected studies	<ul style="list-style-type: none"> No Implemented System for Certificate Validation It does not include image analysis, signature/seal forgery

PROBLEM STATEMENT

- 01. University data is not centralized, there is no seamless verification between internal units (lecturers, students) and external parties (government, industry). [1]
- 02. The "Black Box" Dilemma: Automated identification systems are opaque; they provide a prediction (e.g., "fake" or "real") without explaining the reason behind it. [4]
- 03. Statistics show high anomaly rates (34% in resumes, 5% in academic certificates), indicating that current manual verification methods are failing. [5]
- 04. Educational data stored in traditional centralized systems is vulnerable to hacking and manipulation by unauthorized parties. [6]

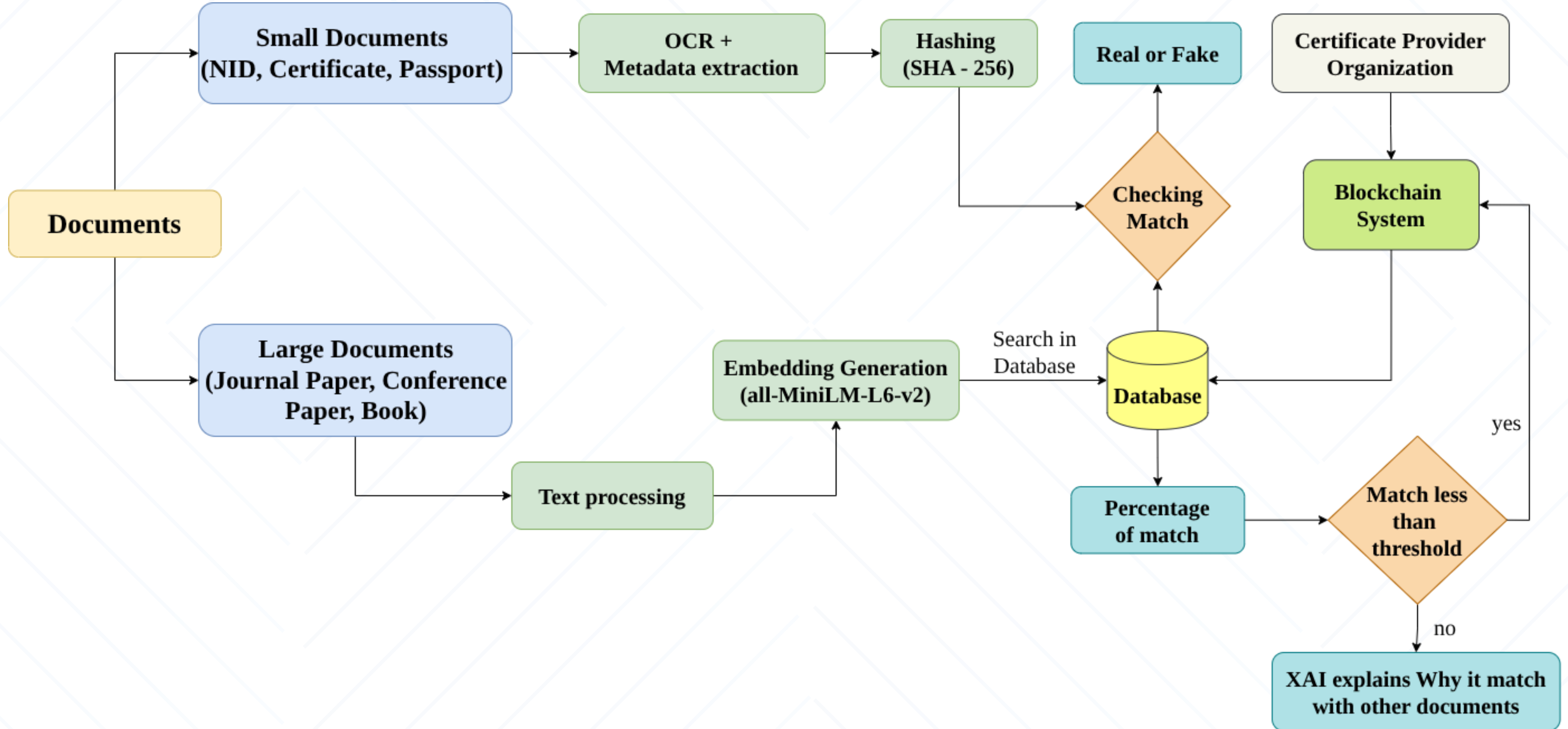
RESEARCH GAP

01. Blockchain is studied for secure document storage, yet not combined with XAI-driven forgery detection.
02. Existing studies apply XAI for educational analytics or document evaluation, but rarely for detecting certificate forgery.
03. There is a few research integrating XAI and Blockchain into a single system that is both “Intelligent” (detects forgery) and “Transparent & Tamper-Proof” (explains reasoning and ensures immutability).

OBJECTIVES

01. To detect forgery and unauthorized tampering by integrating blockchain's based secure storage, ensuring that once a document is recorded, it cannot be altered without detection.
02. To establish a transparent verification process by utilizing Explainable AI (XAI) to interpret and articulate the specific reasons behind validation decisions.

METHODOLOGY



TIMELINE

Task Name	July	August	September	October	November	December	January	February	March	April	May
Review and search relevant papers	Literature Review										
Choose proper field	Finding proper research field										
Identify problem statement and research gap		Finding research gap									
Finalize Thesis proposal				Thesis proposal							
Creating prototype					Implementing prototype						
Analyze and improving the prototype					Improving the prototype						
Writing the final paper										Paper writing	

PROGRESS SO FAR

- 01. Completed reviewing related literature.
- 02. Defined research problem.
- 03. Research Design finalized.
- 04. Working on prototype.

PROGRESS SO FAR

Document Verification System

XAI-Powered Document Analysis & Authentication

Academic Papers

University Upload

Company Verify

Academic Paper Plagiarism Checker

Workflow: Upload your research paper, journal, or thesis for plagiarism analysis. The XAI system will check similarity against existing documents.

- 0-30% similarity:** Acceptable - Upload allowed
- 30-40% similarity:** Review required - Upload allowed with warning
- >40% similarity:** Plagiarism detected - Upload blocked

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Papers, Journals, Thesis, Articles

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Average Similarity: 41.3%

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Document Verification System

XAI-Powered Document Analysis & Authentication

Academic Papers

University Upload

Company Verify

📄 Academic Paper Plagiarism Checker

Workflow: Upload your research paper, journal, or thesis for plagiarism analysis. The XAI system will check similarity against existing documents.

- **0-30% similarity:** ✅ Acceptable - Upload allowed
- **30-40% similarity:** ⚠️ Review required - Upload allowed with warning
- **>40% similarity:** ❌ Plagiarism detected - Upload blocked

Drag & Drop Academic Document

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EXPECTED OUTCOME

01. Development of a Tamper-Proof Digital Repository and proactive Anomaly Detection Prior to Storage.

CONCLUSION

This research will successfully demonstrates the integration of Explainable AI (XAI) and Blockchain that can create a secure, transparent, and tamper-proof framework for digital document and certificate protection.

By combining immutable blockchain records with interpretable AI decision-making, the framework ensures both security and accountability in document verification processes.

REFERENCE

- [01] Meyliana, M., et al. "Defying the certification diploma forgery with blockchain platform: a proposed model." Proceedings of the International Conferences ICT, Society, and Human Beings 2019; Connected Smart Cities 2019; and Web Based Communities and Social Media 2019. 2019.
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THANK YOU