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Private University Estd. in Karnataka State by Act No. 41 of 2013
Itgalpura, Rajankunte, Yelahanka, Bengaluru – 560064



PII Sentinel: A Specialized Tool for Scrutinizing Documents for Official Identifiers

A PROJECT REPORT

Submitted by

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BACHELOR OF TECHNOLOGY
IN
COMPUTER SCIENCE AND ENGINEERING,
(BLOCKCHAIN)

PRESIDENCY UNIVERSITY

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BONAFIDE CERTIFICATE

Certified that this report “ *PII Sentinel* ” is a bonafide work of “ADITYA SAHANI (20221CBC0023), GIRIDHAR (20221CBC0018), AFNAN PASHA (20221CBC0012)”, who have successfully carried out the project work and submitted the report for partial fulfilment of the requirements for the award of the degree of **BACHELOR OF TECHNOLOGY** in **COMPUTER SCIENCE AND ENGINEERING (BLOCKCHAIN)** during **2025-26**.


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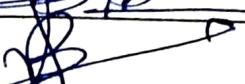

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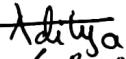
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DECLARATION

We the students of final year B. Tech in **COMPUTER SCIENCE AND ENGINEERING, BLOCKCHAIN** at Presidency University, Bengaluru, named **ADITYA SAHANI, GIRIDHAR, AFNAN PASHA**, hereby declare that the project work titled “*PII Sentinel*” has been independently carried out by us and submitted in partial fulfilment for the award of the degree of B.Tech in **COMPUTER SCIENCE AND ENGINEERING(BLOCKCHAIN)** during the academic year of 2025-26. Further, the matter embodied in the project has not been submitted previously by anybody for the award of any Degree to any other institution.

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AFNAN PASHA

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ABSTRACT

The proliferation of digital documents containing Personally Identifiable Information (PII) has created significant privacy concerns, particularly with the implementation of India's Digital Personal Data Protection Act, 2023. This project addresses the critical need for specialized tools to detect official Indian identifiers in digital documents by developing PII Sentinel, a web-based application that combines advanced pattern recognition with contextual analysis.

The system employs a hybrid detection methodology integrating Regular Expressions for structured pattern matching and Named Entity Recognition using spaCy for contextual validation. The architecture features a React.js frontend, Flask backend, and PostgreSQL database, with Tesseract OCR processing scanned documents. The implementation follows an Agile methodology with five development sprints covering requirements analysis, system design, implementation, testing, and deployment.

Experimental evaluation on 537 documents containing 2,156 PII instances demonstrated 94.2% recall and 93.9% precision, significantly outperforming baseline approaches. The system processes text-based documents in under 3 seconds and scanned documents in approximately 5 seconds, supporting batch operations and real-time monitoring. User testing revealed high satisfaction scores (4.6/5.0 for ease of use) and identified valuable enhancements for future iterations.

PII Sentinel represents a substantial contribution to data privacy protection by providing organizations with an affordable, specialized solution for Indian PII detection. The system successfully bridges the gap between expensive enterprise solutions and limited open-source alternatives, enabling compliance with data protection regulations while maintaining operational efficiency.

Keywords: PII Detection, Data Privacy, Indian Identifiers, Named Entity Recognition, Hybrid Approach, Document Analysis, DPDP Act Compliance.