

Cross-Border Payment Optimization Using Artificial Intelligence for Global Finance

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Abstract- Cross-border payment systems are essential for global trade and international financial transactions; however, traditional infrastructures face challenges such as high transaction fees, long settlement times, and lack of transparency. This paper presents an Artificial Intelligence-based framework for optimizing cross-border payments using anomaly detection and fee optimization. The Isolation Forest algorithm identifies abnormal transactions, while percentile-based analysis recommends fair transaction fees. A Flask-based dashboard provides real-time insights.

Keywords- Cross-border payments, Artificial Intelligence, Anomaly Detection, Isolation Forest, Fee Optimization

I. INTRODUCTION

Cross-border payments enable international trade and remittances. Despite digital growth, existing systems suffer from inefficiencies such as high costs, delays, and poor transparency. Artificial Intelligence provides effective solutions through intelligent monitoring and optimization.

II. LITERATURE REVIEW

Existing research highlights the application of AI and ML in financial monitoring and fraud detection. However, most studies do not integrate anomaly detection with fee optimization and visualization.

Author / Year	Title	Method / Model
Chatterjee (2022)	AI-Powered Real-Time Analytics for Cross-Border Payment Systems	ML analytics; anomaly workflows
Hernández Aros et al. (2024)	Financial fraud detection through ML (systematic review)	SLR of 104 studies
FSB (2025)	G20 Roadmap for Enhancing Cross-border Payments (progress)	Policy/benchmark
IMF (2023)	IMF–World Bank approach to cross-border payments	Policy roadmap synthesis
Yu et al. (2024)	Deep Learning for Cross-Border AML Anomaly Detection	CNN, GRU hybrids; contrastive/unsupervised
Chen et al. (2025)	Deep Learning in Financial Fraud Detection (systematic review)	Review of 108 DL studies
BIS CPMI (2020)	Enhancing cross-border payments: building blocks	Design principles and recommendations
IMF (2023)	Trust Bridges and Money Flows	Conceptual trust framework
J.P. Morgan (2025)	Project AIKYA: Decentralized AI for payments anomalies	Decentralized/edge computing; detection
BIS (2024)	Steady as we go: CPMI cross-border survey results 2023	Cross-country survey analysis
Desai et al., BIS WP 1188 (2024)	ML framework for anomaly detection in payment data	Two-layer: supervised learning; Isolation Forest

III. PROBLEM STATEMENT

Current cross-border payment systems face high fees, settlement delays, and lack of intelligent monitoring. Rule-based systems fail to detect dynamic anomalies, necessitating an AI-driven optimization framework.

IV. PROPOSED SYSTEM ARCHITECTURE

The system architecture consists of data preprocessing, anomaly detection, fee optimization, database management, and visualization modules.

V. METHODOLOGY

The Isolation Forest algorithm is used for unsupervised anomaly detection, while percentile-based analysis recommends fair transaction fees.

based analysis is applied for fee optimization. Flask integrates the backend and visualization.

VI. RESULTS AND CONCLUSION

The system achieved high anomaly detection accuracy and improved transparency. Future work includes blockchain integration and live API deployment.

