



## Summary

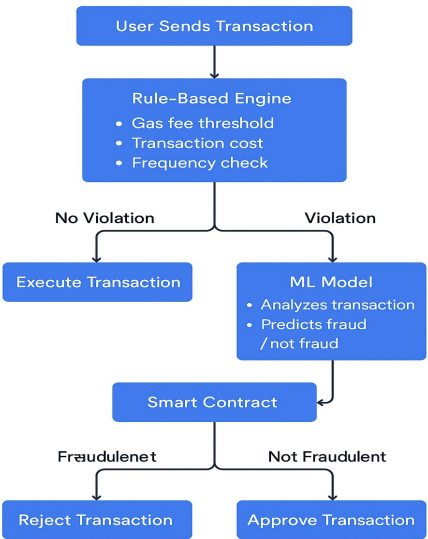
This project tackles Real Time blockchain fraud Transaction by integrating smart contracts with off-chain machine learning. The smart contract enforces transaction rules and auto-blocks suspicious activity, while an ML model analyzes on-chain data to detect fraud patterns. High-risk transactions are blocked in real time, enhancing security and trust in decentralized systems.

## Objective

- To design and implement a secure and decentralized framework using blockchain technology for transaction transparency and immutability
- To integrate trained ML Model with Blockchain’s Smart Contract.
- To track Real time transactions and preventing frauds.

## Methodology

Collected blockchain’s transaction dataset from Kaggle and extracted key features like amount, frequency, and address patterns. After preprocessing and normalization, Trained a ML model to detect fraudulent behavior. Simultaneously, Developed smart contracts in Solidity to apply rule-based checks on transactions. Suspicious transactions were flagged and sent to the off-chain ML model for further analysis. This off-chain/on-chain setup enabled real-time, decentralized fraud detection.



## Results

- Achieved **high accuracy** in fraud detection using the supervised ML model.
- Confusion matrix analysis** showed strong precision and recall, indicating reliable classification of fraudulent vs. legitimate transactions.
- Testing the system on Ethereum mainnet incurred an estimated **cost of 0.0015 ETH (~\$5.25)** per transaction with fraud check.

Model	Recall Score	False Positive
Decision Tree	92.77	65
Random Forest	92.77	9
Gradient Boost	87.23	11

## Conclusion

The integration of Blockchain and ML presents a promising solution to the growing challenge of financial fraud. This approach not only improves fraud detection but also aligns with the broader goals of sustainable financial development by creating more secure, efficient, and transparent financial ecosystems.