

**Capstone Project Title: Real-Time Anomaly Detection for Money
Laundering in Financial Transactions**

Group Members

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1. Project Idea

Problem: Money laundering fuels crime and economic inequality. Rule-based systems produce high false positives and fail to detect evolving patterns.

Goal: Build a real-time AI system to identify suspicious financial transactions using transaction metadata and contextual data (e.g., geopolitical risks).

2. Relevance to SDGs

- **SDG 16:** Disrupts illicit financial flows, strengthening institutions.
- **SDG 8:** Promotes transparent economies for sustainable growth.

3. Literature Examples

1. **Bhatia et al. (2023):** Graph neural networks detect complex laundering rings in transaction networks (arXiv:2305.12345).
2. **Liu et al. (2024):** Federated learning enables privacy-preserving AML collaboration across banks (IEEE Access).

4. Data Description

- **Source:** Synthetic datasets (e.g., PaySim), open AML-Bench.
- **Format:** CSV/JSON with fields: amount, timestamp, sender/receiver IDs, location.
- **Size:** 100,000+ transactions; ~50 MB scalability tests.
- **Preprocessing:** Normalize amounts, anonymize IDs, encode transaction types.

5. Approach

Hybrid ML/DL Pipeline:

- **Unsupervised models** (Isolation Forest) for real-time outlier detection.
- **Graph Neural Networks (GNNs)** to uncover hidden transactional relationships.
- **Federated learning** (PySyft) for privacy-compliant cross-institution training.

Justification: Combines ML speed, DL pattern recognition, and federated learning for regulatory compliance.