Brainstorming & Idea Generation

Online Payments Fraud Detection using Machine Learning

IBM SkillsBuild | AI/ML Final Year Project

Academic Year 2024–25

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1. Problem Space Exploration

The team conducted a brainstorming session to explore the domain of financial technology and fraud detection. The following areas were identified as critical pain points in digital payments:

- Rising number of fraudulent transactions in e-commerce and mobile banking
- Inadequate real-time detection mechanisms in traditional rule-based systems
- High false-positive rates causing poor customer experience
- Lack of explainability in existing black-box fraud detection models
- Rapidly evolving fraud patterns that outpace static rule updates

2. Idea Generation — HMW Statements

Using the 'How Might We' (HMW) framework, the team generated actionable problem statements:

1. How might we detect fraud in real-time without disrupting legitimate transactions?
2. How might we train a model that handles the severe class imbalance in fraud datasets?
3. How might we build a web interface that non-technical users can operate easily?
4. How might we explain the model's decision to an end user or auditor?
5. How might we continuously update the model as new fraud patterns emerge?

3. Idea Prioritization Matrix

Idea / Feature	Impact (1–5)	Feasibility (1–5)	Priority Score
Random Forest Classifier	5	5	25 — HIGH
Flask Web Application	4	5	20 — HIGH
Real-time Prediction API	5	4	20 — HIGH
Probability-based Risk Score	4	4	16 — MED
Deep Learning (LSTM)	5	2	10 — LOW
Graph-based Fraud Network	5	1	5 — BACKLOG

4. Selected Approach

Based on the prioritization matrix, the team selected the following core approach:

- Algorithm: Random Forest Classifier (ensemble method, handles imbalance well)
- Interface: Flask web application with HTML/CSS frontend
- Scoring: Probability threshold tuned to 0.20 for high-recall fraud detection
- Dataset: PaySim synthetic financial dataset (6.3M transactions)

The Random Forest approach was chosen over deep learning alternatives due to its superior interpretability, lower training time, and strong performance on tabular financial data.