FRAUD DETECTION : SECURING BANK TRANSACTIONS

Current Challenge: Bank A struggles with detecting evolving, sophisticated fraud patterns in banking. This results in financial losses and reduced customer trust due to missed fraud and inconvenience caused by flagging legitimate transactions.

Need: This calls for a robust, data-driven approach to enhance fraud detection while minimising disruptions to legitimate transactions.

What are the key patterns that indicate fraudulent activity?

BUSINFO 704

Predictive Business Analytics
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GROUP 22

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REFERENCES

01. DATA OVERVIEW

500K
Transaction Records (synthetic data)

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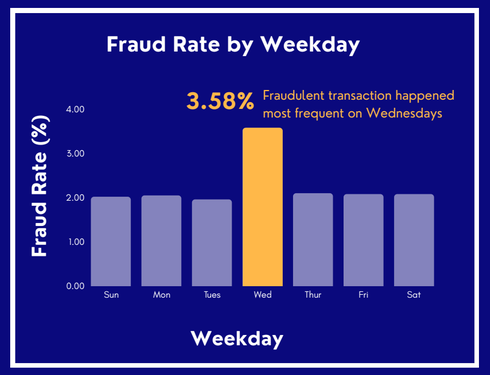
Variables - Transaction Amount, Type, Date, Location, Joint Flag, Balance, Agent and related IDs.

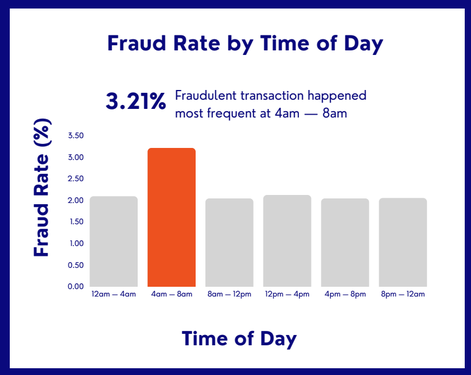
72 years old on average (for fraud transactions)

2% of 500k transactions are fraudulent

33% fraudulent transactions occur during withdrawals.

100 the median fraudulent transaction amount





FRAUDULENT TRANSACTIONS ARE...

- Typically smaller amounts (average $422, median $100), blending in with daily transactions
- Occur in early morning, between 4-5am, when customer activity is low
- Occur on Wednesdays

02. METHODOLOGY

Variable Selection

- Age
- Transaction Type
- Transaction Amount
- Transaction Hour
- Transaction Weekday

Feature Engineering

- Mutate Fraud to Level 1, 0
- Transaction Date to Weekday
- Transaction Date to Hour & time periods

Modeling of Classifiers

- Log Regression, LightGBM, XGBoost
- 80% train - 20% test data

Missing Data: Mutate all NAs to Unknown,
Mutate MerchantID Unknowns to Level 1, else 0, as 73% of the MerchantID is NA

03. RESULTS & FINDINGS

XGBOOST MODEL

XGBoost trained on a SMOTE oversampled dataset

Sensitivity 70%

Area Under The Curve 86%

Key Predictor Ranking

1. Age
2. Transaction Amount
3. Withdrawals

XGBOOST MATRIX

Predicted \ Actual	Fraud	Not Fraud
Fraud	1.6%	**17.6%**
Not Fraud	**0.7%**	80.1%

Target Class: Fraud

Strong Discriminatory Power
Highest True Positives
Lowest False Negatives

70% of the fraudulent transaction is correctly classified

04. RECOMMENDATIONS

ADAPTIVE ALERT SYSTEM

3 months

Adaptive risk thresholds: Adjust time and age specific thresholds, especially during high-risk hours (4 - 8 am).

- flag and delay processing transaction till later
- Withdrawals - push notifications for additional confirmation

TRANSACTION PROFILING

3-6 months

Profile Customer Transactions: Compare current transactions against confirmed legitimate patterns.

Whitelist: Develop a trusted merchant/transaction type list to reduce unnecessary alerts.

ADVANCE MODEL TRAINING

6-12 months

Segmented Models: Train models separately based on customers (age).

Re-calibrate Model: Adjust the fraud detection model to reflect shifts in customer behaviour over time.

Enhances fraud risk management

Reduces inconveniences for false positives

Improves detection accuracy