Fraud detection in online transactions

Presented by The Fraudsters | Group 4

Business

Credit Card Fraud in Philippines Rises 21% as Online Deals Surge

By Siegfrid Alegado
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TECHNOLOGY | News Wire | Company News

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Credit Card Fraud in Philippines Rises 21% as Online Deals Surge

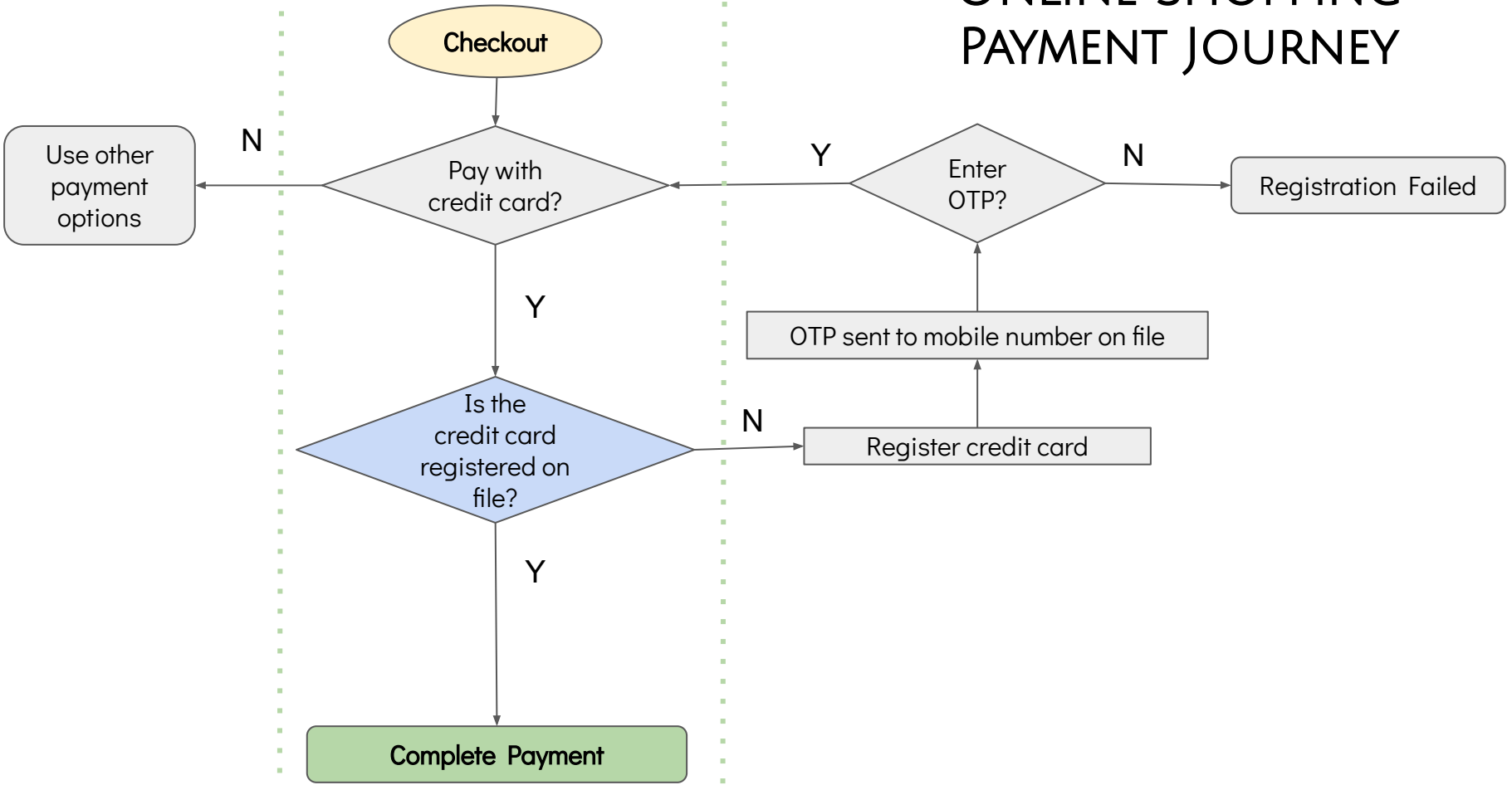
Siegfrid Alegado, Bloomberg News

(Bloomberg) -- Credit card fraud in the Philippines rose 21% since the coronavirus pandemic, with many incidents involving scammers gaining access to one-time passwords to transact online, an industry group said on Thursday.

“The industry has been experiencing high volumes of fraud cases causing financial detriment. These perpetrators have carried out fraud by using the various digital payment platforms,” Alex Ilagan, executive director of the Credit Card Association of the Philippines, said in a statement.

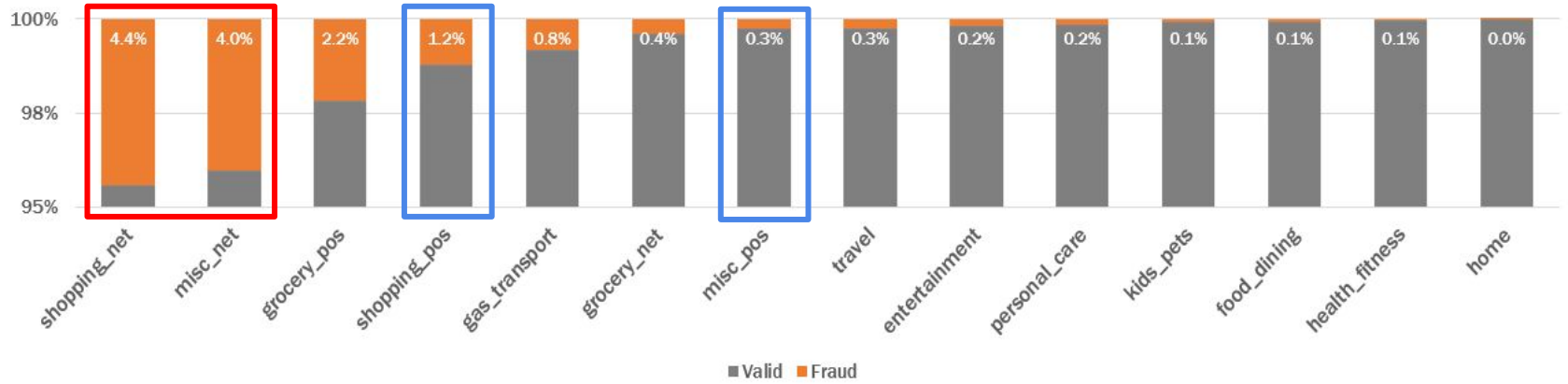
A “virtual account take over” -- where fraudsters access OTPs to validate online transactions -- account for the highest credit card fraud losses, the group said. Regulators and telecommunication companies must tighten rules when providing customers with mobile-phone numbers or changing them, and create a process to report numbers used to defraud people, it said.

Online Shopping Payment Journey



Problem Statement

Merchant categories that fall under online transactions have the highest incidence of fraud.

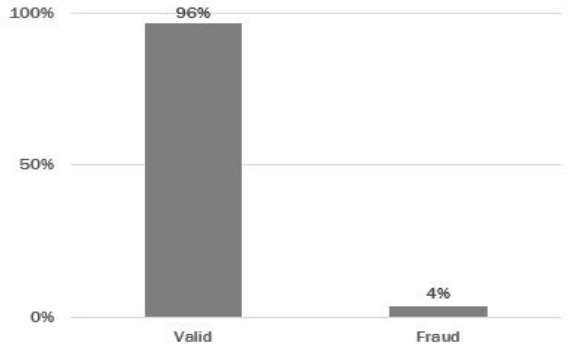


Although the amounts of fraudulent transactions are usually small, it could lead to potential losses that can amount to millions once patrons find out that their personal information may be compromised.

OUR OBJECTIVES

- To find the best machine learning model in terms of recall score that would detect fraudulent online transactions.
- To help credit card companies to stop potential losses due to fraudulent transactions.
- To recommend a system that would prevent unauthorized credit card online purchases.

THE DATA



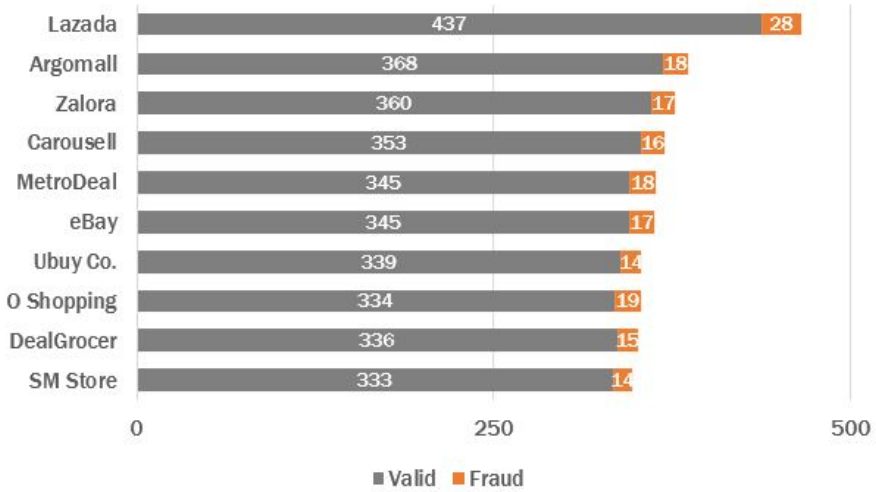
Fraud transactions only comprised 4% of online transactions, creating an imbalanced dataset.

LIMITATIONS:

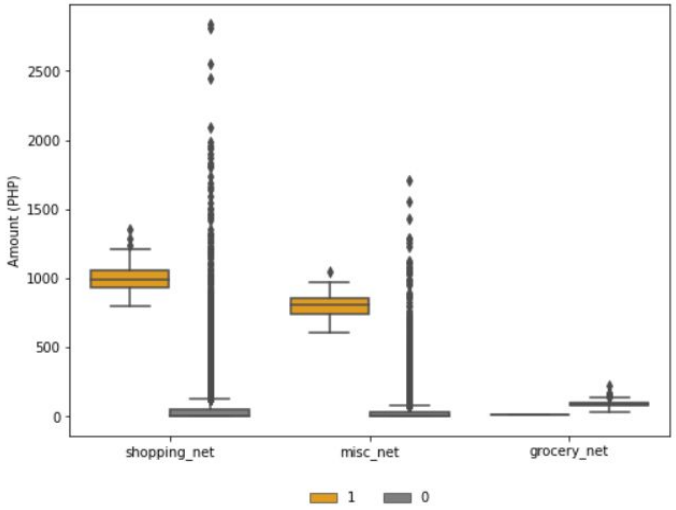
- Synthetic data of credit card transactions was used for the training and testing of the model.
- Only 10,426 rows were identified as online transactions and were utilized for this project.

EDA (ONLINE TRANSACTIONS)

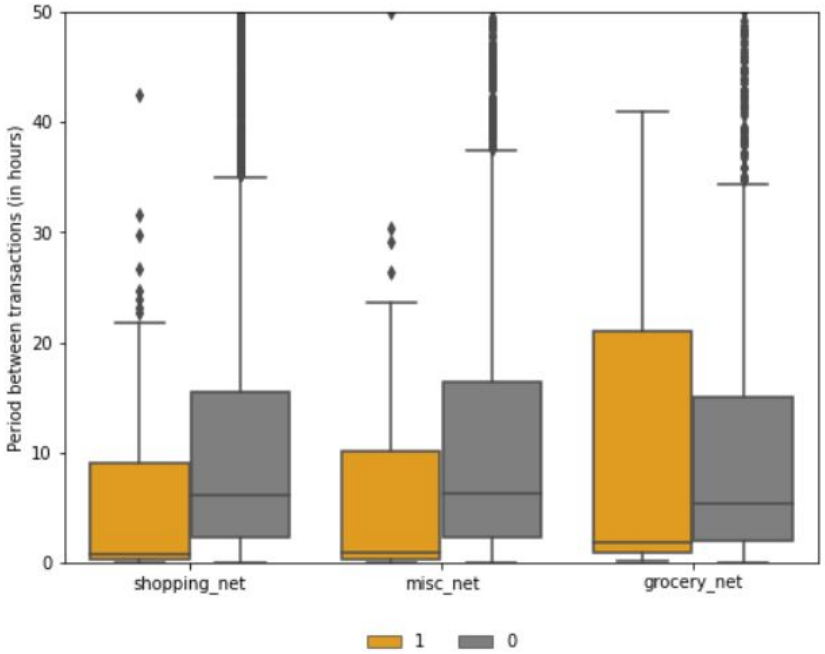
Lazada had the most number of credit card transactions among the online merchants.



Amount of fraudulent transactions usually ranges from 600 to 1300 php



EDA (ONLINE TRANSACTIONS)

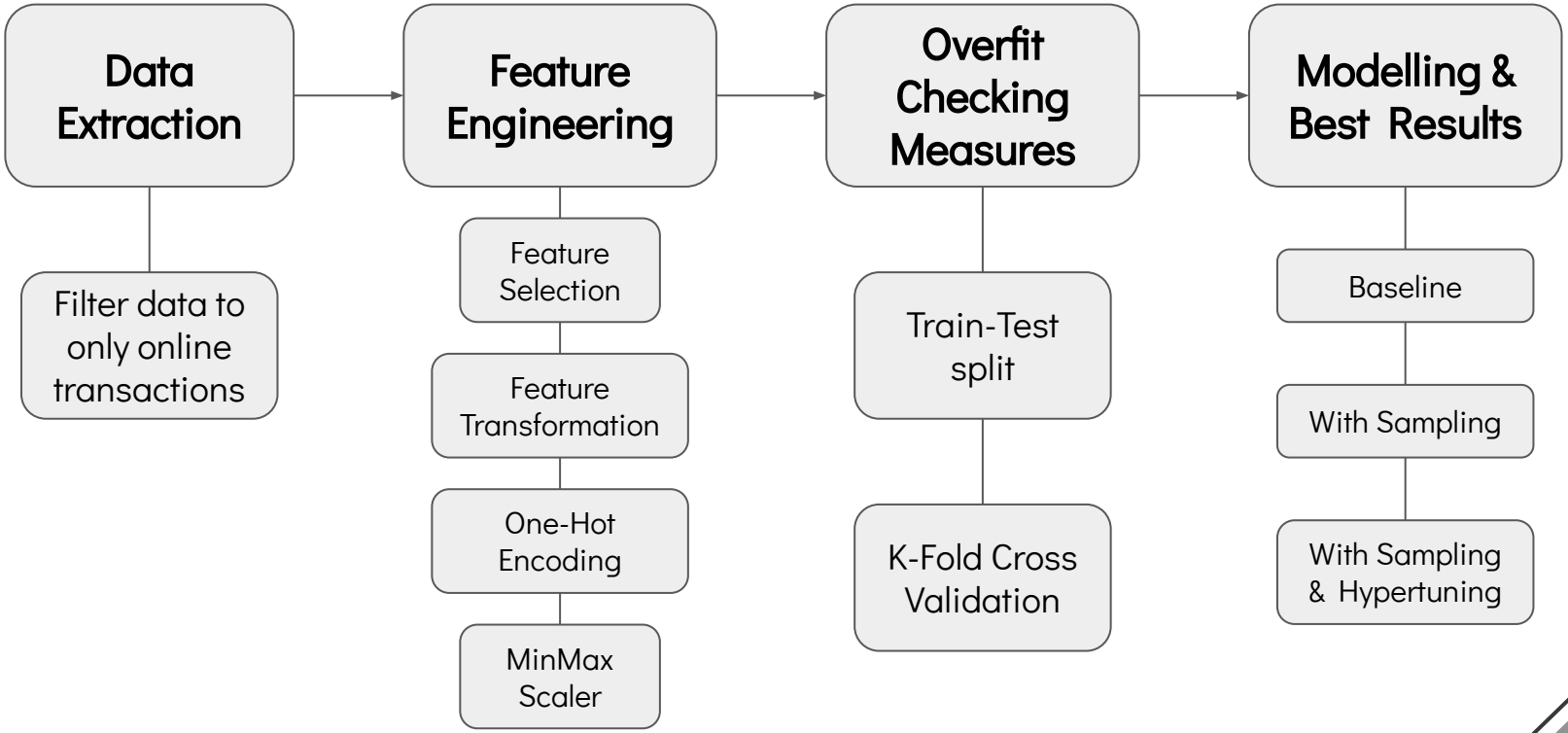


Consecutive transactions of a unique credit card had smaller time interval for frauds.

93 out of 96 credit cards (97%) had fraudulent transactions

- 24 credit cards - all fraud
- 69 credit cards - mix of valid and fraud

METHODOLOGY

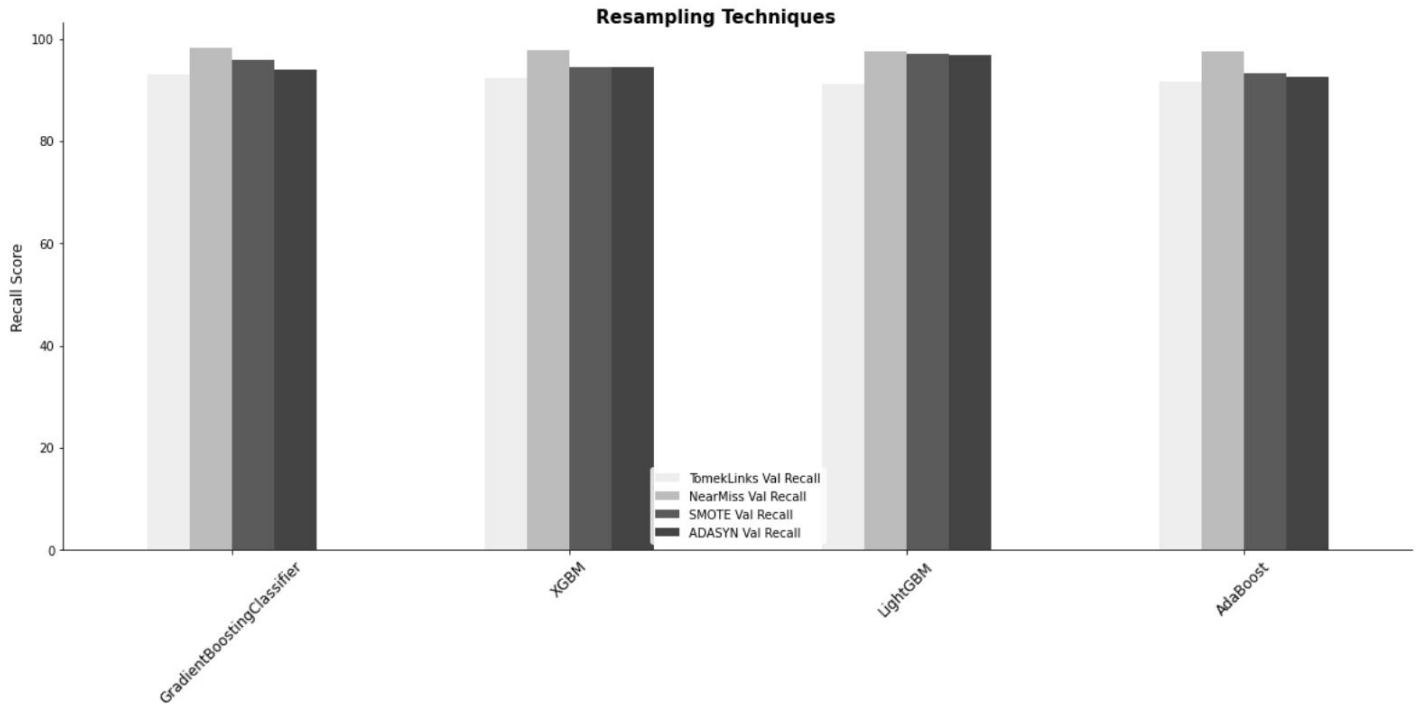


Baseline Models

	Train Accuracy	Val Accuracy	Train Recall	Val Recall	Run Time
GradientBoostingClassifier	99.82%	99.30%	99.74%	93.68%	2.052747
XGBM	100.00%	99.31%	100.00%	91.58%	1.455751
LightGBM	100.00%	99.31%	100.00%	91.93%	0.724191
AdaBoost	99.79%	99.25%	97.89%	90.88%	0.733846

Top 4 out of 7 Models are all gradient boosting classifiers

Sampled Models:



Hypertuning:GradientBoostingClassifier

Parameters Used:

- 'n_estimators': [50, 100, 150, 200],
- 'max_features': ['auto', 'sqrt', 'log2'],
- 'max_depth': list(range(3, 20)),
- 'learning_rate': [0.1, 0.01, 0.001, 0.0001]

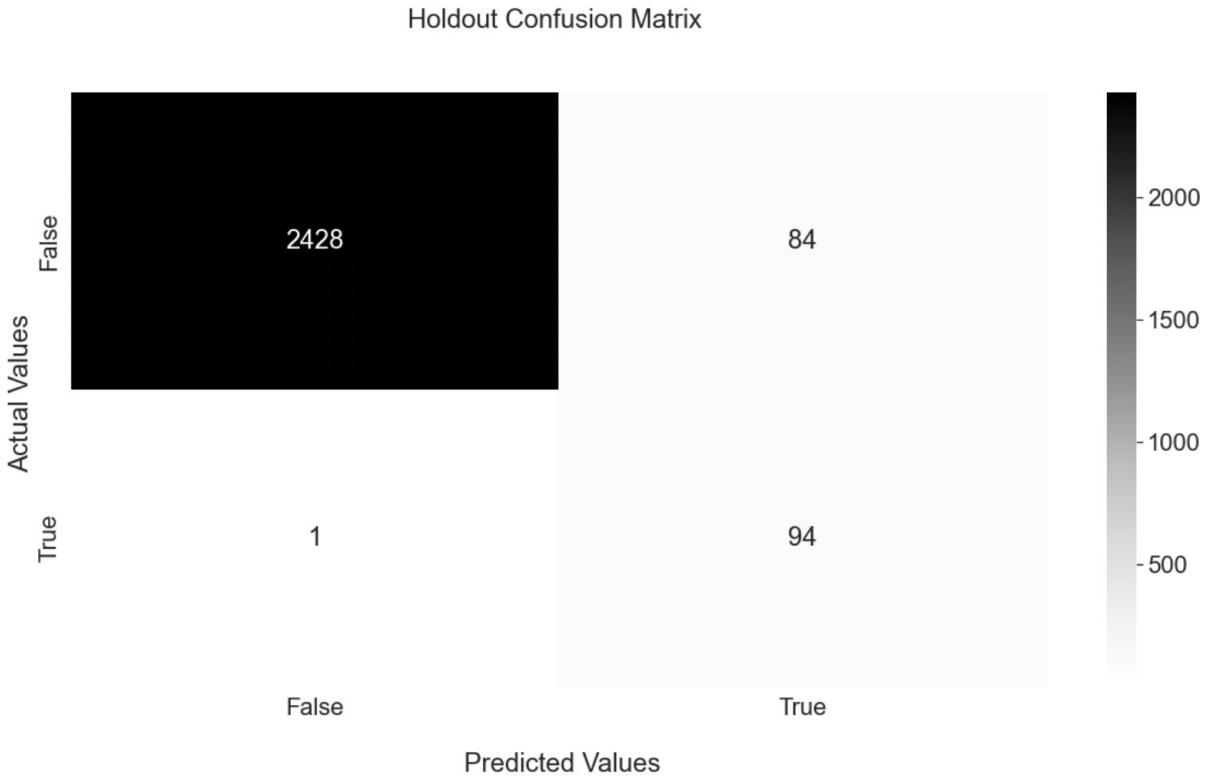
Hypertuning:GradientBoostingClassifier

Parameters Used:

- 'learning_rate': 0.1
- 'max_depth': 3,
- 'max_features': 'sqrt',
- 'n_estimators': 100

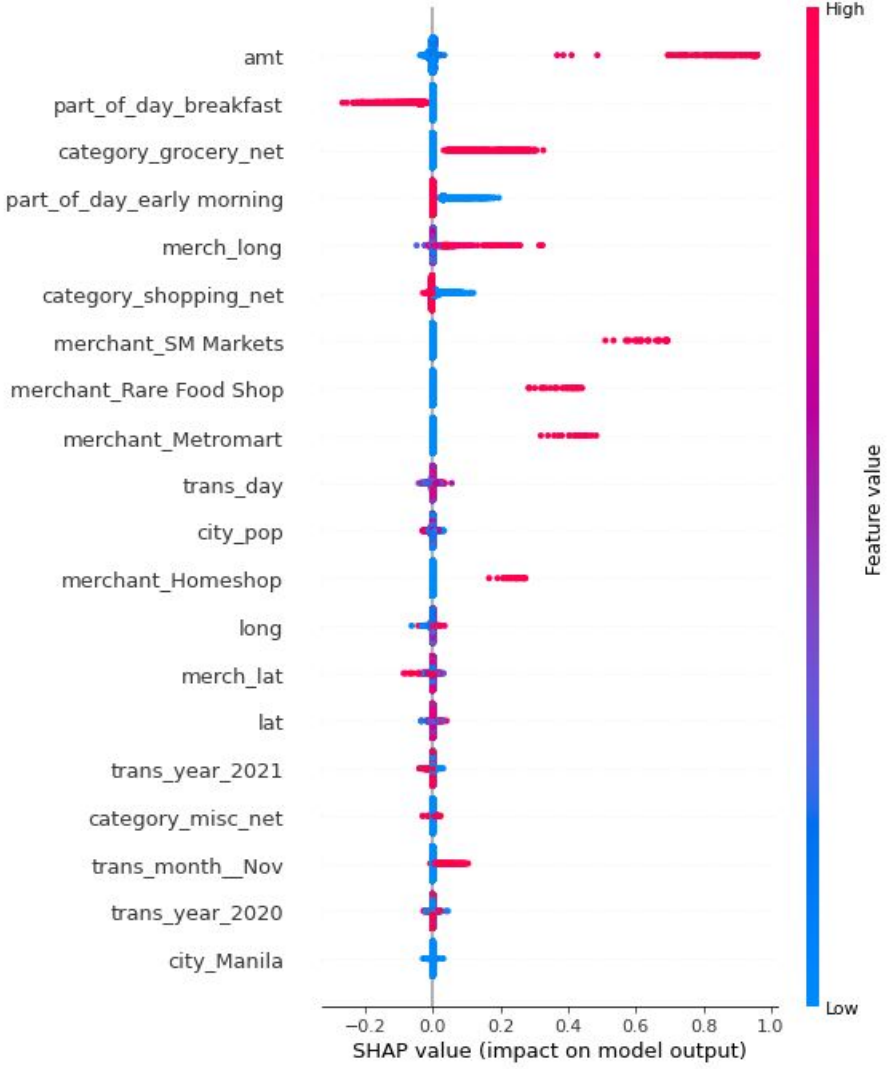
Method	Train Recall	Val Recall	Holdout Recall
No Resampling	99.74%	93.68%	94.74%
Resampling x Hypertune	99.27%	98.60%	98.95%

CONFUSION MATRIX



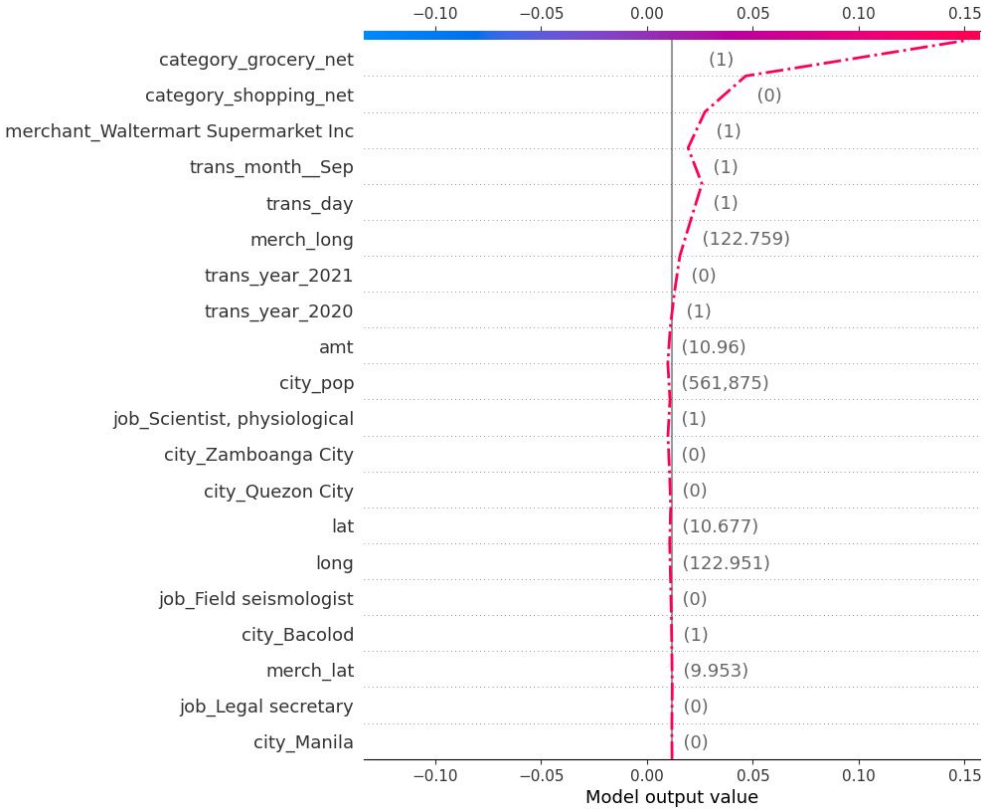
Feature Importance

The amount variable is the biggest factor in determining fraud in our system.



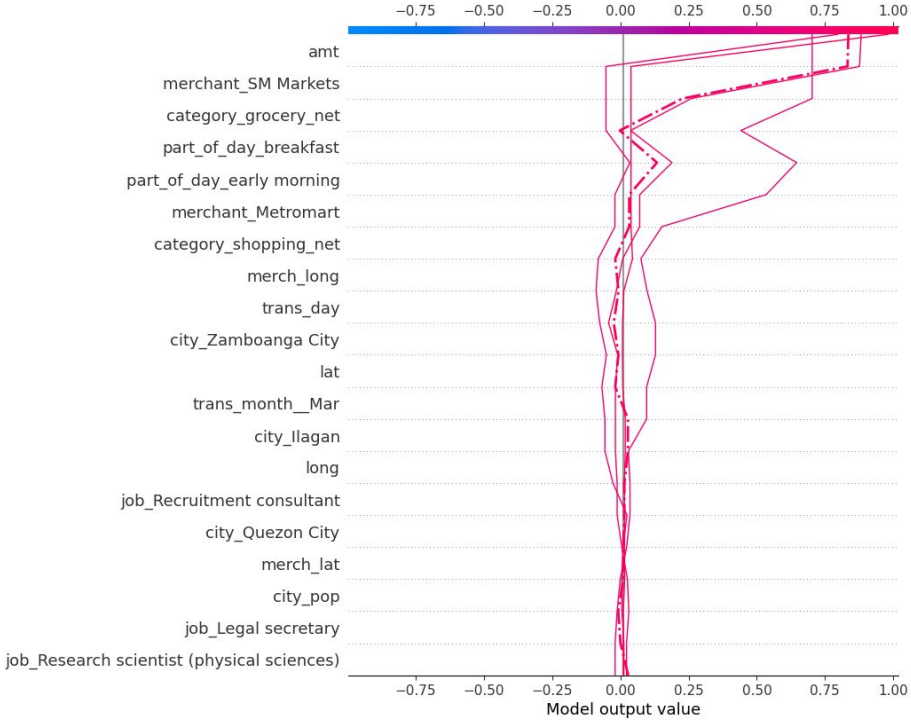
LOCAL INTERPRETATION

Actual Fraud but predicted as valid transaction

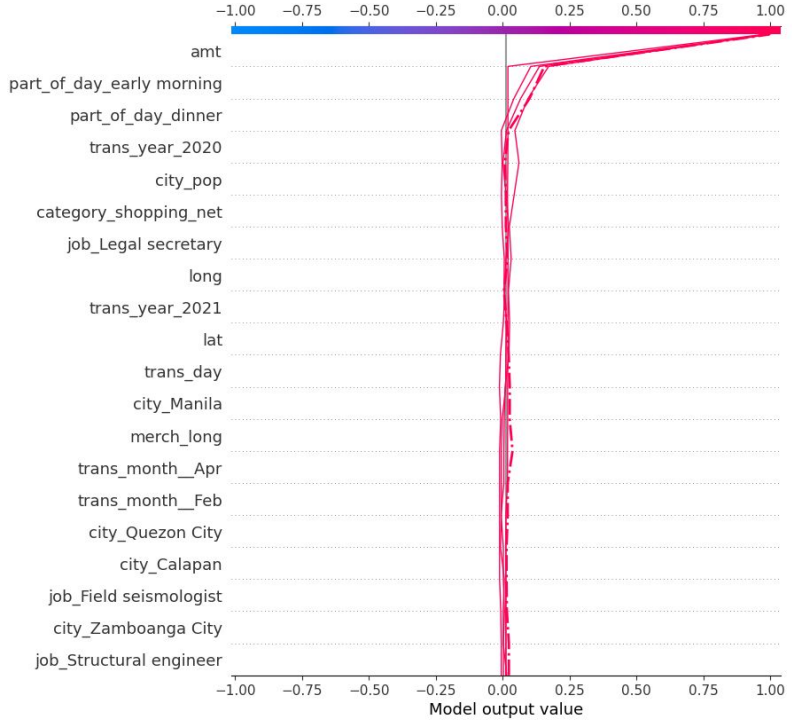


LOCAL INTERPRETATION

Actual valid transactions but predicted as Fraud

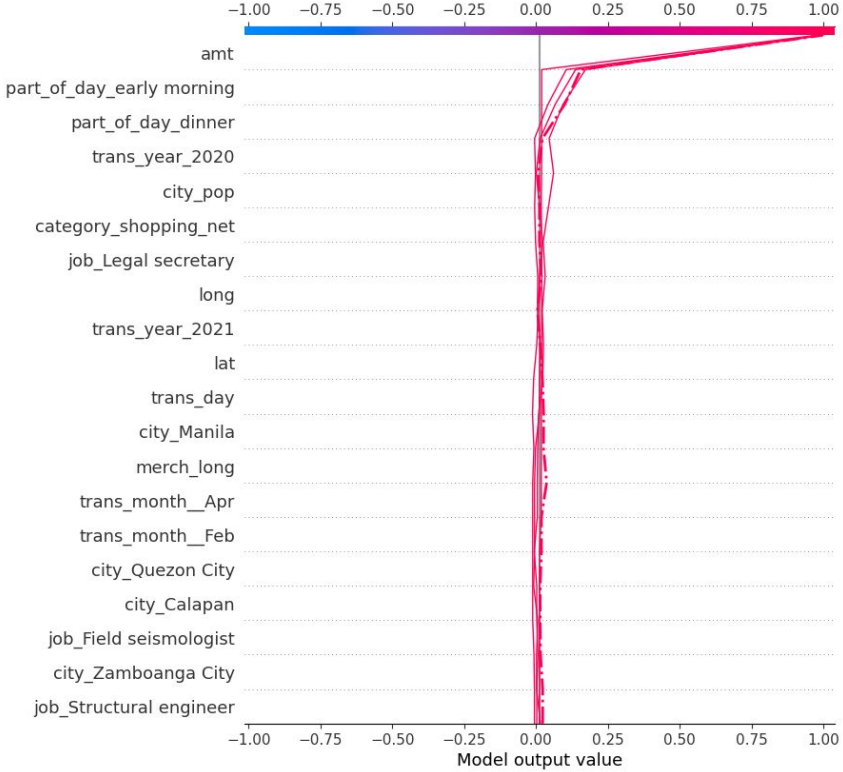


Transactions that are actual Fraud and predicted as Fraud

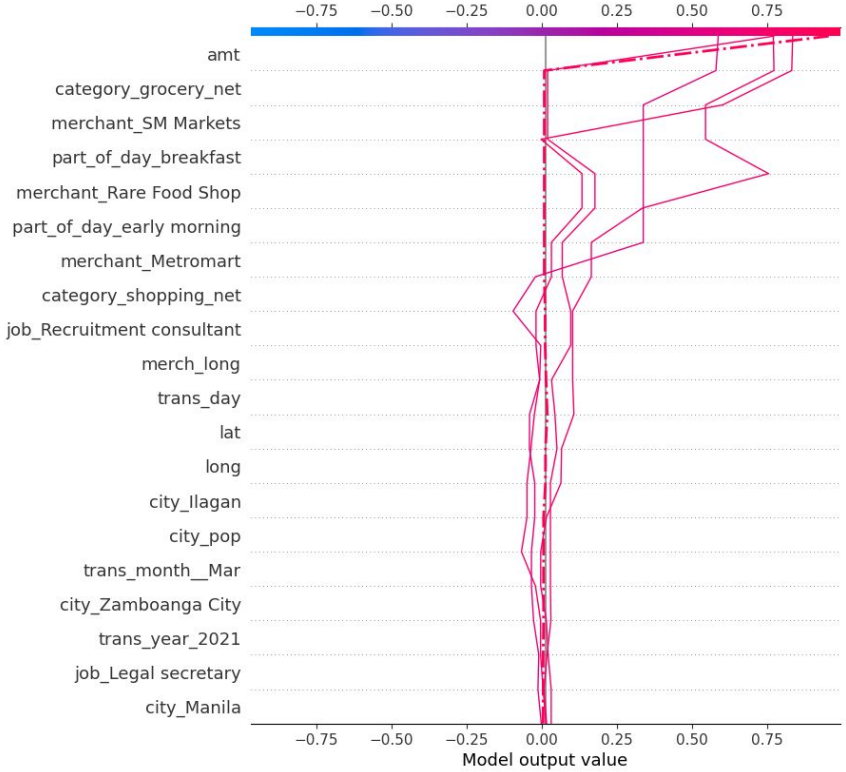


Interpretability - Local Interpretation

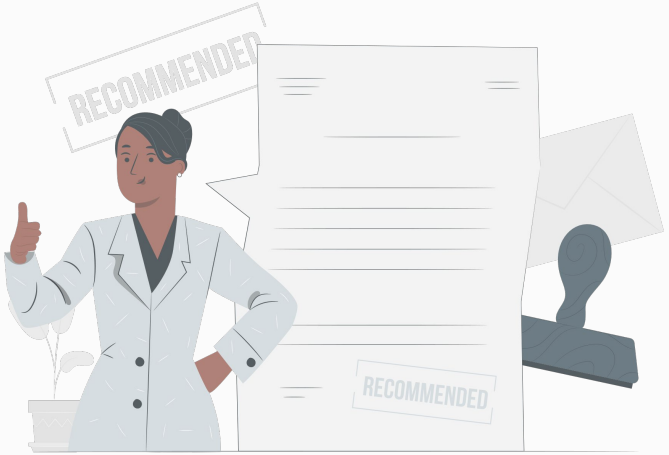
Transactions that are actual Fraud and predicted as Fraud



Actual valid transactions and predicted as Fraud



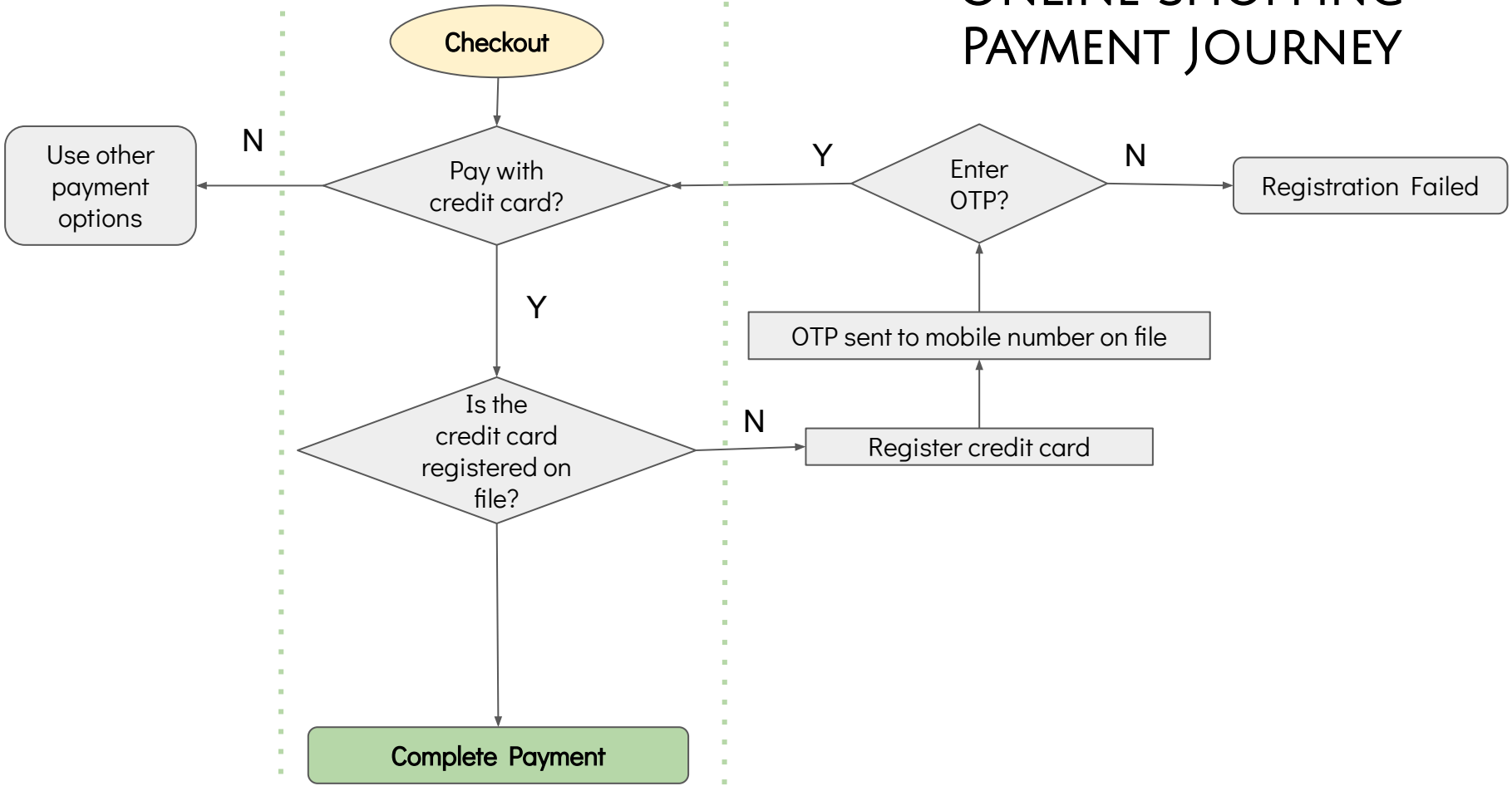
Our Recommendation



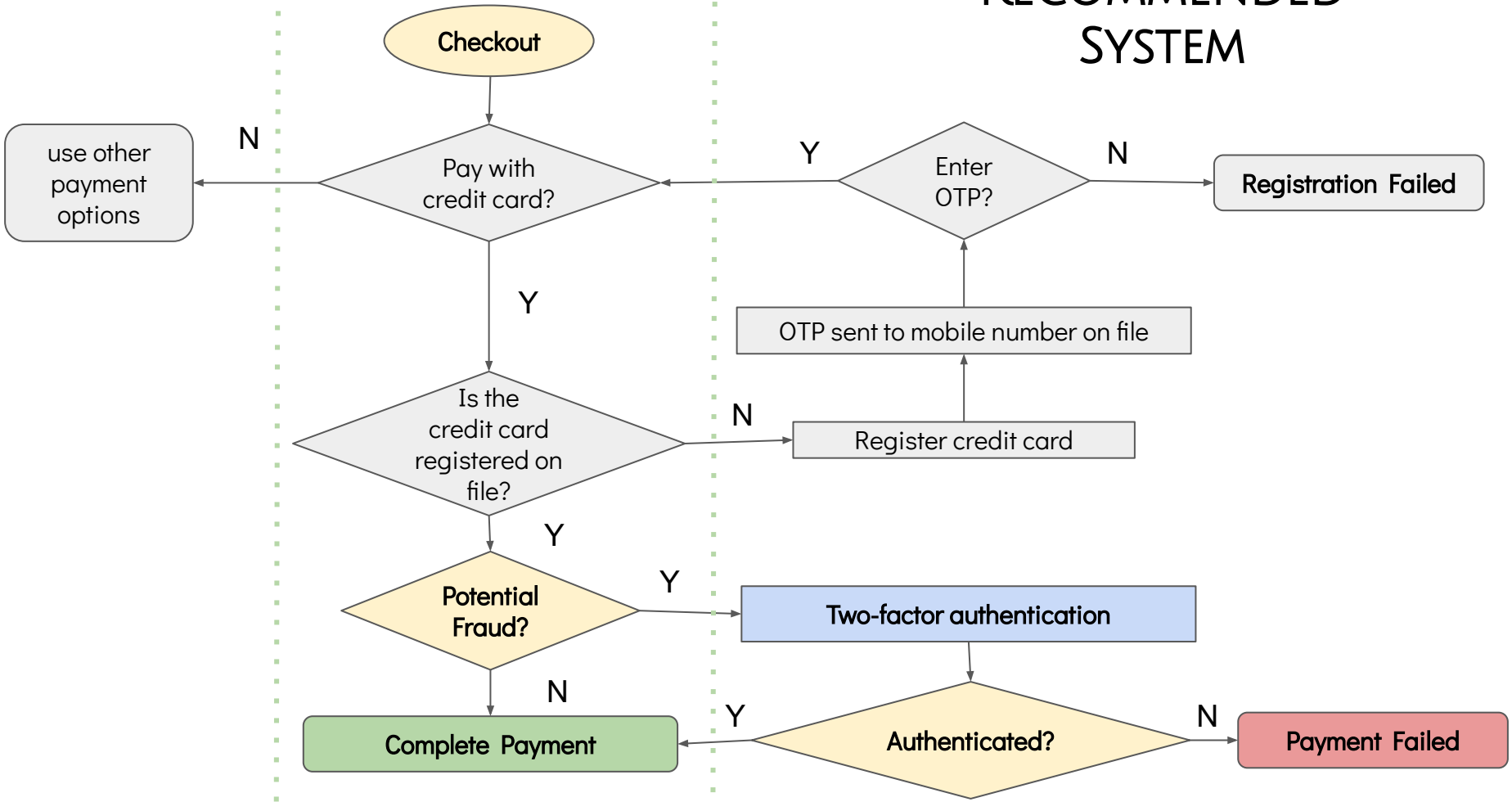
Real-Time Fraud Detection System

Owning to the prediction speed of our model, We can implement **a system that can deter fraudulent transactions without being an inconvenience** to the overall customer experience.

Online Shopping Payment Journey



Recommended System



POTENTIAL SAVINGS

5 Million Pesos

Each Year

Calculation:

- *Ave 1.5 million unique transactions per year*
- *4% of these are fraudulent*
- *Ave net fraud transaction amount is 86 php (2020-2021)*
- *98.25% recall score*

*1,500,000 * 0.04 * 86 * 0.9525 = 5,069,700 php*