



Tecnológico de Monterrey | Hack MTY | DataCoders

# Reduce Money Loss with Fraud Policies

FOCUS ON VALUE PROPOSAL AND DEMO.

[www.capitalone.com](http://www.capitalone.com)

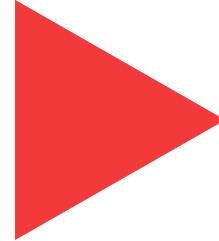
CapitalOne®

A close-up photograph of a person's hand holding a black smartphone. The screen of the phone displays a mobile banking application. At the top, it says "Online Bank" with a gear icon for settings and a menu icon. Below that is a bank building icon. The word "Balance" is visible on the left, and a large amount "\$7532.54" is shown with a right-pointing arrow. In the background, other menu options like "My Accounts" and "Payments" are visible. A small note at the bottom right of the phone's screen says "(Nieto, 2024)".

In the United States, approximately  
**2.6 million frauds** are reported annually,  
about **7,100 frauds** per day.

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(Nieto, 2024)



# What if we apply at least 1 fraud policy

Based on Capital One's 2023 Nationwide Transactions data, implementing our fraud system with 77% accuracy for transactions below \$45 and issuing refunds with restrictions per account, rather than paying \$47.12 for a two-hour investigation, could significantly reduce fraud losses. This approach minimizes costs associated with investigating low-value transactions that are likely fraudulent, optimizing resource allocation and improving overall efficiency in fraud management.

- Threshold amount for refunds: \$45 with average of \$20
- Time per investigation: 2 hours, cost per hour \$23.56

Loss in Fraud Reduction:

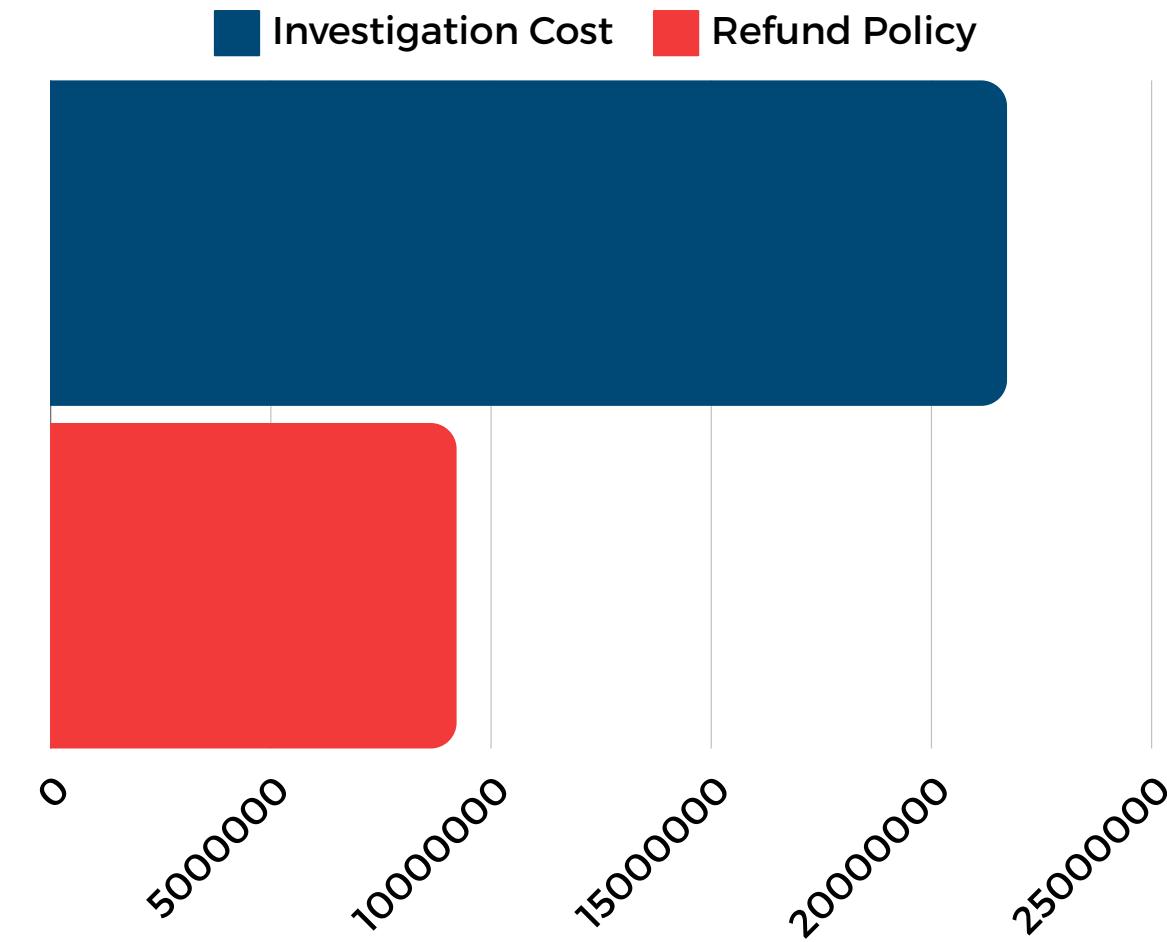
**-57.56 %**



**\$1.29 M dlls**



per day



# MEET OUR TEAM

## PROJECT CREATORS



DILAN  
CASTAÑEDA



ADRIAN PINEDA



LUIS LOPEZ



ROGELIO  
LIZARRAGA

# DEMOSTRATION OF OUR FRAUD DETECTION MODEL

## VIDEO IN GITHUB

```
Enter the client's age: 22
Enter the transaction amount: 200
Transaction in the morning? (1 for yes, 0 for no): 1
Transaction in the afternoon? (1 for yes, 0 for no): 0
Transaction at night? (1 for yes, 0 for no): 0
Transaction at dawn? (1 for yes, 0 for no): 0
In-person transaction? (1 for yes, 0 for no): 0
National transaction? (1 for yes, 0 for no): 1
International transaction? (1 for yes, 0 for no): 0
Client's gender (1 for female, 0 for male): 1
Transaction during December holidays? (1 for yes, 0 for no): 1
Dangerous category? (1 for yes, 0 for no): 0
No Fraud
```

NO FRAUD

```
Enter the client's age: 22
Enter the transaction amount: 2000
Transaction in the morning? (1 for yes, 0 for no): 0
Transaction in the afternoon? (1 for yes, 0 for no): 0
Transaction at night? (1 for yes, 0 for no): 1
Transaction at dawn? (1 for yes, 0 for no): 0
In-person transaction? (1 for yes, 0 for no): 0
National transaction? (1 for yes, 0 for no): 0
International transaction? (1 for yes, 0 for no): 1
Client's gender (1 for female, 0 for male): 1
Transaction during December holidays? (1 for yes, 0 for no): 1
Dangerous category? (1 for yes, 0 for no): 1
Fraud
```

FRAUD

# Common anomalies in Fraud



## Temporary Anomaly

Case: Purchases are made at 3 AM local time when the customer typically shops during the day.

Explanation: Activity outside normal hours can be suspicious.



## Category Anomaly

Case: Purchases are made in categories the customer rarely shops instead of their usual basic needs.



Explanation: Sudden changes in spending categories can indicate suspicious or unauthorized activity.



## Amount Anomaly

Case: A customer who typically makes small purchases under \$100 suddenly spends \$5,000 on luxury electronics.



Explanation: A significant deviation from normal spending patterns may indicate unauthorized use.



## Geographical Anomaly

Case: A card is used in New York and then two hours later in London.



Explanation: Impossible travel time suggests the card may have been cloned.

# Database transformation

## Dataset import

A test dataset was imported from **HeyBanco** with data similar to that of **Capital One**

## Creation of categorical variables

Columns such as: 'sex', 'morning', 'afternoon', 'evening', 'early morning', 'december\_dates', 'in-person', 'national', 'international' and 'dangerous category'

## Transaction anomalies

4 columns of anomalies were created in the transactions called: '**temporary anomaly**', '**amount anomaly**', '**category/amount anomaly**' and '**geographical anomaly**'

## Fraud label

Taking into account the 4 anomalies, the transaction **is labeled as fraud or not.**

# Classification models implemented

**Logistic Regression**

Accuracy: 96.6%, Recall: 77.8% and F1 score: 55.4%

**Decision Tree**

Accuracy: 96.9%, Recall: 69% and F1 score: 67.8%

**Random Forest**

Accuracy: 97.2%, Recall: 70.3% and F1 score: 71.5%

**FNN**

Accuracy: 97.1%, Recall: 83.3%

**XGBOOST**

Accuracy: 97.2%, Recall: 75.2% and F1 score: 72.4%

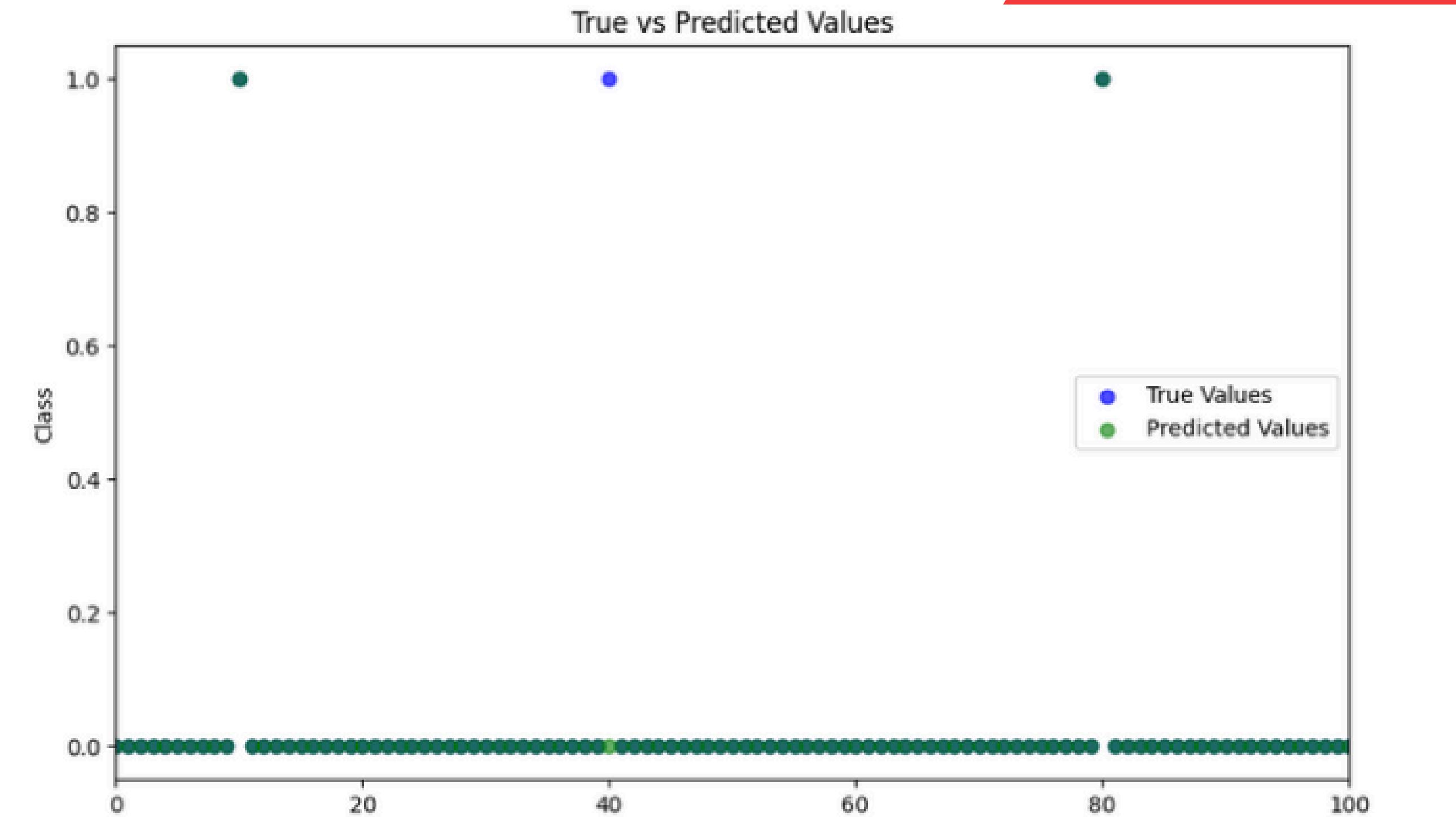
**LSTM**

Accuracy: 97.12%, Recall: 97.2%

# Best model

LSTM

True vs Predicted Values



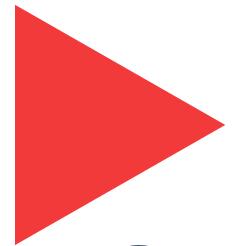


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# THANK YOU!



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## References

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