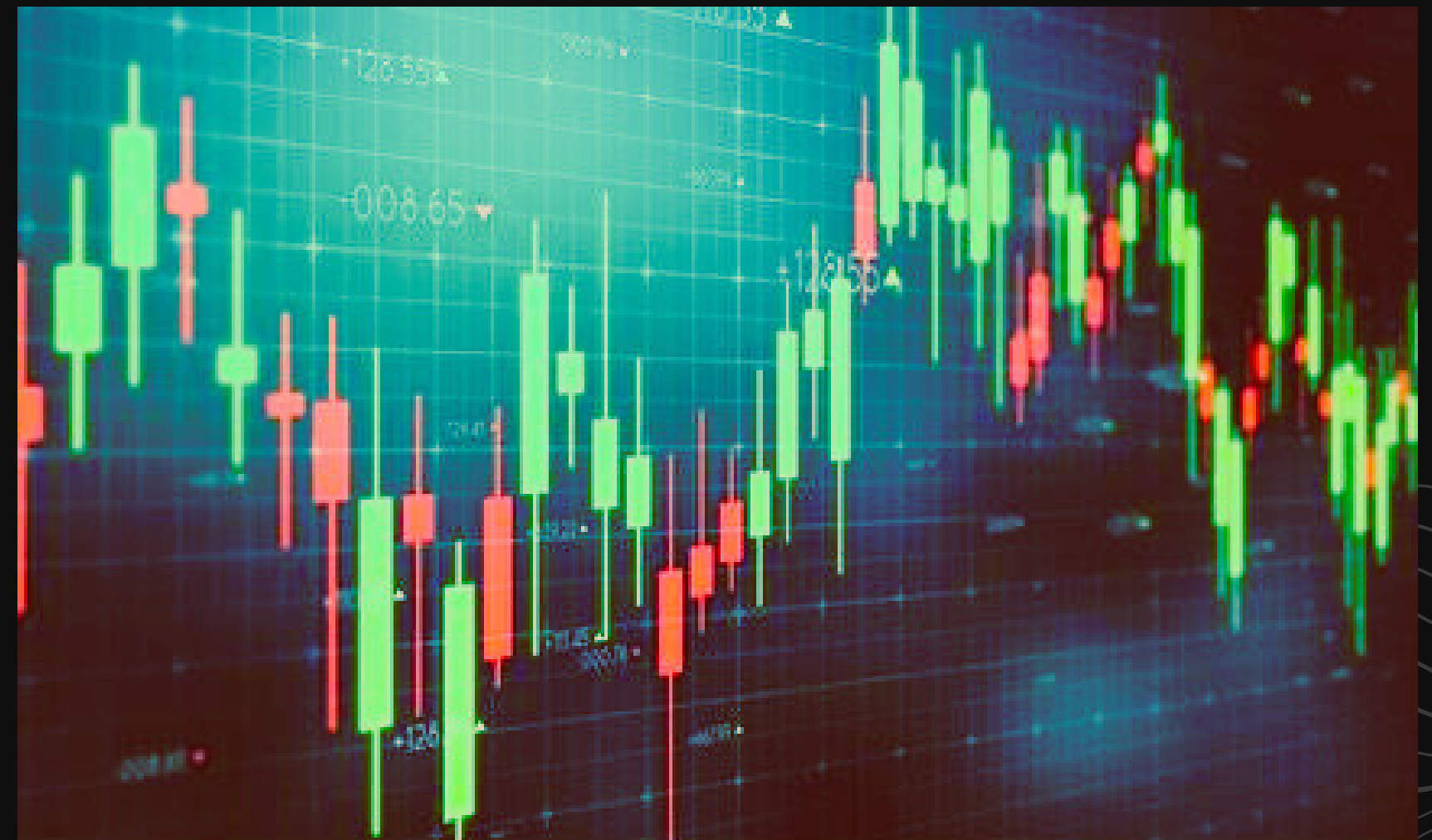# Stock Buy Signal Prediction

Presented by: SHIJIN

Why Predict Buy Signals?

"The Stock market presents daily opportunities, but manually identifying buy moments is tough, This model aims to automate buy signal prediction"

Data Import & Libraries

- Historical stock data via yfinance(2018-2024)
- Library used: pandas,numpy,matplotlib,scikit-learn,XGBoost,ta,seaborn,imbalanced learn

Technical Indicators as Features

1. Indicators:RSI,MACD,EMA,ADX,BOLLINGER Band Width, ADX,CCI,Williams %R, and lag features

Target Variable

- Defines Target: 1 if next-day retuen>0.7%,else 0.
- Represents 'Buy' vs 'No Buy' signal.

Preprocessing

- Defines selected features (X) and target variable(y)
- Cleaned missing and infinite values
- 80/20 train-test-split
- SMOTE used to balance Buy class

Model Training

- Trains an XGBClassifier with defined hyperparameters

Threshold Tuning

- Model Predicts probabilities
- Evaluated threscholds from 0.01 to 0.6
- Selected best F1-score threshold

Classification Results

- Accuracy: 72%
- Class 0 (No Buy): Precision 0.89, Recall 0.77, F1 0.82
- Class 1(Buy): Precision 0.25, Recall 0.46, F1 0.33

	Class	Precision	Recall	F1-Score	Support
0	0 (No Buy)	0.89	0.77	0.82	290.00
1	1 (Buy)	0.25	0.46	0.33	50.00
2	Accuracy	0.72	0.72	0.72	0.72
3	Macro Avg	0.57	0.61	0.57	340.00
4	Weighted Avg	0.80	0.72	0.75	340.00

Confusion Matrix

Strong at avoiding false buys

- TN: 222, FP: 68
- FN: 27, TP: 28
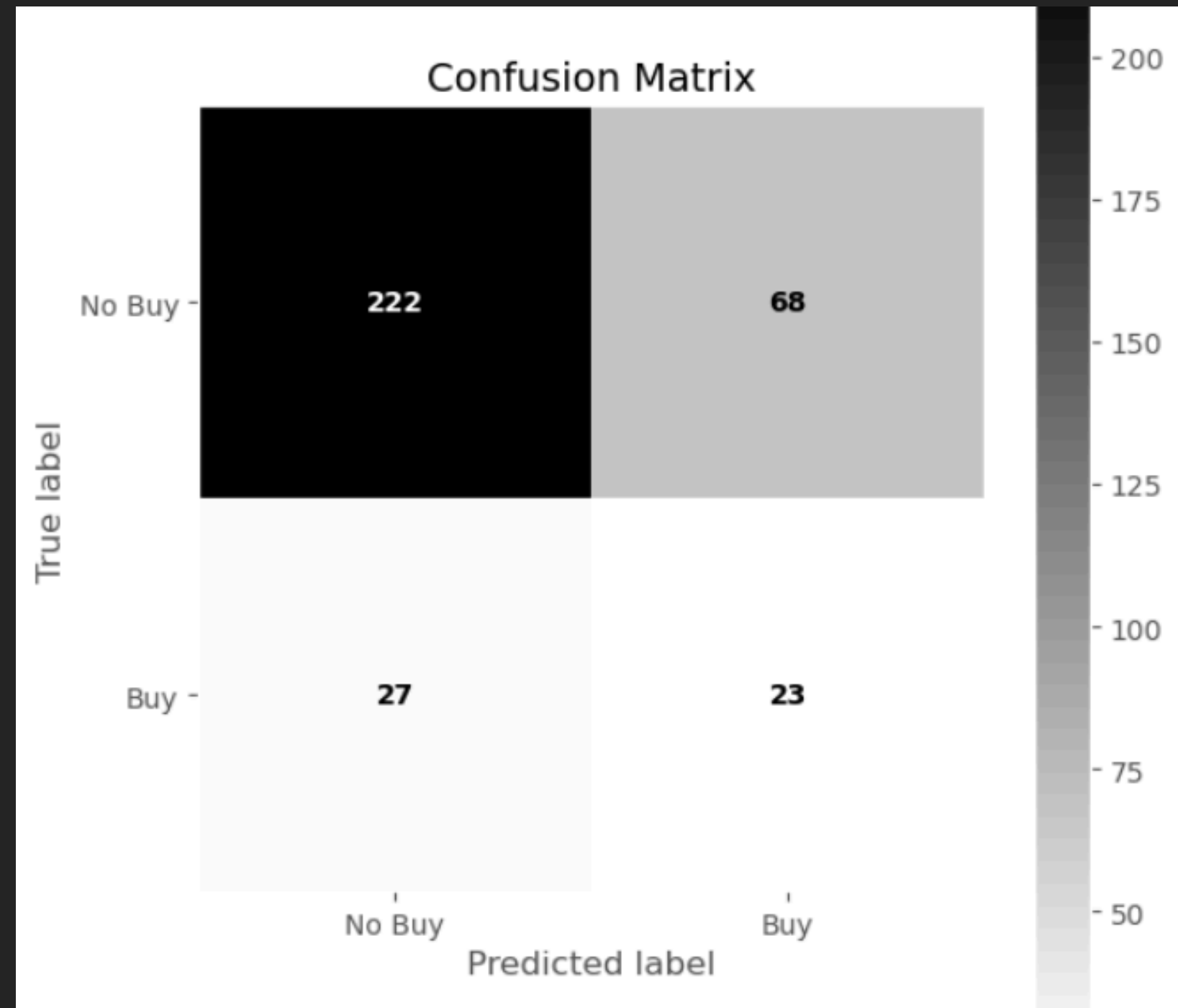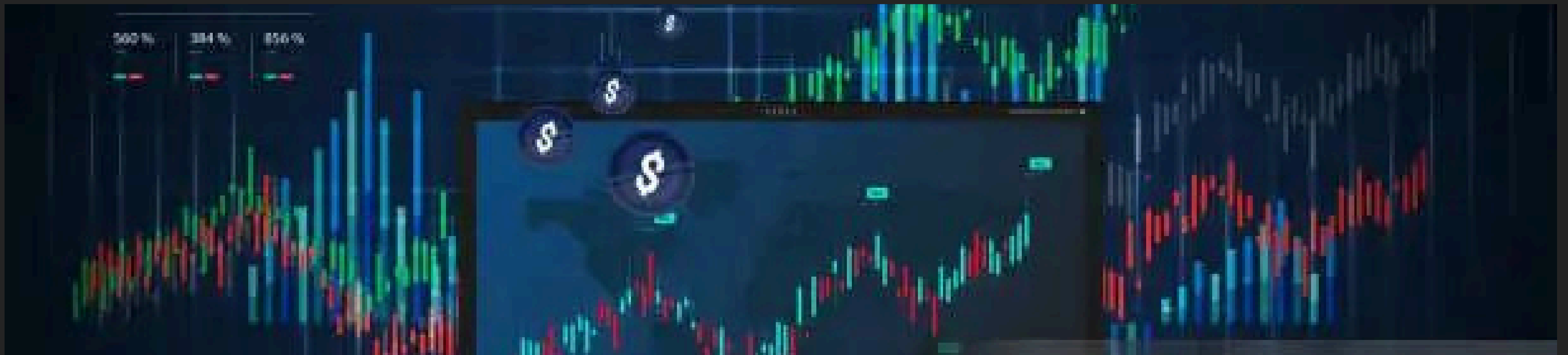
Buy Signal Visualization

Predicted vs Actual Buy Signals on NIFTYBEES
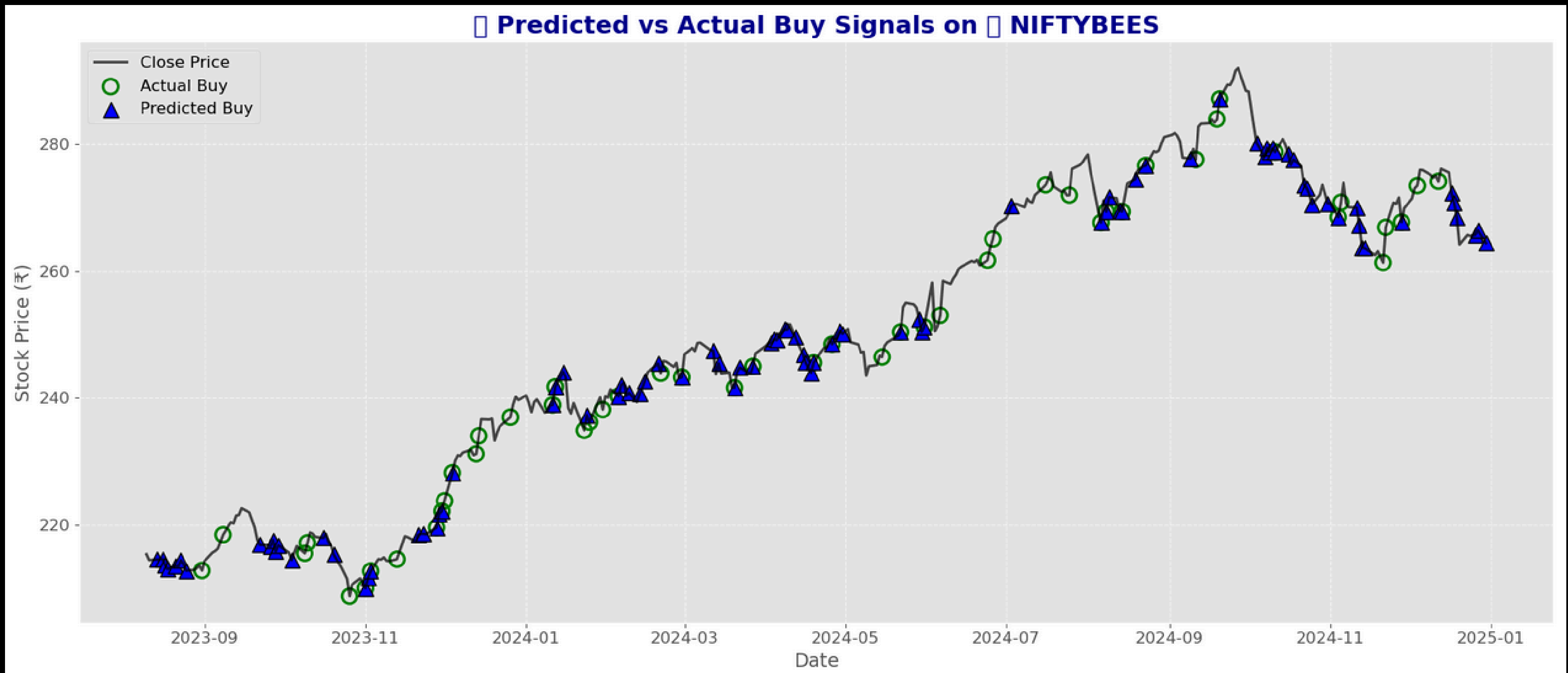
Learning Outcome

- Built an end-to-end ML pipeline
- Learned SMOTE, XGBoost, and threshold tuning
- Gained insights on stock ML challenges

Summary

- This model serves as a strong foundation for future algorithmic trading systems.it can be scaled,refined and integrated into live trading setups.
- Next Improvements:
- Use LSTM for time-series memory
- integrate new sentiment
- Add volume trends & multi-timeframe signals

"Thank you for your trust.Analyze wisely trade better!"

"Share your thoughts--your input helps me improve!"