TEAM HACKBEES

Fraud Detection in Stock Market

AI & ML-Based Approach

INTRODUCTION

Stock Market Fraud: A Growing Concern

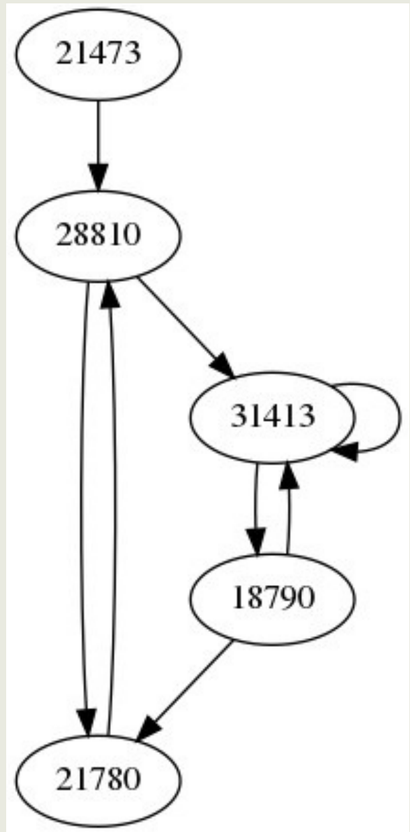
Illegal activities aimed at manipulating stock prices for unfair financial gains.

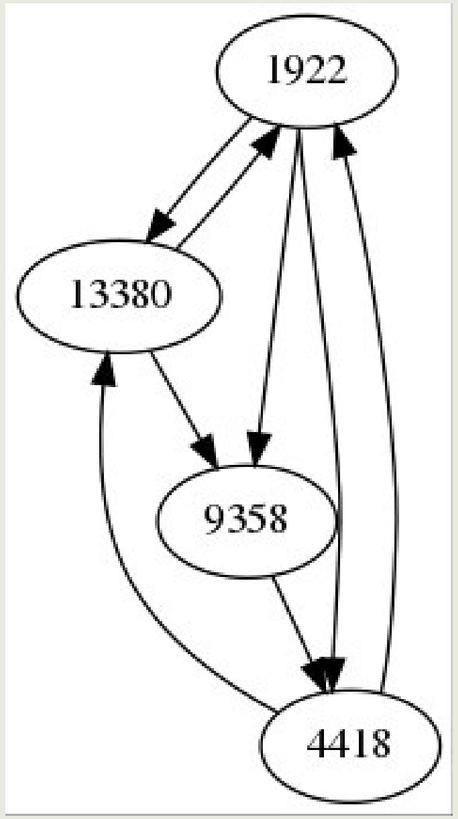
Types of Stock Market Fraud:

- Insider trading
- Pump and dump schemes
- Circular trading
- Spoofing and layering

Impact of Stock Market Fraud:

- Loss of Investor Trust:
- Market Volatility:
- Financial Instability





PROBLEM STATEMENT

Circular Trading

Circular trading involves coordinated buying and selling of the same security among multiple accounts to create a false sense of high trading activity.

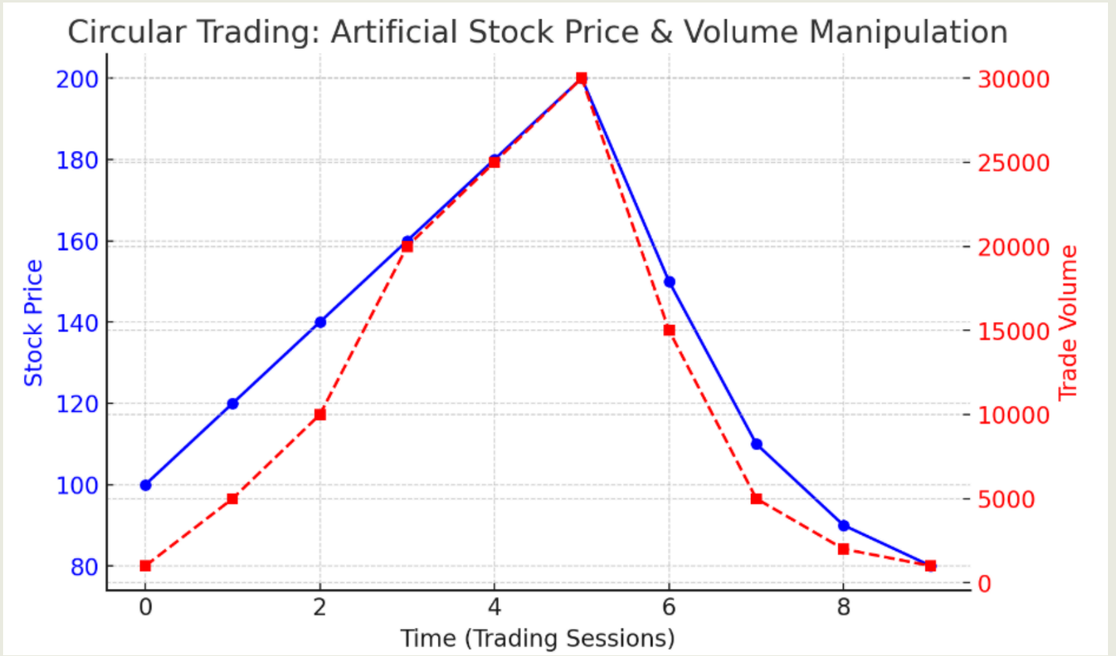
Mechanics of Circular Trading

1.Orchestration:

- Network of connected trading entities
- Synchronized order placement
- Strategic time intervals between trades
- Use of multiple trading accounts

2. Technical Indicators:

- Unusual trading patterns
- Consistent trade sizes
- Price manipulation patterns
- Volume spikes without news



Stock Market Fraud Detection Overview

ABC Securities (2023)

- Pattern: 6-month circular trading
- Impact: 40% price inflation
- Detection: ML-based recognition
- Resolution: $50M penalties

Recent Regulatory Actions

SEBI Investigations:

- 200+ entities identified
- ₹500 crore manipulated trades

SEC Enforcement:

- Cross-border manipulation rings
- Integration with crypto markets

Red Flags and Indicators

Trading Patterns

- Repeated buy-sell orders of similar quantities
- Trades concentrated in off-market hours
- Synchronized trading across accounts

Price Impact

- Artificial price support levels
- Unusual movements against market trend
- Price reversals after volume spikes

CHALLENGES IN DETECTION

Massive Data Volumes

- Billions of daily trades to process
- Multiple accounts and transactions to track
- Real-time analysis requirements
- Complex patterns across different time zones

Market Impact

- Decreased investor confidence
- Reduced market transparency
- Potential revenue loss for exchanges
- Risk to market integrity

Pattern Complexity

- Sophisticated coordination between parties
- Algorithmic trading masking fraudulent activities
- Interconnected account networks
- High-speed trading complications

SOLUTION

Leveraging Technology to Combat Fraud

1.Al & ML for Fraud Detection

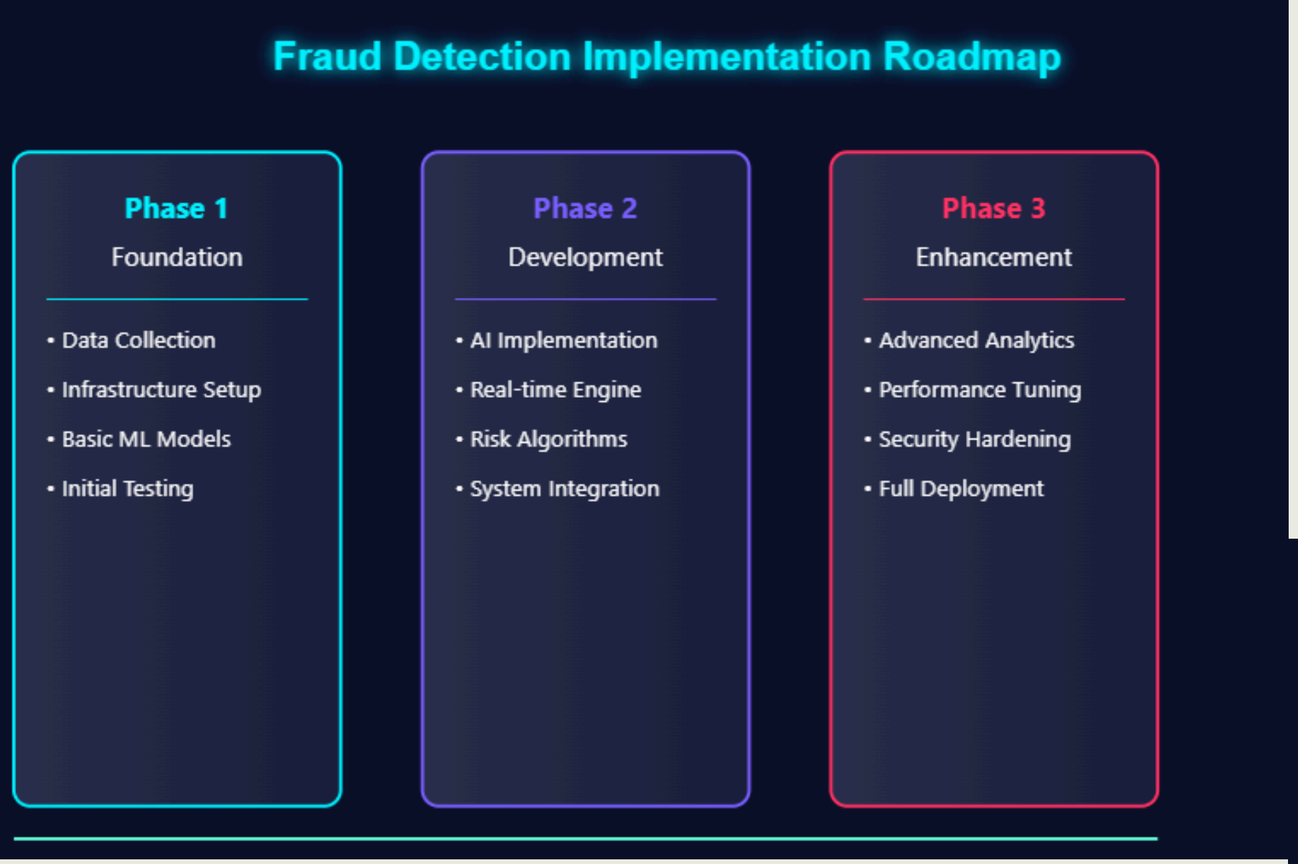
- Utilizing advanced algorithms, Al and machine learning technologies are deployed to identify anomalies in trade behavior. This proactive approach enables organizations to spot unusual patterns that may indicate fraudulent activities, leading to timely interventions.

2.Real-Time Analysis

- The system is designed to provide real-time analysis of transactions, allowing for the instant detection of suspicious activities. This immediate feedback loop enhances the ability to act quickly on potential threats, minimizing financial losses.

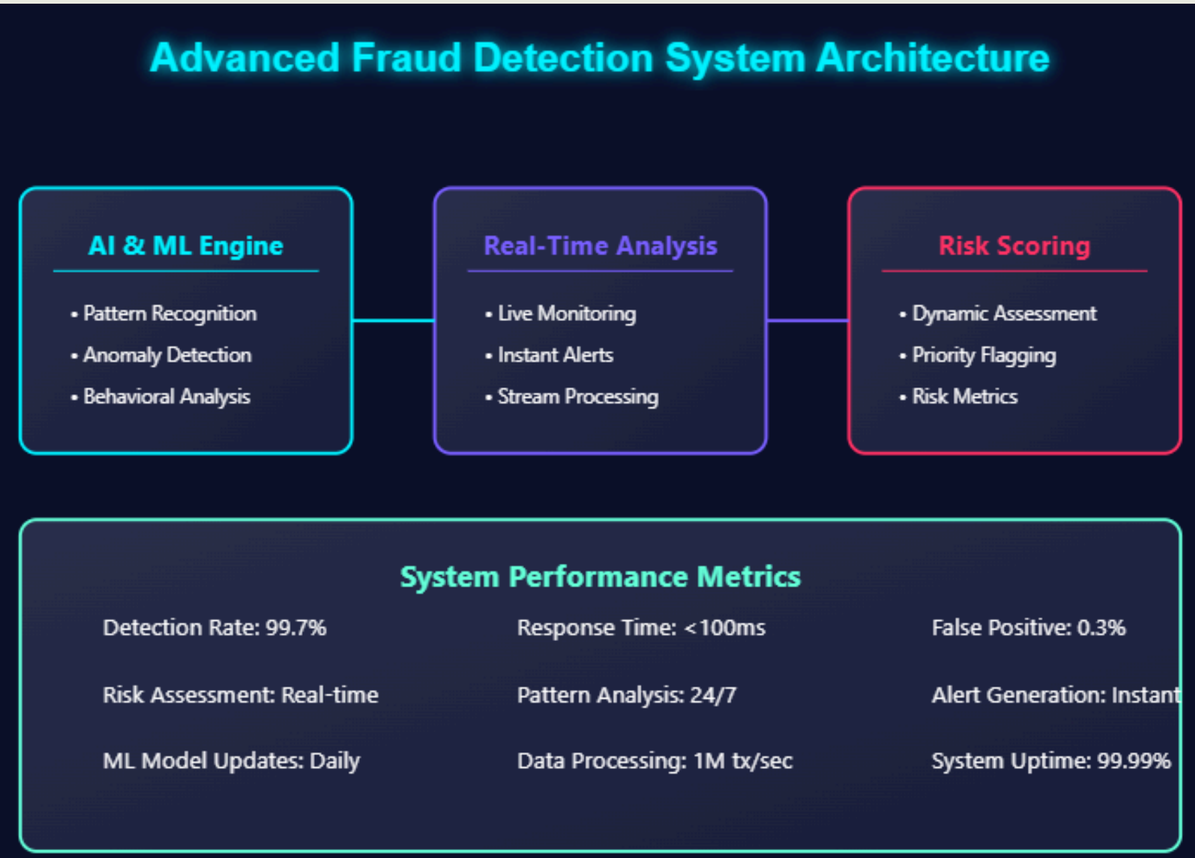
3.Automated Risk Scoring

- With automated risk scoring, transactions are dynamically flagged based on their risk level. This continuous assessment helps prioritize which transactions require further investigation, ensuring that high-risk activities are scrutinized more closely.



Behavioral Analysis Engine

- Real-time monitoring of trading patterns and user behaviors
- Dynamic adjustment of detection parameters based on historical data



Real-Time Analysis:

1. Stream Processing Framework

- Sub-millisecond processing of transaction data
- Parallel processing architecture for scalable performance

2. Instant Alert Mechanism

- Multi-channel notification system for immediate response
- Customizable alert thresholds based on risk levels

DATA SOURCES

Understanding fraudulent trading requires analyzing key market patterns. By examining trade frequency, volume fluctuations, and suspicious entity connections, we can uncover hidden anomalies indicating circular trading activity.

Primary Data Sources

The foundational datasets used for analysis are Orders.csv and Trades.csv, which provide criticalinsights into trading activities and order placements.

Trade Frequency & Volume Patterns

Analyzing trade frequency and volume patterns helps identify trading behaviors and trends over time, enabling better prediction of market movements and trader activities.

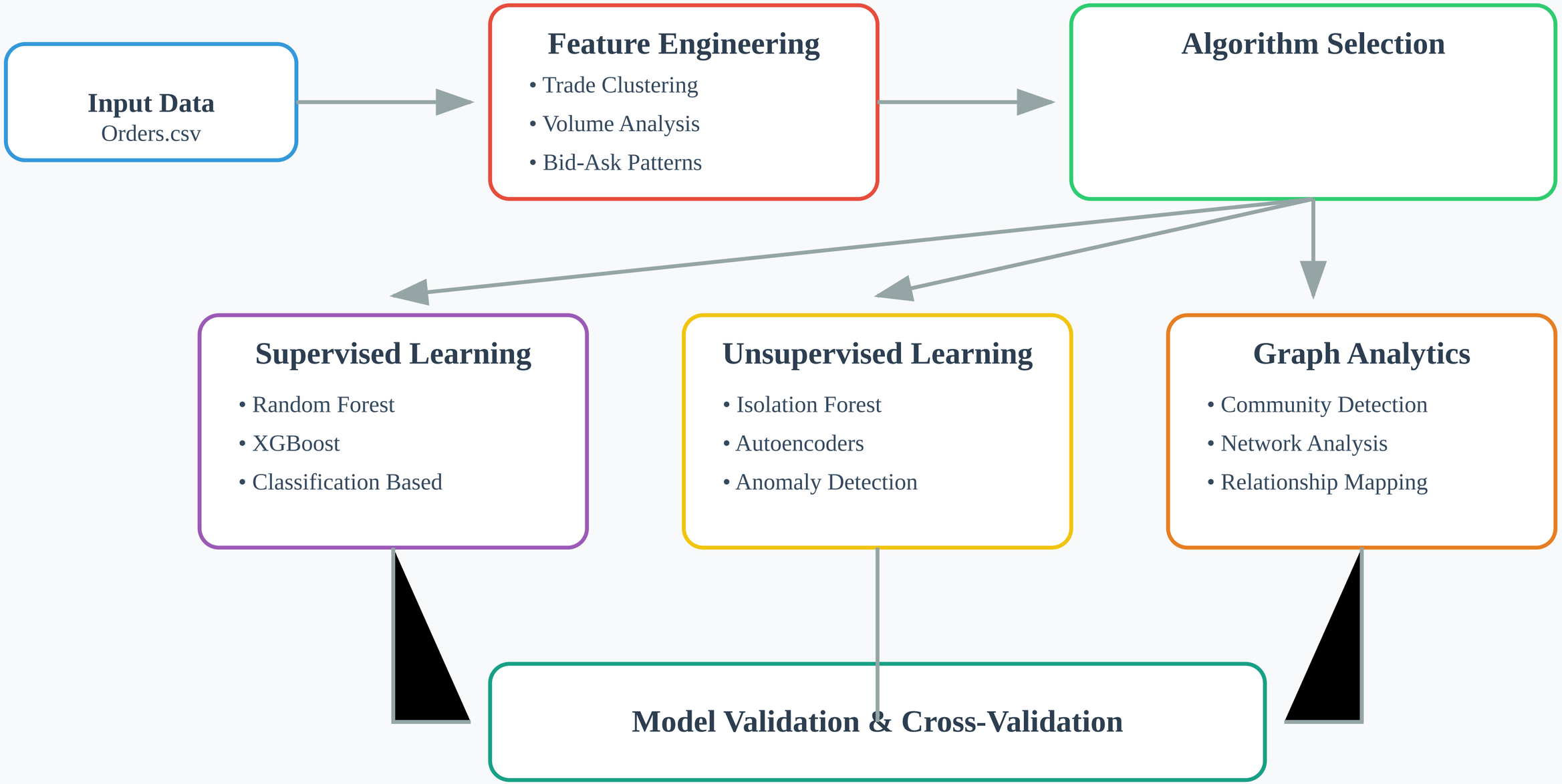
Price Volatility Anomalies

Understanding price volatility anomalies is essential for detecting unusual market movements that could indicate significant events or shifts in
market sentiment.

Networked Relationships Between Entities

Examining the networked relationships between entities allows for the identification of interconnected trading activities, which can reveal underlying market dynamics and influence factors.

Machine Learning Pipeline for Fraud Detection



Implementation Architecture

Data Ingestion
Orders & Trades
Processing

Preprocessing
Feature Extraction
Noise Removel

Model Training
AI-based Fraud
Pattern Recognition

Deployment
Real-time
Monitoring

Cloud Deployment Strategy

- Scalable
- Real-time Analytics

On-Prem Deployment

- Data Privacy
- Regulatory Compliance

TARGET MARKET

Target Market Segmentation

Primary Market

Stock Exchanges & Trading Platforms

- High-volume trading environments
- Need real-time fraud detection
- Regulatory compliance requirements

Financial Regulatory Bodies

- Market surveillance needs
- Investigation support tools
- Compliance monitoring

Investment Banks & Brokerages

- Client trade monitoring
- Risk management systems
- Automated compliance checks

Secondary Market

Asset Management Firms

- Portfolio monitoring
- Investment validation
- Risk assessment tools

FinTech Companies

- Integration with existing platforms
- API-based solutions
- Scalable fraud prevention

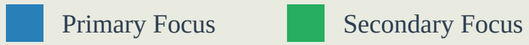
Cryptocurrency Exchanges

- Digital asset protection
- Cross-chain monitoring
- Market manipulation detection

Market Size & Opportunity:

Primary Market: $5B+ Total Addressable Market

Secondary Market: $3B+ Growth Opportunity



REAL-TIME MONITORING

Enhancing Financial Security Through continuous Monitoring

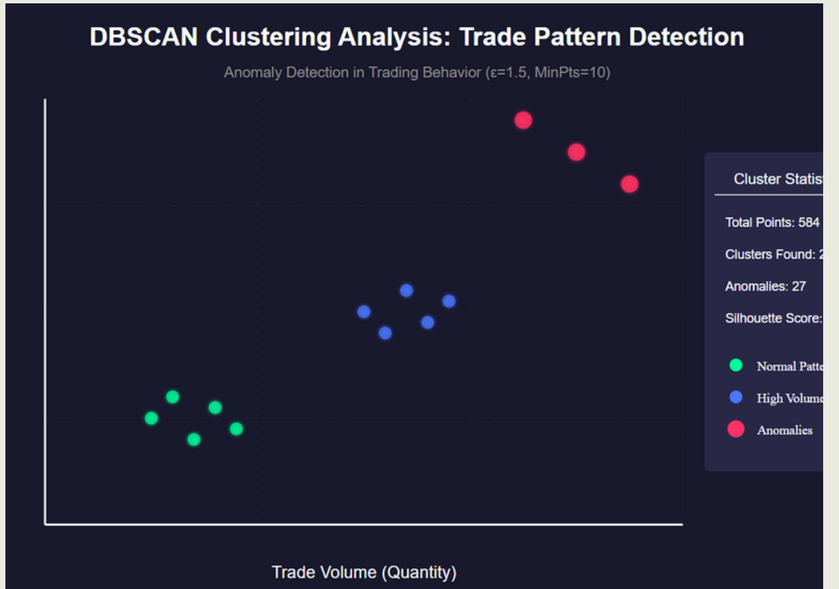
Continuous Surveillance	Implementing live trade tracking ensures that transactions are monitored in real-time, allowing for immediate detection of anomalies that could indicate fraudulent activities. This proactive approach enhances the security and integrity of financial operations.
Alert Mechanism	An effective alert system is crucial for timely responses to potential fraud. This includes instant notifications to relevant stakeholders when fraudulent patterns are identified, ensuring that any activities are addressed without delay.
Severity-Based Fraud Risk Classification	Classifying fraud risks based on severity allows organizations to prioritize their responses to threads.by understanding which incidents pose the greatest risk, resources can be allocated more efficiently to mitigate potential impacts.
Dashboards & Reporting	Utilizing dashboards and reporting tools provides visual analytics that are essential for regulatory reviews. These tools offer insights into trading activities and highlight trends, making it easier to comply with regulatory requirements.

Expected Impact and Output

Understanding the Benefits of Enhanced Fraud Detection Systems

ORDER_ID	TRADE_NUMBER	TRADE_TIME	TRADE_QUANTITY	TRADE_VALUE	RATE	QUANTITY	TRADE_RATE	CLUSTER
55500001	1001	10:15:30	500	1,000,000	1500	1000	2000	-1 (Fraud)
55500002	1002	10:16:45	10	500,000	200	200	2500	-1 (Fraud)
55500003	1003	10:17:10	1000	5,000,000	800	500	3000	-1 (Fraud)

Fraudulent transactions (marked -1) indicate potential circular trading or market manipulation.



Risk Assessment Features

Smart Scoring

- Dynamic Risk Profiling
- Behavioral Analytics

Alert System

- Instant Notifications
- Priority-based Alerts

Key Technical Components

Deep Learning

- Sequential Pattern Mining
- Neural Network Models

Data Processing

- Real-time Analysis
- Automated Validation

Automated Risk Scoring:

- Dynamic Risk Assessment
  Continuous evaluation of transaction patterns
- Adaptive scoring algorithms based on market conditions
- Risk Prioritization System
  Automated triage of suspicious activities
- Risk-based resource allocation for investigation

CONCLUSION

Harnessing AI/ML for a Secure Financial Future

Key Takeaway: Enhanced Fraud Detection

Artificial Intelligence and Machine Learing significantly improve the ability to detect fraudulent activities in financial markets by analyzing vast amount of data and identifying unusual patterns

Next Step: Deployment

The implementation of AI/ML solutions is crucial for real-time fraud detection. This step involves integrating these technologies into existing financial system to enhance security.

Next step: Regulatory Integration

Collaboration with regulatory bodies is essential to ensure that AI-driven fraud detection methods comply with legal standards, fostering trust and accountability in financial markets.

Final Thought: Technology- Driven Security

Investing in technology-driven fraud prevention strategies not only safeguards financial institutions but also contributes to a more secure and trustworthy stock market environment.

Thank you...