

Unleash the power of AI/ML for **anomaly detection**



CASE STUDY



About Client

India's leading exchange



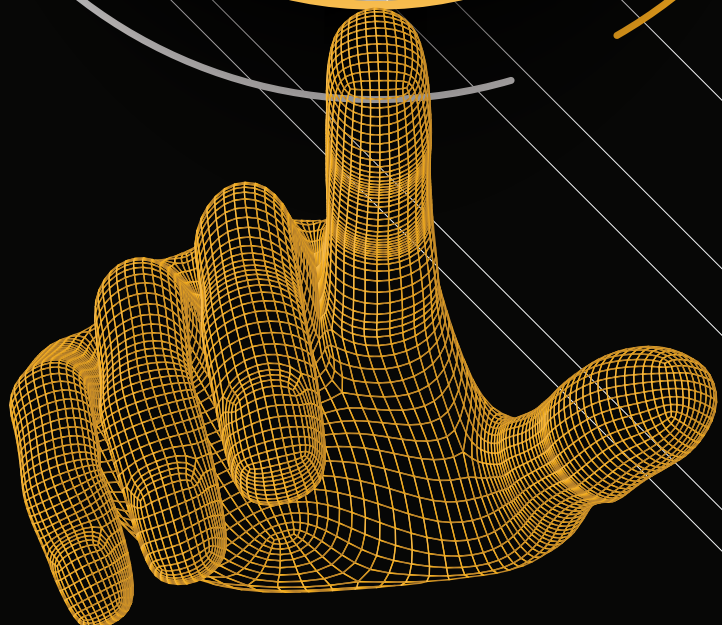
Industry

Capital markets



Service

Data analytics



Business **Need**

The client was using a static rule-based or query-based anomaly detection approach to monitor the activities of its trading members and clients. In general, trading partners, client

behavior, and the stock exchange function dynamically, and a static approach is insufficient for anomaly detection. Therefore, the client wanted a dynamic, predictive anomaly detection system.

Business **Challenge**

Digitalization has led to an exponential increase in the amount of data generated daily. Whether it's a manufacturing plant, financial institution, insurance company, capital market or airline, the future lies in data and deriving real-time actionable insights from it. However, this speed of digitalization has its risks, and as a company receives large amounts of data, handling it properly becomes a huge challenge. Fraudulent activities have the potential to hamper an organization's reputation, collapse its entire system, and lead to customers' losses. The only way to prevent this is to have a system to detect anomalies and outlier activities.

The client, India's leading exchange, receives a huge amount of trading data every day. Its client base is divided into algorithmic and non-algorithmic trading member categories, with their respective behaviors. Further, each trading member has different behavior, and the stock market sentiments change frequently. Detecting anomalies and analyzing them is critical for the client to proactively identify and quickly resolve critical issues and generate new insights. For this, the client used a static rule-based or query-based

approach for anomaly detection, which had many challenges:

- ▶ Insufficient to cater to dynamic member behavior and changing market sentiments
- ▶ Resulted in false positives that had to be cleared through human intervention causing effort, cost, and time wastage
- ▶ Reactive in nature as it generated alerts based on previous rules only
- ▶ Ran only once a day

The client wanted to implement a dynamic anomaly detection system to eliminate these challenges and cater to the changing member behavior and market. The new system must:

- ▶ Identify potential high frequency traders
- ▶ Detect market abuse practices and capture multi-leg reversal cases
- ▶ Detect algorithmically induced price crashes

Business **Solution**

NSEIT, empowered with our capital market and technological expertise, created an in-house, dynamic artificial intelligence and machine learning (AI/ML) based anomaly detection system for the client.

We developed the system in-house and using open-source platforms, made it cloud-agnostic with 100% proprietary code. It involved the following steps:

- ▶ Exploratory data analysis and selection : We identified 20 key attributes or influencers, such as trade ratio, trade value, etc.
- ▶ Data pre-processing and data cleansing

- ▶ Data enrichment and attribute computation
- ▶ Creation of the ML algorithm for anomaly detection : The 20 influencers became a part of the ML algorithm
- ▶ Model training and implementation

The state-of-the-art AI/ML-powered self-learning system not only considers the past behavior of trading members, customers, and market sentiments but adapts and evolves with the changing trading members' behavior and market sentiments in real-time. While the previous system was reactive as it only generated alerts based on previous rules, the new AI/ML-based system is predictive and helps improve the surveillance

workflow by increasing the types of anomalies detected, improving detection efficiency, and reducing false positives.

The interactive anomaly detection dashboard summarizes the five use cases and their outlier data, enabling the surveillance team to further drill down the details and take action if required.

The anomaly detection system can swiftly handle big data volumes. It handles 3+TB of data volume and processes 7+ billion messages daily.

NSEIT harnessed the power of AI/ML to automate anomaly detection that helped the client become more proactive in resolving anomalies through a user-friendly, predictive, and automated anomaly detection system.

Tech Stack



Business Impact

- ▶ Near real-time, predictive anomaly detection
- ▶ Integrated real-time and past data for better contextual understanding
- ▶ Broadened the scope to catch more breaches leading to higher control of investigations
- ▶ Reduced false positives through ML in market surveillance
- ▶ Optimized costs due to reduced manual intervention
- ▶ Improved user experience and faster results
- ▶ Anomaly and unusual behavior alerts immediately, providing dynamic insights

The anomaly detection system enabled the customer to achieve the following domain objectives:

- ▶ Identify potential high frequency traders and determine if any identified traders negatively impact the market
- ▶ Detect market abuse practices in equity stock options over-the-market (OTM) contracts and capture multi-leg reversal cases and market abuse practices, where option contracts are traded at away prices without a change in the 'underlying'
- ▶ Detect algorithmically induced price crashes and therefore empower the exchange with the foresight to stop possible crashes

About **NSEIT**

NSEIT Limited is a digital native technology company that engineers world-class solutions to help our global customers accelerate their digital transformation journeys. Our key service pillars are Application Modernization, Business Transformation, Data Analytics, Infrastructure &

Cloud Services, and Cybersecurity, through which we create intuitive digital experiences and tangible business impact. For over two decades, our innate drive for excellence has made us the partner of choice for global organizations. At NSEIT, we fuel digital progress.

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