



FRAUD DETECTION USING AI IN GST PRACTICES - A CASE STUDY

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Abstract

The Goods and Services Tax (GST) framework in India, despite its technological sophistication, nevertheless encounters difficulties in identifying and mitigating tax fraud. Fraudulent invoicing, improper Input Tax Credit (ITC) claims, and circular trading have grown widespread. Artificial Intelligence (AI) has become an effective means for evaluating extensive transactional data, recognizing patterns and detecting irregularities that may signify fraudulent actions. This study examines the application of AI in fraud detection within the GST framework, provides case-based proof of its effective implementation, and proposes additions that would strengthen the system further. The results emphasize the revolutionary impact of AI in facilitating proactive governance, enhancing enforcement, and augmenting tax compliance.

Introduction

The GST system in India was established to consolidate indirect taxes and enhance compliance efficiency. The use of a digital-first strategy has rendered fraud detection challenging through conventional methods due to the vast volume and intricacy of data associated with GST filings. Prevalent frauds encompass fictitious companies, fraudulent invoices, circular commerce, and ineligible Input Tax Credit claims. The Government and corporations have progressively adopted AI technologies to tackle these challenges efficiently¹.

Artificial intelligence technologies—particularly machine learning (ML), natural language processing (NLP), and graph analytics—can analyse extensive data sets in real-time, detecting fraudulent tendencies that are not readily apparent to human auditors.² This study assesses the existing utilization of AI in GST fraud detection and suggests improvements for its expanded applicability.

Objectives of the Study

1. To understand the role and application of AI in detecting GST frauds.
2. To analyze a case where AI has successfully identified tax evasion.

Literature Review

The impact of artificial intelligence on taxation has been investigated in several studies and reports, including the following:

1. According to a survey by EY India (2023), more than sixty percent of tax authorities around the world are implementing AI-based systems for the purpose of monitoring compliance and detecting fraud.
2. KPMG (2022) stressed the significance of integrating artificial intelligence with enterprise resource planning (ERP) and GST systems in order to detect fraud at an earlier stage.
3. Mehta and Joshi (2021) pointed out that artificial intelligence has the potential to cut manual audits by more than forty percent by means of automated anomaly identification.
4. The success of artificial intelligence in detecting fraud in excess of ₹50,000 crore under the Goods and Services Tax (GST) regime in India was recorded by Deloitte (2021).
5. Sharma, Raja & Garg, Ruchi. (2025) highlights the transformative potential of Artificial Intelligence (AI) in enhancing the efficiency, transparency and integrity of India's GST system.

Nevertheless, a number of these studies warn against laying a high level of reliance on AI models, since problems over data privacy and false positives tend to be of major concern.

Techniques Used in AI-based Fraud Detection

1. AI utilizes a range of methodologies to identify fraud inside the Goods and Services Tax structure. **Machine Learning (ML)** is a prevalent technology adept at recognizing patterns in extensive datasets and detecting abnormalities that diverge from typical taxpayer behaviour. These anomalies may encompass inconsistent ITC claims, abnormally high turnover with negligible tax payments, or discrepancies in sales and purchase data.
2. Another instrument is the integration of **Natural Language Processing (NLP)** with **Optical Character Recognition (OCR)**. These technologies facilitate systems in reading, interpreting, and categorizing text from GST-related documents, including invoices, bills of supply, and shipping manifests. This automation identifies discrepancies in the description, amount and classification of commodities or services³.
3. **Graph Analytics** is extensively employed to reveal intricate networks associated with circular trading or shell business activities. By delineating links among various GSTINs, transaction pathways, and shared identifiers (such as IP addresses or contact numbers), AI algorithms can detect fraudulent clusters and reveal illicit supplier networks.
4. **Risk Scoring Models** are utilized to categorize taxpayers according to criteria such as filing frequency, ITC usage habits, payment reliability and vendor conducts. These scores assist authorities in prioritizing audits and closely monitoring high-risk taxpayers, therefore enhancing enforcement efforts.

Pan-India Fake Invoice Scam (2021–2023) – An Analysis

Background

From 2021 to 2023, India experienced one of the most significant actions on GST-related fraud conducted by the Directorate General of GST Intelligence (DGGI). This operation revealed an extensive network of more than 7,000 fraudulent companies scattered across many states. The term "Pan-India Fake Invoice Scam" is used since the scam was extensive across various states and regions of India, rather than limited to a certain city or state. The fraudulent companies included in the scheme were registered in almost every major state, including Maharashtra, Delhi, Gujarat, West Bengal, Tamil Nadu, Uttar Pradesh, and Karnataka. The fraud affected various sectors, including steel, construction, textiles, chemicals, IT hardware, and professional services. This cross-sectoral characteristic conferred a genuinely nationwide economic influence. These companies were established exclusively to generate fraudulent invoices for other enterprises, allowing them to illegally claim ineligible ITC without the genuine provision of goods or services.⁴

Table No.1: List of Fraud cases reported in News papers

Date of Publication of News	Evasion Amount (Rs. In Crores)	Fake Invoices / Firms
Dec 4, 2020 – Thiruvananthapuram	₹14 Crores	Fake purchase bills between two entities
Nov 26, 2020 – Mumbai	₹2,300 Crores	Multiple fictitious firms
Dec 31, 2020 – Delhi	₹12.9 Crores	Invoices via non-existent firms
Jan 2021 – Chennai, Bengaluru etc.	₹384 Crores	32 cases — ~2,200 fake GSTINs, 6,600 entities
Mar 18, 2023 – Delhi	₹17 Crores	Bogus invoices & circular trading
Jul 13, 2022 – Gurugram/Ghaziabad	₹52 Crores	Fake/bogus ITC invoices
Sep 10, 2022 – Mumbai	₹27.8 Crores	Bogus invoice racket
May 20, 2025 – Nagpur	₹156 Crores	60–70 fake companies
Jun 28, 2025 – Jodhpur	₹524 Crores	240 fake firms across 22 states
Jun 29, 2021 – Odisha	₹106 Crores	One fake company
Jul 9, 2025 – Rae Bareli	₹10.76 Crores	Bogus invoices
Jul 9, 2025 – Lucknow	₹7.35 Crores	Fake documents/invoices
Jul 9, 2025 – Karnataka / Rajasthan	₹266 Crores	Fake billing network
Jul 5–9, 2025 – Madhya Pradesh	₹512 Crores	23 fake companies & 150 bank accounts

Source: National level e-papers

Modus Operandi

The scam operated on a sophisticated fake invoicing mechanism:

- Bogus companies were registered using forged identity documents such as fake Aadhaar cards and PAN numbers.
- These shell firms issued invoices reflecting large transactions without actual movement of goods.
- Recipient firms used these fake invoices to claim ITC and reduce their GST liability.
- In many cases, no actual GST was paid to the government on these invoices, and the input credit was passed on in a cascading manner through circular trading.⁵

Role of AI in Detection

The DGGI utilized AI-driven analytics and machine learning models to examine data from GSTR-1 (sales returns), GSTR-3B (summary returns), and e-way bills. AI tools assisted in identifying:

- Discrepancies between outward supplies reported in GSTR-1 and tax liability reported in GSTR-3B.

- Lack of relevant e-way bills or logistics movement, indicating no genuine transportation of goods.
- Entities that operate from identical IP addresses or mobile numbers, yet are registered under various names⁶.
- Identifying circular transaction patterns among suspicious companies' indicative of circular trading. Circular trading is a method of tax evasion in GST wherein a consortium of deceptive taxpayers (traders) seeks to conceal illicit trade by executing multiple false transactions (which do not enhance the worth of goods or services) among themselves within a brief timeframe. Given the extensive database of taxpayers, it is impractical for authorities to manually identify groups of circular traders and the illicit transactions in which they engage. This employs big data analytics and graph representation learning methodologies to provide a system for identifying communities of circular traders and isolating fraudulent transactions within such communities⁷.
- Furthermore, graph analytics facilitated the visualization of relationships among various GSTINs (Goods and Services Tax Identification Numbers), revealing concealed connections between fraudulent suppliers and recipients.

Outcome

- More than 400 individuals were arrested, including chartered accountants, business owners, and intermediaries.
- Fraudulent ITC claims worth ₹55,000 crore were unearthed.
- Thousands of GST registrations were suspended or cancelled.
- The operation significantly strengthened the case for integrating AI into India's indirect tax enforcement strategy.⁸

Impact on Policy and Governance

The exposure of the Pan-India fake invoice scam acted as a turning point for GST administration in India. The scam highlighted loopholes in registration, verification, and return filing mechanisms that were exploited by fraudsters across the country. In response, the government and GSTN undertook several key reforms aimed at tightening controls and enhancing the fraud detection framework using technology and policy updates.

1. Stricter Verification Protocols for New GST Registrations

Following the scam, the GSTN and the Central Board of Indirect Taxes and Customs (CBIC) introduced more rigorous verification processes before granting new GST registrations. Key measures include:

- Physical verification of business premises for high-risk applicants before registration approval.
- Mandatory field visits in cases where mismatches were found between PAN, address, or nature of business.
- Use of AI-based validation tools to detect and reject multiple registrations from the same IP address, mobile number, or Aadhaar/PAN credentials.

3. Mandatory Aadhaar Authentication

To prevent the misuse of fake or stolen identities for GST registration, the government made Aadhaar authentication compulsory for all new applicants from August 2020, which became a critical policy after the 2021–2023 scam.

GST registration is not granted unless the applicant's Aadhaar is successfully authenticated or undergoes physical verification. Linking of Aadhaar to GST registration allows authorities to trace the individual behind the firm, reducing anonymity and enhancing accountability.⁹

4. Integration of AI-Based Risk Profiling

In the aftermath of the scam, the government accelerated the integration of AI-powered risk engines to monitor and flag suspicious taxpayer behaviour. This includes:

- Real-time risk scores are assigned to taxpayers based on multiple variables such as ITC claim patterns, mismatch trends, filing consistency, and vendor history.
- Taxpayers with high-risk scores are red-flagged for closer scrutiny or audit, while low-risk taxpayers benefit from faster processing and refunds.
- AI models are continually updated using supervised learning to incorporate new fraud tactics.

5. Real-Time Data Integration via E-Invoicing and E-Way Bill Systems

Recognizing the delay and mismatch in invoice reporting that enabled fraud, the government mandated real-time e-invoicing and automated e-way bill generation, particularly for B2B transactions, as follows:

- E-invoicing became mandatory for businesses with a turnover above ₹5 crore, ensuring that invoices are validated and recorded in the GST portal instantly.
- Auto-generation of e-way bills from validated invoices ensures that the movement of goods is traceable and linked to real transactions.
- This integration allows AI tools to match invoice data with goods movement data in real time, making it extremely difficult to fake transactions without detection¹⁰.

Findings of the Study

1. AI has significantly improved detection speed and accuracy in identifying GST frauds.
2. Government agencies successfully use AI models to identify and track shell entities.
3. Graph analytics and anomaly detection are key in uncovering complex fraud schemes.
4. Implementation challenges include data privacy concerns, lack of skilled personnel, and model reliability.

Suggestions

1. The government can expand AI training and infrastructure at state GST departments to improve the detection of GST fraud.
2. The government has to mandate AI-based reconciliation tools for large enterprises.
3. The government has to integrate banking, transport, and ERP data sources for robust fraud detection.
4. Foster collaboration between public authorities and AI experts from academia and industry is required.

Conclusion

AI presents a revolutionary shift in the way tax fraud is detected and prevented under the GST regime. While the initial results are promising, there is a need for deeper integration of AI with policy, systems, and field operations. With the right regulatory framework and investment in AI tools and training, India can set a global benchmark in tech-driven tax governance.

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