

VAT/GST in the age of AI and Digital Transformation:
**Leveraging AI to combat GST
evasion**

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Challenges of Conventional Fraud Detection in GST

Key Limitations

Massive data volume

- High transaction volumes from return filing, e-invoicing, e-way bills etc. overwhelm manual analysis and review, causing delays in fraud detection.



Rule based checks

- Dependence on rule-based checks (such as specified thresholds) may result in failure to spot subtle anomalies or evolving fraud tactics like circular trading.

Human oversight

- Prone to fatigue and bias.
- Unscalable across vast taxpayer base.

Lack of real-time detection

- Interval-based data handling hinders timely fraud detection, missing dynamic evasion patterns that exploit GST's short compliance windows.





Why Tax Administrations Need Fraud Analytics and AI

Combating evasion and enhancing tax compliance

Integrating advanced AI/ML technologies

- Real-time Monitoring: AI, machine learning (ML), and natural language processing (NLP) for superior analysis and real-time insights
 - Strengthens identity verification, boosts compliance, and protects government revenue
-

Process Automation

- Automates tax processes to minimize manual efforts, errors, and delays.
- Resource Optimization: Allocation of staff and resources efficiently

Identifying complex evasion patterns

- ML algorithms detect subtle fraudulent patterns previously invisible to traditional methods.
- Reveals taxpayer behaviour trends via data analytics, enabling proactive issue resolution.

Targeted Enforcement

- Risk assessment: Risk scoring flags high-risk taxpayers by ITC patterns/filing trends for prioritized action.
- Inter-State Analysis: Detect IGST frauds and mismatches

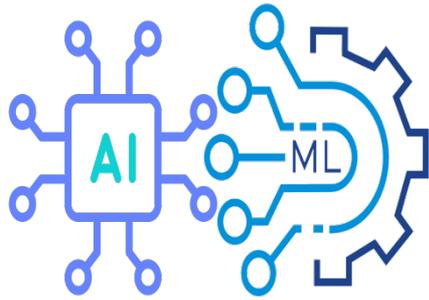




Business Intelligence & Fraud Analytics (BIFA)

Tool by GSTN

BIFA: Methods used for development of models



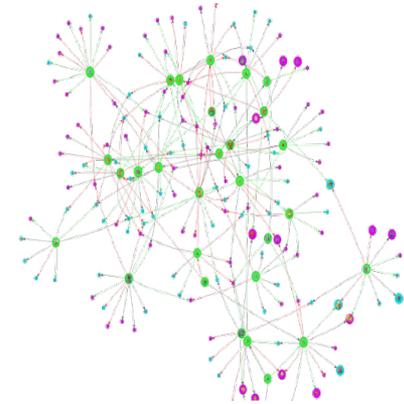
01

Artificial Intelligence
and Machine Learning
(AIML) algorithm
based



02

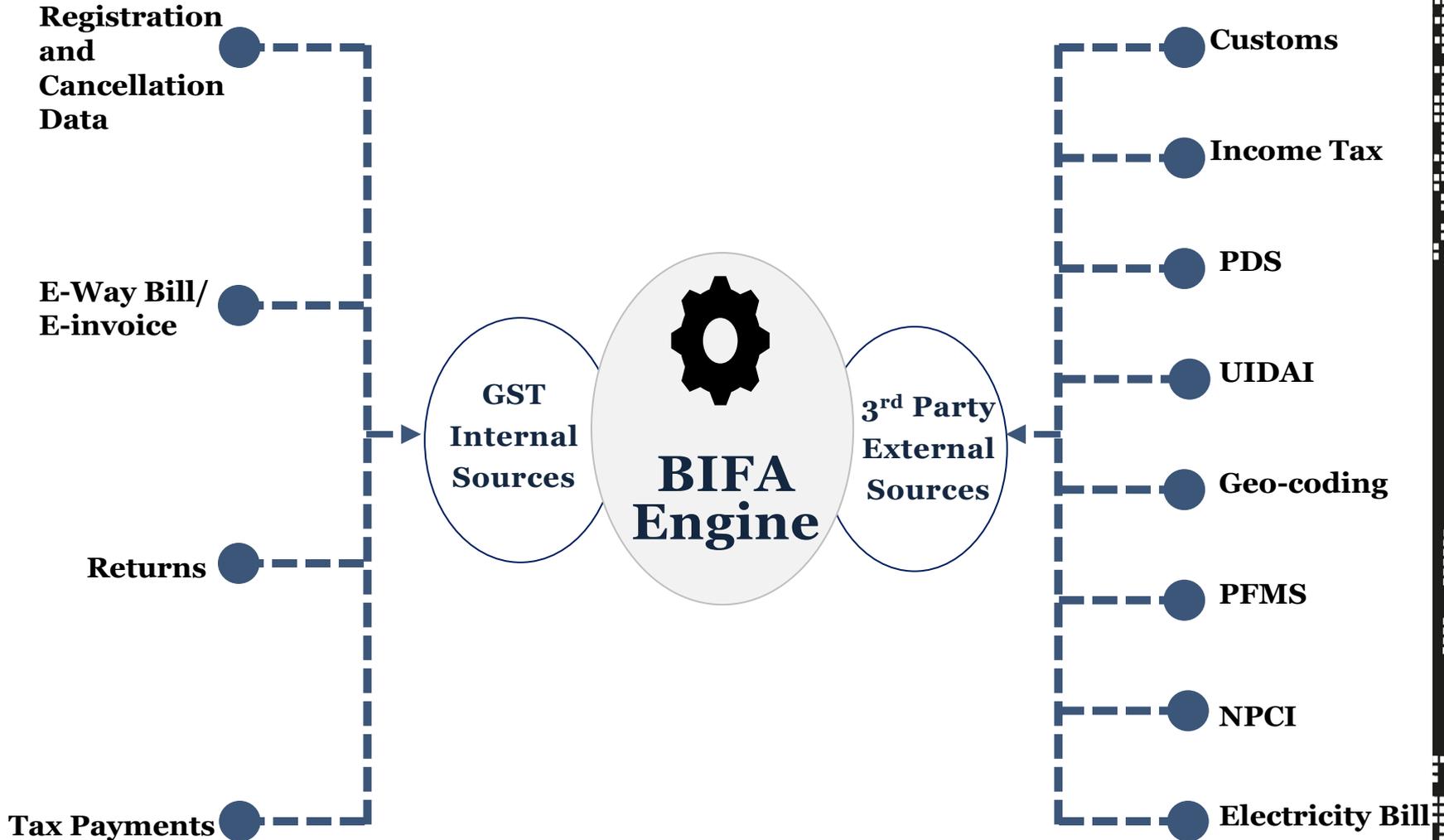
Rule based and
feedback on modus
operandi prevalent
in the field



03

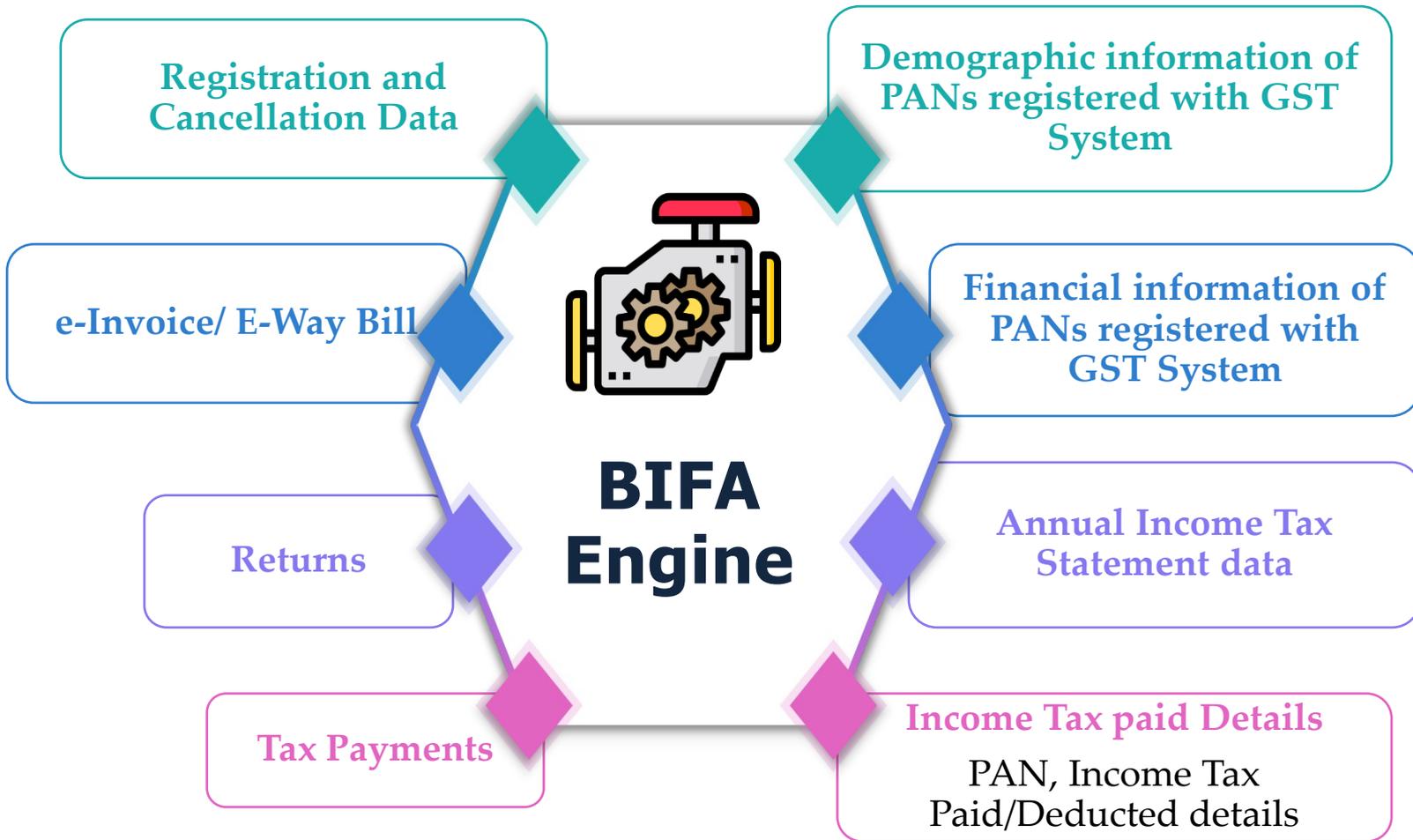
Network Graph
based
visualization for
holistic view of
value chain
(ITC/Refunds)

BIFA Data Sources

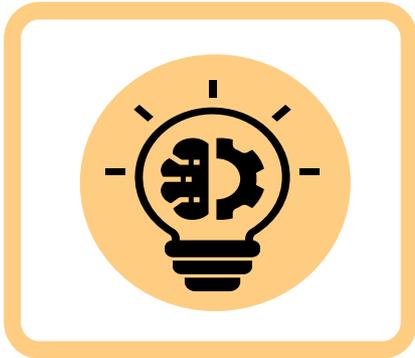


Data integration for better compliance

For Analytical use and Risk Profiling

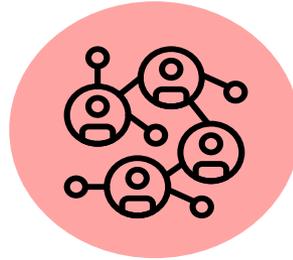


Targeted Intervention BIFA



Technique

- Artificial Intelligence and Machine Learning (AIML) algorithm-based methods
- Rule based and feedback on modus operandi prevalent in the field
- Segmentation of Taxpayers



Network Analysis

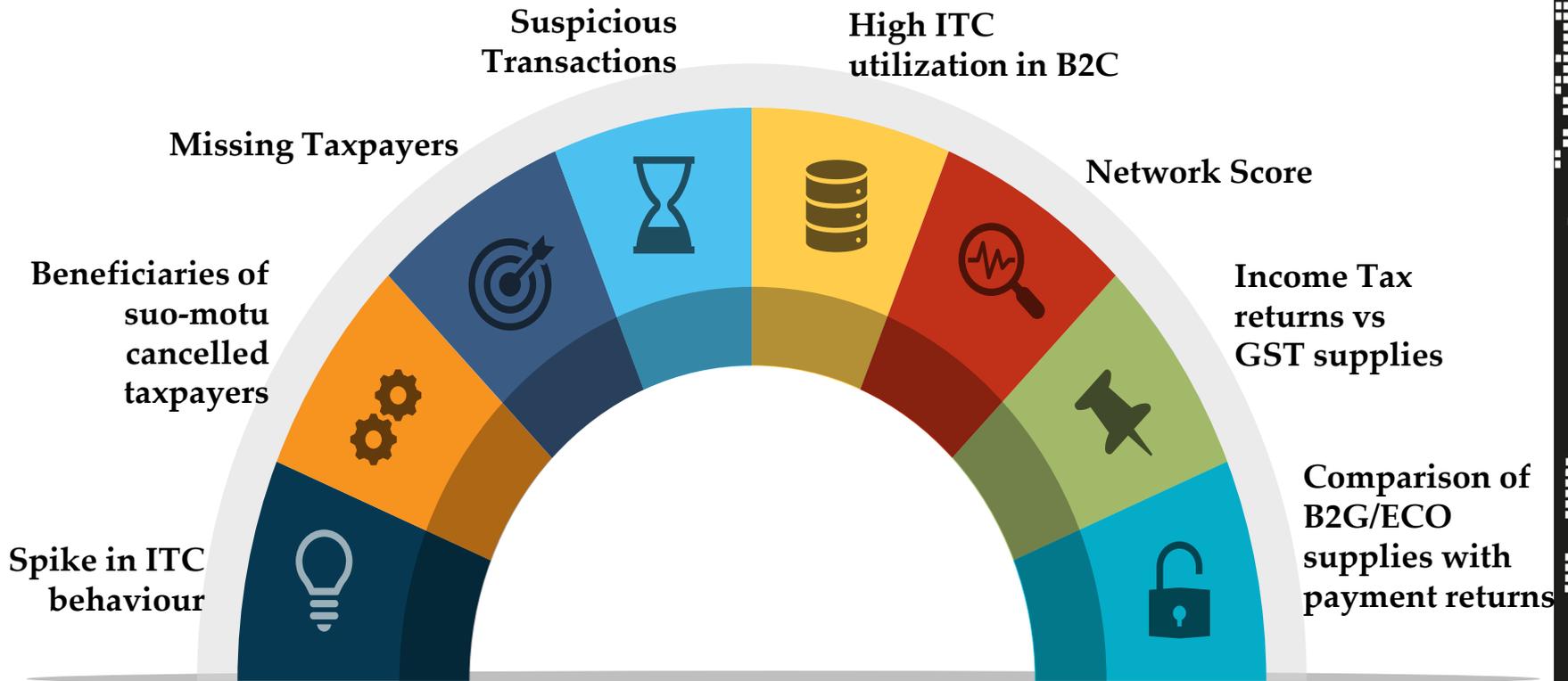
- Graph based visualization for holistic view of value chain (ITC/Refunds)
- IP based analytics



Do It Yourself

- Anomaly Detection
- Leads to Tax officers for Targeted intervention

Important BIFA Analytical Tools



Investigation / Decision Support Tools

GST Profile (360° View of a GSTIN)

Investigation Support System
- Data Extraction Dashboard



Various Risk Scores

Related Entities Based on
Common
Linkages/Parameters

Network Score

Network Analysis

BIFA- Network Score Use case

1

2

3

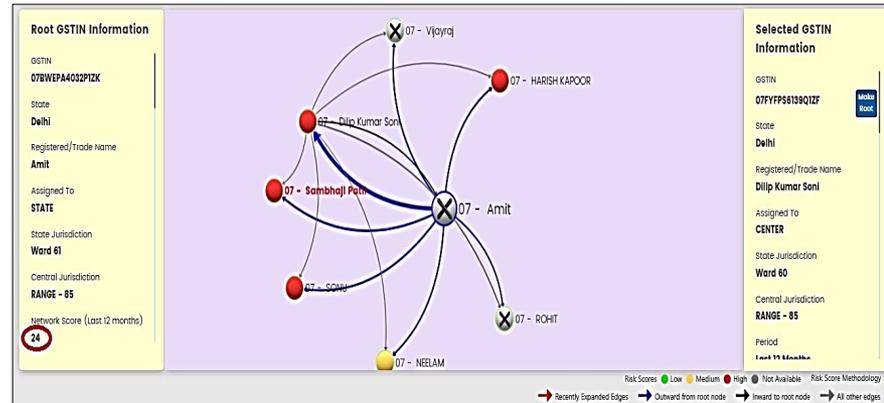
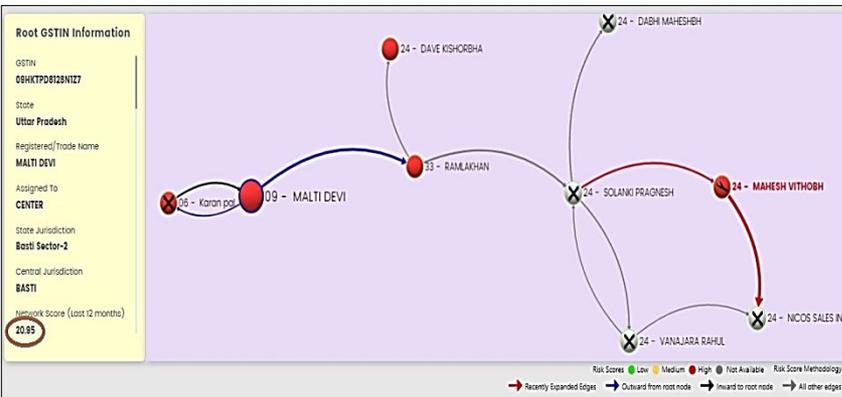
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**PATH
EXTRACTION FOR
THE GSTIN**

**FEATURE
ENGINEERING**

**PREDICT THE
PROBABILITY OF
RISKINESS OF THE
PATH**

**SCORE
GENERATION**



Risk Scores ● Low ● Medium ● High ● Not Available Risk Score Methodology

➔ Recently Expanded Edges ➔ Outward from root node ➔ Inward to root node ➔ All other edges

- ✓ To help tax officers **visually identify highly risky Taxpayers' Network** in the GST system requiring immediate action.
- ✓ The **Score** of the network is generated which helps identify riskiness of a complete network for focused action.

ITC Reliability Score-Supplier side Network Score

To help tax officers visually identify Supplier Side Tax evaders Network in the GST system by generating Score which gives the riskiness of a network.

Network Scoring - Inward/Outward Supply Chain

GSTIN Number: 12BIHPT8329MIZP | Year: Last 12 Months | Direction Of Supply: Inward

Select period (points to Year dropdown)

Select direction of network (points to Direction Of Supply dropdown)

Buttons: Submit, Trade Names, ITC Passed

- Click on edge to view tax being passed
- Click on a non-root node to see its details
- Right click on a node to expand the graph
- All amounts are in LAKHS
- Lead based counts are for last 6 months
- * ITC Accrued, for the period prior to July 2020, is based on

Supplier Side Network Score : 4.42 (Moderate Risk)

Root GSTIN Information

GSTIN	12BIHPT8329MIZP
State	Arunachal Pradesh
Registered/Trade Name	GUMIN TAKI
Assigned To	STATE
State Jurisdiction	Pasighat
Central Jurisdiction	PASIGHAT RANGE
Period	Last 12 Months

```
graph TD; A((12 - DILIP TIWARI)) --> B((12 - GUMIN TAKI)); B --> C((12 - Vijay Kumar Gupta));
```

BIFA Analysis – Suspicious Vehicle Movement

Suspicious Vehicle Movement

Vehicle Number: TN77Z4455 ✓

Vehicle Number	EWB No.	EWB Date	EWB Validity Date	GSTIN (Seller)	Legal Name/Trade Name (Seller)	GSTIN (Buyer)
TN77Z4455 ✓	431407775051	29-01-2024	01-02-2024	09BJFFPH4210Q1Z0	RAMDEV ENTERPRISE	07ALLPG0004C1ZC
	561605763207	31-01-2024	02-02-2024	33BWCVPV7997Q1Z8	M V IMPEX	33GNWBP80936D1Z:
	561605808540	31-01-2024	04-02-2024	33BDJPC9160Q1Z4	NARESH ENTERPRISES	36HSTPM8654Q1Z:
	571605854728	31-01-2024	04-02-2024	33BDJPC9160Q1Z4	NARESH ENTERPRISES	36DMBPA8816G1Z:
	581605220386	30-01-2024	02-02-2024	33DTQPS9590R1Z6	STAR ENTERPRISES	33FCNPB4388G1ZG
	581606029964	31-01-2024	03-02-2024	33DTQPS9590R1Z6	STAR ENTERPRISES	33AACPJ4165D1Z7
	591606041044	31-01-2024	03-02-2024	33DTQPS9590R1Z6	STAR ENTERPRISES	33AACPJ6763F1ZV

Suspicious Vehicle Movement

- The movement of goods is monitored through e-Way Bill movement analysis using location and time-based signals.
- This module evaluates pin code-to-pin code movement, route deviations, travel duration, and trip frequency to detect abnormal logistics behaviour.
- It helps identify cases where goods are reported as moved but the available data indicates to the contrary.

View: Original

Print



Directorate General of Analytics & Risk Management (DGARM)

Specialized CBIC directorate for targeted risk profiling and intelligence mining.

DGARM: Business Intelligence Analytics for GST

Actionable Intelligence/Anveshan Reports

- Analytical reports generated based on risk parameters and data analysis.
 - Identification of potential revenue leakage and non-compliance.
 - Early warning.
-

Scrutiny Support

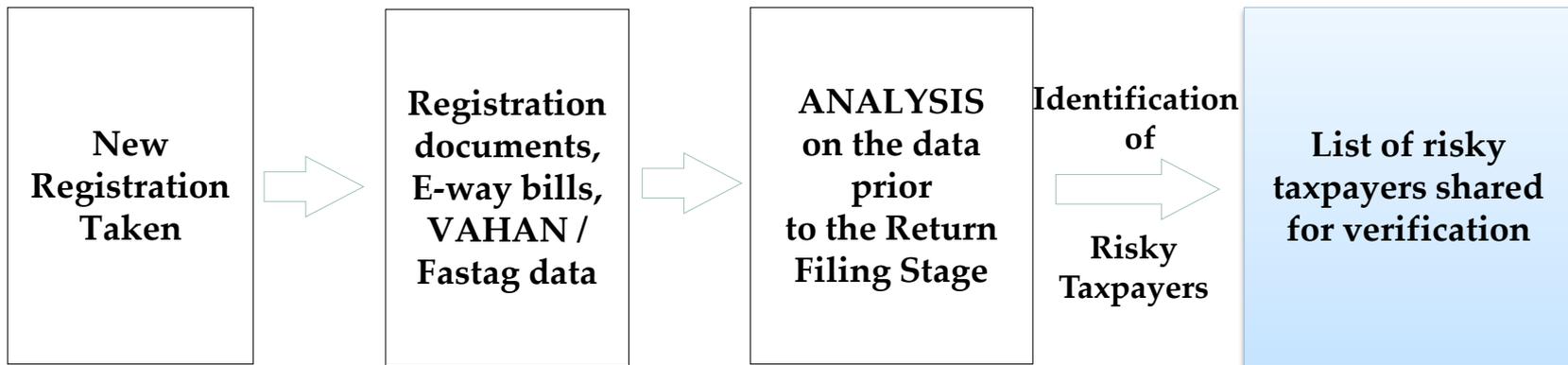
- Provides inputs and data-driven insights to field formations.
 - Case selection for scrutiny under GST.
-

Audit Risk Assessment

- Risk parameters based identification of taxpayers for audit.



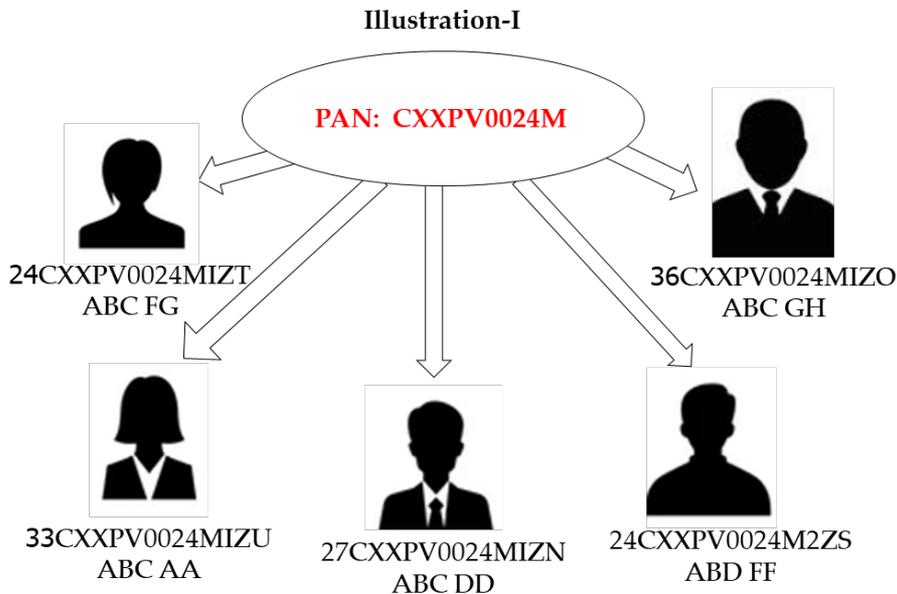
ANVESHAN: Aalytics, Verification, Shortlisting of Anomalies



New approach to risk analysis

- Identification of GSTINs with propensity for fake/ fraudulent activity in the time window between registration and return.
- Idea was to bring fake registrations into the immediate notice of Proper officer, before this bogus ITC enters the supply chain module.
- If inadmissible ITC already availed, the same would be flagged for blockage of ITC.

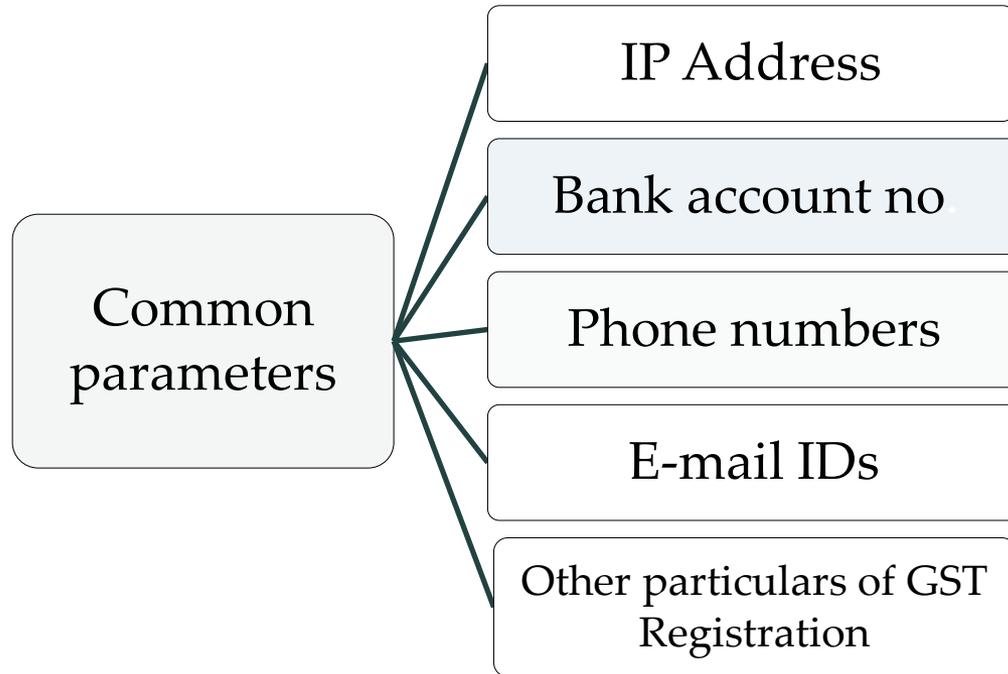
AI/ML Integration in the GST Ecosystem: Facial Recognition and Authentication



Anomalies in Digital Information:

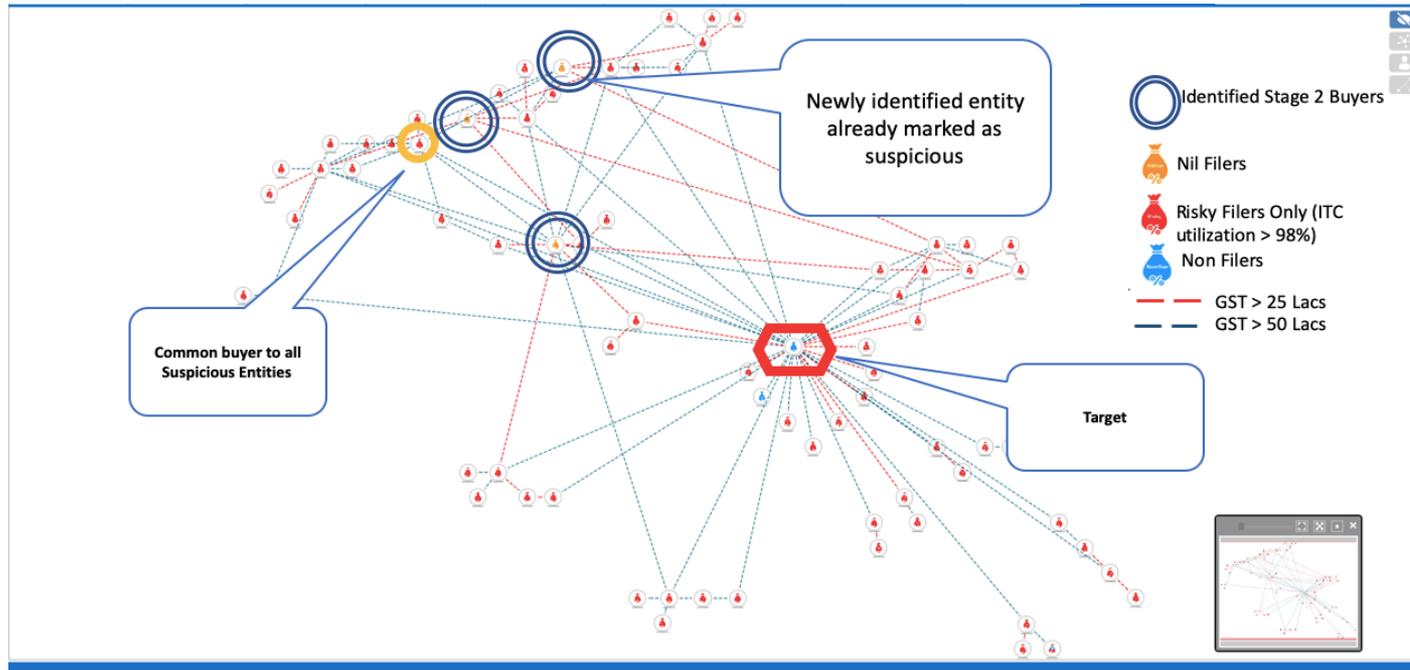
- A key capability is Face Authentication, currently available on the analytics portal as a decision-support tool for tax officers.
- The system performs face similarity checks against defined thresholds to determine whether two images belong to the same individual.
- This assists officers by flagging potential cases of impersonation or fake identity usage.

Analysis of data on common parameters



- Identification of suspect GSTINs based on common parameters like IP Address, Bank account no., phone numbers, e-mail IDs and other particulars submitted at the time of GST Registration by the taxpayers.

Supply Chain Analysis



- Actionable Intelligence wherein through the network of entities, Beneficiary, end user is identified and shared with field formations with entire network of suspicious entities.

AI/ML based HSN Search: Facilitating Taxpayers

HSN Reporting in e-Invoice

Tax Invoice							
National Enterprises #27, 80 Ft Road, Industrial Area, Koramangala 8th Block, Bangalore GSTIN/UIN: [REDACTED] State Name : Karnataka, Code : 29 E-Mail : sales@nationalenterprises.com Consignee (Ship to)		Invoice No. 77	Dated 31-Mar-21				
Bharti Airtel Limited State Name : Karnataka, Code : 29		Delivery Note	Mode/Terms of Payment				
Buyer (Bill to) Bharti Airtel Limited State Name : Karnataka, Code : 29		Reference No. & Date.	Other Reference				
		Buyer's Order No.	Dated				
		Dispatch Doc No.	Delivery Note Date				
		Dispatched through	Destination				
		Terms of Delivery					
Sl No.	Description of Goods	HSN/SAC	Quantity	Rate	per	Disc %	Amount
1	Penolls	22345678	1.00 u	2,500.00	u		2,500.00
2	Paper Trays	22945678	1.00 u	16,250.00	u		16,250.00
							18,750.00
Central Tax							3,237.50
State Tax							3,237.50
Total							25,225.00
Amount Chargeable (in words) INR Twenty Five Thousand Two Hundred Twenty Five Only							
HSN/SAC		Taxable Value	Central Tax Rate	Central Tax Amount	State Tax Rate	State Tax Amount	Total Tax Amount
22345678		2,500.00	6%	150.00	6%	150.00	300.00
22945678		16,250.00	19%	3,087.50	19%	3,087.50	6,175.00
Total		18,750.00		3,237.50		3,237.50	6,475.00
Tax Amount (in words) : INR Six Thousand Four Hundred Seventy Five Only							
Declaration We declare that this invoice shows the actual price of the goods described and that all particulars are true and correct.		for National Enterprises					
		Authorized Signatory					
This is a Computer Generated Invoice							



HSN Search

Goods and Services Tax

Home Services GST Law Downloads Search Taxpayer Help and Taxpayer Facilities e-Invoice

Home Services User Services Search HSN Code

Search HSN Code * Indicates mandatory fields

Search By: HSN Description

Search HSN Chapter by Code*

Search HSN Chapter by digits

[Download HSN Directory in Excel Format](#)

Note: If HSN of any Goods/Service is otherwise valid but not available here, kindly raise a ticket on GST Self-Service Portal: <https://selfservice.gstsystem.in/>

Disclaimer:



Fetching HSN from e-Invoice Database using AI/ML

AI/ML based HSN Search: Facilitating Taxpayers

- To improve classification accuracy and minimize errors, the system employs HSN code prediction models combined with language-based analysis.
 - NLP and semantic models analyze business descriptions submitted during e-invoicing to recommend appropriate HSN codes.
-
- When product images are available, image-based models examine visual attributes to validate whether the declared HSN code aligns with the actual product.
 - Together, these approaches help reduce both unintentional classification errors and deliberate misreporting.





Challenges

Key Challenges

Data Quality issues:

- algorithmic bias from skewed data
 - lack of explainability for flagged cases
 - integration across data sources
-

Technical capacity constraints

- Skill gaps among officers requires targeted training programs and system modernization.
-

Data Privacy Concerns

- Balancing enhanced compliance monitoring with robust privacy protections.





Way Ahead

New and Emerging Technologies

Block chain for Transaction Verification

- Block chain technology could enhance the verification of transactions reported in tax filings, particularly for GST/VAT.
 - Potential for block chain to reduce fraudulent input tax credit claims by creating immutable transaction records
-

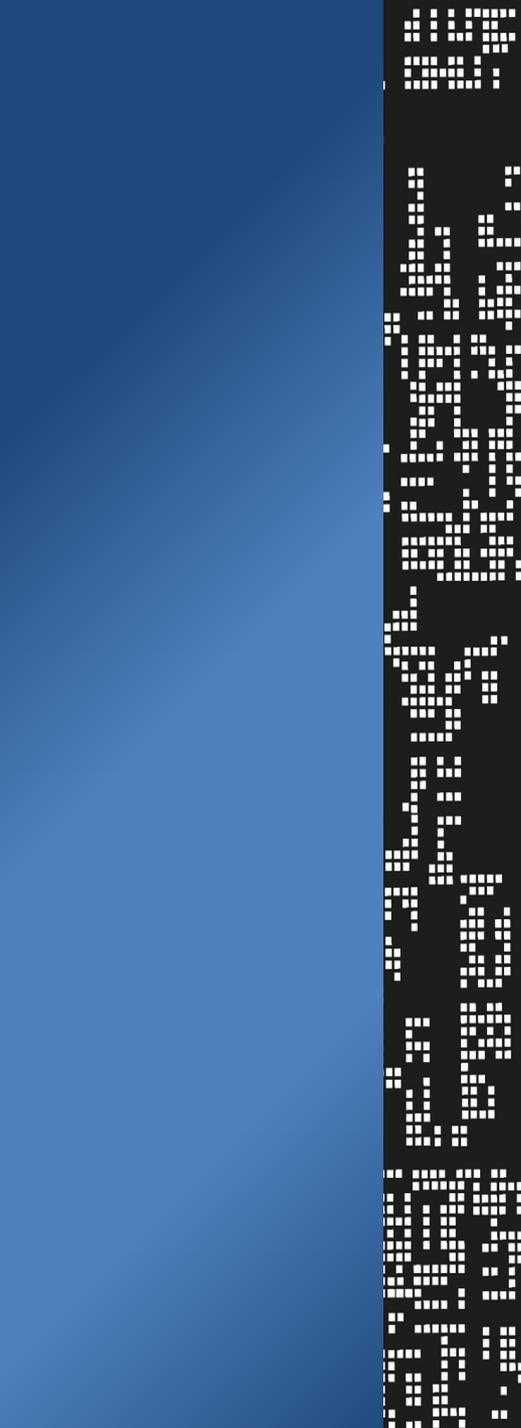
Advanced Natural Language Processing

- Developments in NLP offer opportunities to enhance the analysis of unstructured data in tax administration :
 - Automated analysis of documents and rulings to ensure consistent tax treatment.
 - Sentiment analysis of taxpayer communications to flag compliance risks early.
-

Federated Learning

- Train AI models across decentralized tax datasets without sharing raw data.





Thank You



GST System Statistics

As on 31st December, 2025

16 mn

Registered Tax Payer

1.8 bn

Total Returns filed

7.1 bn

E-Way Bill

26.9 bn

Total Invoice upload

101.4 tn

Payment through the portal

0.4 bn

Total no. of payment transactions

3.3 mn

Highest Returns Transactions in a day

1.2 mn

Highest Payment Transactions
in a day

