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How Data Analytics Detects and Combats Fraud in Mining

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Tackling fraud has long been a persistent challenge in the mining industry, leading to significant financial losses and reputational damage. Historically, mining has been a boots-on-the-ground activity with unconnected processes and components. The lack of real-time data sharing across the **pit-to-port value chain** hindered the process detection of lapses or fraud. However, governments and enterprises are increasingly turning to data analytics as a powerful tool to detect and combat fraud in mining operations. By leveraging the vast amounts of data generated throughout the mining value chain, data analytics can help uncover patterns, anomalies, and trends that indicate fraudulent activities.



Role of Data Analytics in Detecting Frauds

Data analytics is like a bloodhound that sniffs out suspicious patterns and anomalies in your data. It can uncover hidden connections and outliers that humans might miss by analyzing large amounts of information. It's like having a superhuman sidekick who can crunch data like no one's business. **Data visualization** adds a splash of color to the fight against fraud. Rather than drowning in numbers, data visualization presents information in a way that even

non-data superheroes can understand. Prevention is better than cure, and that's where predictive analytics swoops in. A predictive analytics algorithm can predict future fraud risks by analyzing past fraud cases and trends. Imagine having a crystal ball that tells you about potential fraudsters before they even step foot in your mine.

Odisha's i3MS and the Need for Fraud Analytics

The **Integrated Mines and Minerals Development System (i3MS)** implemented by the Department of Steel & Mines in Odisha is an end-to-end ore accounting system that integrates the state and non-state actors and tracks the ore journey from pit to port. This system adds 0.5GB of data and handles 13 million+ transactions each day. Since its inception, i3MS has nearly 500 million+ records, roughly translating to 500+ GB of data. This data includes documents related to e-Pass, Form A returns, Permits, and payments, to name a few. The legacy data is a rich repository that can be leveraged for descriptive, predictive, and prescriptive analyses.

This is where the **SAS Detection & Investigation Solution** came into play to deliver analytics-powered insights and outcomes. The solution was envisaged to empower the department to explore, analyze, and investigate the data available and identify hidden data points, if any, between the entities. It was designed to enable the department to make an informed decision to forecast the mineral production, catalyze effective planning of resources and logistics, improve collaboration and transparency, minimize the losses due to revenue leakages, if any, and track the effectiveness & regulation of various projects/initiatives taken by the department.



How SAS Detection & Investigation Solution is a Game-Changer

The i3MS generated a large volume of reports from disparate sources. There was no single source of truth or a uniform data repository. **The system eliminated shortcomings by switching to a complete enterprise-wide advanced analytical reporting system with Detection and Investigation Solution by SAS.** The SAS solution offered a multitude of features and benefits like:

- Improving Auditability and Accounting.
- Circle Wise Analysis, Mines Analysis, Mineral wise Analysis, Mineral Grade wise analysis, etc., for policymaking.
- Module-wise Analysis of all the forms available in I3MS.
- Grade-wise misreporting of Minerals to manipulate Royalty Payment.
- Permit Management and E-Transit Pass Generation Analysis with Cross-checking Analysis for Permitted Quantity and Dispatched Quantity.
- Weigh Bridge and Check Gate Management Analysis for possible mismatch in the quantity of the minerals dispatched.
- Revenue analysis from different areas in terms of Royalties, Application fees, dead rent, Penalties, etc.
- Revenue targets are set using analytical forecasting techniques and calibrating the same against achievements.
- Analyzing the multidimensional changes in Royalty Collection through 'What if Analysis'.

To complement the capabilities, the SAS Detection & Investigation Solution provides robust, user-configurable, and comprehensive data integration components to draw in data from all relevant sources. Also, it gives the option to cleanse and standardize the data as and when it flows into the system. Moreover, the solution has the built-in SAS Visual Investigator system for enabling the user to dynamically investigate and dispose of alerts and events of interest. The alerts and event management capabilities of the SAS Detection & Investigation solution enable the user to

- Prioritize and assign alerts.
- Visualize alerts in different views to gain context.
- Enhance alerts by adding entities and integrating and connecting data from the source, such as i3MS.

Future of Fraud Detection – Blending Data Analytics with Blockchain

The mining industry involves handling sensitive data, including employee information, financial records, and business information. Security and privacy are paramount when using data analytics to detect fraud. Mining operations can benefit greatly from **blockchain technology** when it comes to fraud detection. Creating a decentralized and immutable ledger of transactions provides a high level of transparency and security. Besides, using blockchain-based systems can help prevent fraudulent practices such as double-spending, tampering with financial records, and manipulating supply chain data. A more robust fraud detection and prevention system in the mining industry can be achieved by integrating blockchain and data analytics.



AUTHOR:

Jayajit Dash

Senior Manager- Corporate Communications (Marketing)