Machine learning-based *anomaly detection* **for** Chief Financial Officers

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The evolving role of the modern CFO

The role of the Chief Financial Officer (CFO) has undergone significant evolution during the past several decades, particularly in relation to technology management. A recent McKinsey interview highlights that, while traditionally tasked with tracking cash flows, financial planning, and analyzing an organization's financial strengths and weaknesses, the CFO's role now increasingly encompasses overseeing and managing the organization's technology stack. This shift reflects a broader realignment of responsibilities within the C-suite, responding to the complexities introduced by digital transformation.[1]

In financial services, the expansion of CFO responsibilities is prominently seen in the area of technology investment and oversight. According to a Gartner forecast, 50% of organizations will use AI to replace time-consuming, bottom-up forecasting approaches by 2028. This transition towards AI as a practical, off-the-shelf innovation highlights a shift where CFOs are expected not just to endorse but actively drive the adoption of advanced fintech solutions. In fact, the same Gartner survey highlighted that 80% of CFOs anticipate increasing their investment in AI technologies within the next two years. This strategic pivot is not just about adopting new technologies but about integrating them into the financial governance framework to enhance accuracy, efficiency, and insight. [2]

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The need for machine learning to detect and address anomalies

The evolving complexity and volume of financial data have significantly heightened the need for CFOs to invest in machine learning (ML) technologies to detect and address anomalies in the data. This necessity is driven by several critical areas:

General ledger anomalies

Errors in general ledger postings can lead to significant inaccuracies in financial statements. Traditional sampling techniques for auditing these records are increasingly seen as inadequate because they often fail to identify low-frequency, high-risk anomalies in large datasets. Furthermore, these methods are prone to biases due to judgment-based sampling and are constrained by the auditors' capacity, limiting the review to only a small portion of the total records. [3]

Sustainability and greenhouse gas emissions reporting

As organizations intensify their focus on sustainability goals, CFOs are increasingly tasked with validating the accuracy of emissions and sustainability data. A survey involving more than 900 global CFOs and finance leaders confirms that managing and reporting sustainability data is now a fundamental part of the CFO's responsibilities. [4]

Liquidity risk reporting

Traditional statistical methods, while insightful, fall short in managing the liquidity risks faced by a large and growing number of banks, exacerbated by the rapid pace of today's financial transactions. ML-based anomaly detection offers a more scalable and efficient approach, enabling banks to monitor liquidity risks more effectively. [5]

Not all anomaly detection tools are created equal

The integration and effectiveness of existing anomaly detection solutions in financial services, particularly from the perspective of a CFO, face several notable challenges. These issues not only affect the operational efficiency but also the strategic decision-making capabilities within organizations.

Most commercially available anomaly detection solutions do not offer root cause analysis (RCA) capabilities. While these systems may successfully identify anomalies, they often fail to provide actionable insights for business functions.

This leaves CFOs and their teams to undertake additional analysis to understand the underlying causes of these discrepancies. For instance, if an anomaly detection tool identifies incorrect transaction entries as a major issue, but only relates them to non-actionable data points like date mismatches, the tool falls short. Effective RCA should extend to pinpointing specific operational or departmental origins of discrepancies, such as identifying that erroneous entries predominantly arise from certain profit centers within a legal entity operating in a particular country.

> Unlike rule-based systems, ML-based solutions can adapt and improve, resulting in lower total costs of ownership and more effective anomaly detection as they evolve.

Additionally, the integration of anomaly detection systems within existing business processes presents another hurdle. Financial services organizations require seamless integration to maintain operational continuity and security. However, some anomaly detection solutions necessitate data transfers across company firewalls, posing significant cybersecurity risks. Others require additional layers of connectivity to various business processes, increasing operational risks and associated costs. These integration challenges necessitate further investment in mitigating strategies, such as developing backup systems, which add to the overall cost burden.

Another pressing concern is the cost associated with real-time anomaly detection. Many financial institutions are forced to opt for near real-time solutions due to the high expenses involved in setting up real-time systems. These costs stem from the need for dedicated live streaming environments that must connect with various business systems, often hosted in disparate locations, increasing the complexity and expense of the infrastructure.

Lastly, the reliance on rule-based anomaly detection systems poses a limitation in harnessing the full potential of ML. When ML is merely an add-on rather than an integral part of these systems, it leads to increased maintenance costs and diminishing accuracy over time. Unlike rule-based systems, ML-based solutions can adapt and improve, resulting in lower total costs of ownership and more effective anomaly detection as they evolve.

Introducing our ML-based anomaly detection solution built with AWS

Capgemini and AWS are pleased to introduce a cutting-edge ML-based anomaly detection solution designed specifically for CFOs of financial services institutions. This innovative tool is an AWS-native solution, ensuring seamless integration with various business processes while offering the flexibility to be tailored to unique client needs.

Our solution stands out in the marketplace by supporting all three categories of machine learning models:

Supervised

Uses labeled data to train the model, enabling precise detection of known anomalies in financial transactions.

Semi-supervised

Utilizes a mix of labeled and unlabeled data to improve anomaly detection, balancing between supervised learning and the adaptability of unsupervised methods.

Unsupervised

Identifies new and unknown anomalies by learning patterns directly from unlabeled data, providing robust detection in dynamic financial environments.

These capabilities allow the solution to adapt to a wide range of anomaly detection needs, from known issues to identifying new, undefined patterns. Unlike traditional rule-based systems that require frequent updates and can trigger extensive software development lifecycles, our solution minimizes the need for such cycles, thereby reducing downtime and accelerating the time to value.

Key advantages of our solution:

Enhances flexibility

Supports a broader array of variations and complexities in business rules across multiple dimensions, offering superior adaptability compared to traditional rule-based systems.

Saves time

Effective RCA saves valuable time for business experts by allowing the ML system to learn directly from data, which is subsequently validated by these experts. This process reduces the reliance on rigid rule-based models.

Minimizes intervention

Requires minimal to no manual adjustments to adapt to changes in underlying data, significantly reducing system downtime compared to rule-based solutions.

Improves accuracy

Significantly cuts down on false positives and negatives, which not only streamlines operations but also reduces the potential costs associated with these errors.

Enhanced user interaction

Our solution offers intuitive interaction capabilities using natural language, facilitated by generative AI, enhancing user experience and accessibility.

Use case
Error detection for CFO reports

Financial data reporting is becoming increasingly complex, especially with the growing emphasis on sustainability and environmental, social, and governance (ESG) factors. CFOs are tasked with compiling and analyzing diverse datasets, including structured and unstructured data, that encompass financial performance, sustainability metrics, and risk exposures. As financial landscapes evolve, traditional rule-based solutions for tasks such as liquidity reporting are seeing diminishing returns, struggling to keep pace with the complexity and variety of data. This complexity raises the potential for errors and inconsistencies in reports, which can lead to financial misstatements, regulatory penalties, and damage to the organization's reputation.

Limitations with existing solutions

Narrow focus on time series
Most solutions predominantly support only time series anomaly detection, lacking versatility to handle varied data types.

Rigid customization options
Offers limited flexibility for integration with diverse business processes, hindering adaptability to specific organizational needs.

Expensive AI integration
Incorporating generative AI technologies necessitates costly architectural changes, increasing overall deployment expenses.

Expected outcomes of our solution

Reduction of unintended errors
Our solution significantly minimizes the occurrence of errors in CFO reports by automatically identifying discrepancies and anomalies in the data. This reduces the risk of financial misstatements and enhances the overall accuracy of reports.

Identification of suspicious trends
The advanced analytics capabilities of our solution enable the detection of subtle, suspicious trends that may not be immediately apparent. This proactive identification helps CFOs address potential risks before they escalate, safeguarding the organization's financial health and compliance standing.

Key differentiators

Increased accuracy and efficiency
Our solution addresses the unique challenges faced in financial and sustainability reporting including time series anomaly detection. By automating error detection through supervised, semi-supervised, and unsupervised machine learning capabilities, the solution enhances the accuracy and efficiency of the reporting process.

Highly customizable
Leveraging AWS's robust and scalable infra-structure, the solution can handle extensive data volumes and integrates smoothly with existing financial systems. This seamless integration facilitates easy adoption, custom-ization, and reduces the need for extensive reconfiguration of current workflows.

Use case
Anomaly detection in general ledger data

Managing the integrity and accuracy of accounting data is paramount. The general ledger (GL) serves as the backbone of an organization's financial records, summarizing every financial transaction over the accounting period. As the volume of accounting data continues to grow, driven by expanding business activities and increasingly complex financial transactions, the risk of operational inefficiencies and audit issues rises. Detecting anomalies in GL data is crucial to mitigate these risks, ensure accurate financial reporting, and maintain regulatory compliance.

Limitations with existing solutions

Lacks root cause analysis
Available solutions fail to provide root cause analysis, crucial for identifying the drivers behind anomalies.

High manual labor costs
These systems require extensive manual efforts to label large datasets, significantly increasing operational costs.

Static anomaly detection
Current solutions do not adapt to recognize evolving anomalous trends, limiting their effectiveness over time.

Expected outcomes of our solution

Reduction of audit findings
By proactively detecting anomalies in GL data, our solution helps organizations address potential issues before they are discovered during audits. The solution provides detection of common and uncommon anomalies including vendor and GL account mismatches, missed accrual reversals, reoccurring transaction time deviations, and more.

Increase in operational efficiency
Our solution enhances the efficiency of financial operations by automating the detection of anomalies, reducing the time and effort required for manual reviews. This leads to faster reconciliation of detected GL anomalies, enabling finance teams to focus on more strategic tasks and improving overall productivity.

Key differentiators

Customizable root cause analysis
Provides detailed, transparent insights into the drivers of anomalies, enabling precise corrective actions.

Cost-efficient unsupervised learning
Dramatically reduces the need for manual data labeling, lowering operational costs and speeding up analysis.

Detects emerging anomalous trends
Continuously adapts to new patterns, proactively identifying and responding to evolving risks in financial reporting.

It's time to take action

The importance of a powerful, adaptive anomaly detection system has never been more critical for the financial services industry. Our solution offers a comprehensive line of defense, transforming anomaly detection from a passive, error-prone task into an active, insightful process. With the power of machine learning and cloud computing, it not only identifies existing threats but also predicts and adapts to potential future risks, ensuring that CFOs are not just reacting to threats, but preempting them.

The time to act is now. Our anomaly detection solution offers not just security but a competitive edge—a tool that turns potential threats into opportunities for refinement and growth. By implementing our solution, CFOs can ensure their institutions are not only equipped to handle the challenges of today but are also prepared for the complexities of tomorrow.

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Don't wait for the next anomaly to disrupt your operations—take control and turn your data into a strategic asset that drives success. Contact us today to schedule a demonstration or discussion about how our anomaly detection solution can transform your business.

Endnotes

1. https://www.mckinsey.com/capabilities/strategy-and-corporate-finance/our-insights/in-conversation-the-new-cfo-mandate

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4. https://www.forbes.com/sites/jimdeloach/2024/01/30/esg-data-management-and-reporting-are-the-cfos-responsibility-period/

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Contact us

Please reach out with questions or to schedule a conversation about this paper's content and our capabilities to assist your organization.

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