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Enhancing Financial Insight Through Machine Learning-Driven KPI Correlation Analysis

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The research explores how financial auditing is being reshaped by the rapid expansion of digital data and the integration of artificial intelligence (AI) and machine learning (ML). Traditional methods that rely on manual checks and limited data samples are no longer sufficient to ensure reliability in today's complex financial environment. By leveraging KPI ratio correlation analysis, predictive algorithms, and process mining, auditing can move beyond retrospective reviews and provide continuous, data-driven assurance. This shift, sometimes referred to as "Auditing 2.0," enhances the detection of anomalies and strengthens financial oversight. A central theme is the role of KPI correlation analysis in uncovering subtle links between financial indicators. These relationships are valuable for identifying anomalies, assessing financial health, and predicting potential risks before they escalate.

The study emphasizes that while simple ML models such as decision trees offer transparency, they often fail to capture the complexity of financial data. More advanced techniques, including neural networks and Long Short-Term Memory (LSTM)-based systems, excel in predictive tasks but present challenges in terms of interpretability. Hybrid approaches that combine both simplicity and sophistication appear to be the most effective, offering a balance between accuracy and explainability.

The research also highlights the importance of continuous auditing, where monitoring and testing occur in real-time rather than at periodic

intervals. This proactive approach allows errors and fraudulent activities to be detected and addressed immediately, reducing the possibility of them becoming embedded in financial statements. The integration of AI-driven process mining adds further depth, enabling auditors to model and analyze business processes more effectively, compare expected workflows with actual performance, and provide near-instant assurance after critical business events.

Finally, an experimental analysis of KPI datasets revealed that most indicators are not strongly correlated, suggesting that a broad range of them can provide unique insights for ML applications. However, correlation analysis alone is insufficient for identifying the most valuable features; additional statistical and feature-selection methods are needed to refine the inputs and improve model reliability.

The findings point to a future where AI-enhanced auditing combines advanced analytics, transparency, and regulatory alignment to improve trust and effectiveness, while also raising important questions about fairness, security, and ethical use of AI in financial decision-making.