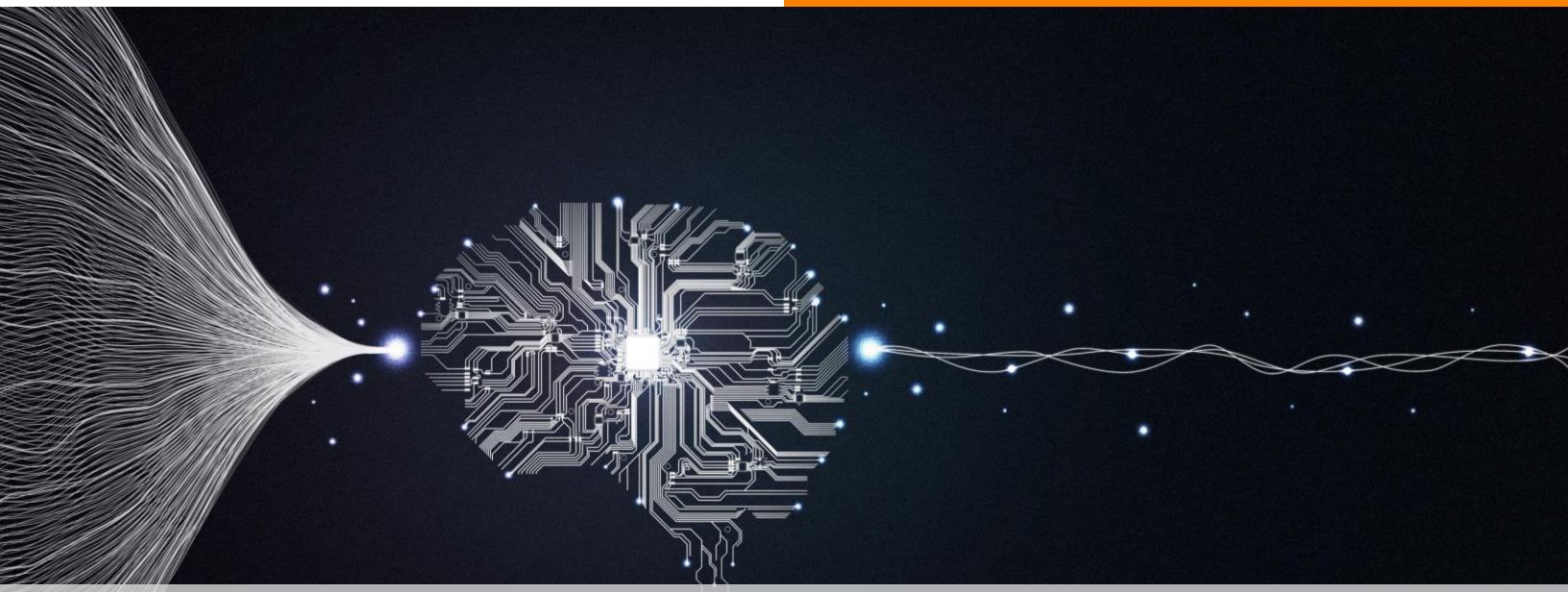

Machine Learning is Transforming Data Quality in Investment Operations: Uncovering the Patterns and Why You Should Care

From an early age, we are trained to recognize consistencies and breaks in patterns, spotting similarities and identifying differences. Whether learning to read, identifying objects in nature, or recognizing faces, pattern recognition is ingrained within us. This ability extends beyond daily life and into highly technical fields. Radiologists, for instance, analyze X-rays and scans, searching for anomalies that deviate from expected patterns. Similarly, ducks can instinctively recognize members of their flock while detecting potential threats in their surroundings.

Investment operations professionals use the same process, analyzing massive datasets, identifying inconsistencies, and making informed decisions. In this blog, we explore the importance of spotting patterns to verify data quality, the current challenges firms face, and how machine learning offers a transformative solution.

THE BURDEN OF DATA QUALITY CHECKS

Data quality management in investment operations is a constant balancing act. Firms face three primary challenges while reviewing their data:

Complexity:

- Sifting through vast datasets to identify exceptions is labor-intensive and often reactive rather than proactive.

Cost:

- Quick turnaround times and service-level agreements necessitate additional headcount, driving up expenses.

Timeliness:

- Static rules struggle to keep pace with market fluctuations, leading to outdated logic and missed anomalies.

The traditional approach, defining rules and applying them to data, often results in inefficiencies. Rules can become obsolete, leading to either missed exceptions or overwhelming false positives, both of which consume valuable resources.

At Meradia, we asked ourselves: *Can we build a smarter approach? One that evolves, mimicking human intuition while leveraging the power of machine learning?*

LEARNING FROM PATTERNS: THE MACHINE LEARNING ADVANTAGE

Just as radiologists analyze thousands of images to train their eyes to detect irregularities, investment operations teams use years of experience to recognize breaks in patterns within data. However, unlike the human brain, rule-based systems lack the ability to learn and refine logic over time.

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LEARNING FROM PATTERNS: THE MACHINE LEARNING ADVANTAGE (continued)

Machine learning changes the ability to recognize patterns by:

- **Moving from static rules to dynamic learning models** – Instead of pre-defining rules, machine learning algorithms can generate and refine rules based on historical data and real-time feedback.
- **Minimizing false positives** – By continuously improving, models can filter out noise and pinpoint meaningful exceptions.
- **Adapting to changing market conditions** – Unlike rigid rule-based systems, machine learning evolves with market events, corporate actions, and shifting investment strategies.

A PRACTICAL APPROACH: BUILDING AN INTELLIGENT DATA QUALITY MODEL

Machine learning isn't new. It has been applied to algorithmic trading, risk modeling, and now, data quality management. Our approach, rooted in the C4.5 decision tree algorithm, transforms static data validation into a dynamic, evolving process.

After 10 months of rigorous research and development, we've built a working Python-based prototype that can:

- Analyze historical exceptions to detect patterns.
- Generate rule variations and measure their effectiveness.
- Allow operations teams to select and refine the best-performing rules.
- Continuously improve through real-time feedback loops.

The result? A self-learning data quality model that reduces operational friction, optimizes exception handling, and improves efficiency over time.

THE FUTURE OF DATA QUALITY: CONTINUOUS LEARNING

Just as ducks instinctively recognize which members belong to their flock and radiologists refine their ability to spot abnormalities over time, machine learning enhances investment operations by continuously learning and adapting. By shifting from rigid rule engines to adaptive models, investment firms can future-proof their operations. Instead of a data quality process that degrades over time, machine learning offers a continuous improvement process. With each iteration, exceptions become more precise, reducing the burden on operations teams and ensuring higher-quality data outputs.

WHY MERADIA

At Meradia, we combine deep operational expertise with forward-looking innovation to solve complex challenges in investment operations. Our machine learning prototype for data quality is just one example of how we move beyond static rules to build smarter, evolving solutions.

We don't stop at theory; our team implements real-world models that reduce noise, streamline exception handling, and adapt to changing conditions. With decades of experience and a practical approach to transformation, we help firms modernize data quality frameworks and position themselves for long-term growth.

Want to learn more? Check out Jose's full article, "Applying Machine Learning Techniques in Investment Performance: Uncovering Heuristics to Decipher Data Quality Checks", and visit www.Meradia.com or connect with us at upcoming industry events to see how machine learning is shaping the future of investment operations.

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