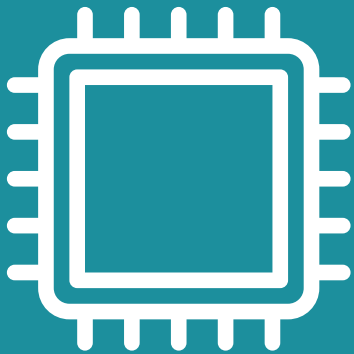




QuantaVerse



APPLYING ARTIFICIAL INTELLIGENCE TECHNOLOGY TO REDUCE AML RISK FOR GLOBAL FINANCIAL INSTITUTIONS

ENHANCING TRANSACTION MONITORING SYSTEMS WITH AI AND MACHINE LEARNING TO IMPROVE AML OUTCOMES

In recent years, financial institutions have navigated through a rising tide of regulatory obligations and compliance requirements related to anti-money laundering (AML), counter-terrorist financing (CTF), Bank Secrecy Act (BSA) and Know Your Customer (KYC). In response to increased scrutiny, and the risk of significant fines and enforcement actions, these covered institutions have spent billions of dollars in an effort to be compliant and thwart criminals from laundering their illicit proceeds through the global banking industry.

Maintaining both effective and efficient AML programs has proven elusive for financial institutions due to a reliance on legacy technology solutions and a seemingly ever-increasing investigator case workload. Artificial intelligence (AI) and machine learning, however, hold the key to helping institutions reduce regulatory risk, and improve the AML investigation process.

An effective AI-based AML solution enhances existing compliance systems to catch the false negatives that embody financial and reputational risk, drive out false positives that represent an estimated 95 percent of the alerts generated by transaction monitoring systems and increase investigative efficiency. With vast amounts of financial crimes going unalerted and trillions of dollars in laundered money still channeling through the global banking system, AI and machine learning offer the opportunity to move toward a new standard of AML.

The application of AI technology is a logical solution in solving the problem of AML risk for financial institutions. Modern AI systems have progressed to the point where large volumes of transactional and other sources of data can be culled, consolidated, analyzed and scored for risk so that investigators can make more accurate SAR-filing determinations. The time is now for financial institutions to confidently leverage the proven technology of AI in their AML ecosystems.

CURRENT APPROACH TO ANTI-MONEY LAUNDERING IS DUE FOR IMPROVEMENT

Under constant scrutiny from both federal and state regulators, financial institutions invest billions each year on technology and investigative personnel. Despite increases in compliance spending (industry analyst firm, Celent, estimated that financial industry spending on AML-KYC compliance technology, operations, and data would reach \$32.1 billion globally in 2019), the money laundering problem faced by financial institutions is not abating and the risk of penalties remains high. According to a report by Duff & Phelps, the first half of 2020 saw global AML fine values jump to \$706 million compared to 2019's full-year-total of \$444 million.

Transaction monitoring technology is essential for the maintenance of an effective AML program. However, transaction monitoring systems need assistance on multiple fronts:

- 1) Catching transactions that represent serious risks for financial institutions. If a financial crime does not violate a stated rule, the transaction monitoring system will not flag it and a high volume of dirty transactions continue to go undiscovered. The United Nations Office on Drugs and Crime (UNODC) estimates that the amount of money laundered globally in one year is two to five percent of global GDP, or \$800 billion to \$2 trillion U.S.
- 2) Reducing the high rate of false positive alerts that transaction monitoring systems create. With a rules-based system, the search for criminality will frequently catch the normal, licit transactions of legitimate clients. These "false positive" alerts trigger time-consuming and expensive human investigations. The industry estimates that approximately 95 percent of the alerts generated by transaction monitoring systems are false positives.
- 3) Reducing the time required to adjudicate alerted transactions. In addition to dealing with the sheer number of false positives that require investigation, teams spend precious time with multiple databases and disparate systems attempting to search for, collate and analyze impossible amounts of data for accuracy and fit.

THE ALL TOO HUMAN ANTI-MONEY LAUNDERING PROCESSES

On the front line in the fight against money laundering are human AML investigators. A typical investigator at a financial institution works four to six alert cases per day allocating, on average, 45 minutes to each. The work is complicated by having to check multiple, disparate bank systems such as customer information program (CIP) databases, KYC databases, cross-referencing the transaction monitoring system for related

flags and checking historical SAR databases as well as turning to external information sources such as online investigative services, government databases, and Internet research sites. Complicating things further, when dealing with intermediaries and correspondent banks, customer information is often altogether unavailable.

Historically, compliance relies on human investigators at every step of the AML investigation process...



Over time, it has become even harder to keep up. The Financial Crimes Enforcement Network, or FinCEN, mandates that all U.S. financial institutions file a suspicious activity report (SAR) no later than 30 calendar days after the date of the initial detection of suspicious activity and no later than 120 days for continuing activity. Even during the COVID-19 pandemic, FinCEN wanted to know if financial institutions were falling behind. In March 2020, FinCEN requested that financial institutions affected by the pandemic contact their functional regulator as soon as practicable with concerns about potential delays in its ability to file required BSA reports.

If being poorly equipped and pressured to work faster isn't enough to increase the likelihood of dangerous errors, investigators bring different levels of skill, training, and biases to the job. Confirmation bias, for example, has been identified as point of failure occurring when an investigator inadvertently interprets data in a way that confirms his or her own pre-existing beliefs. Others include social bias, and pre- and post-decision biases that can impact the all too subjective nature of the investigative process.

INVESTIGATORS WITH SUPERPOWERS

Breakthroughs in the areas of data science, computational advancements and big data practices have accelerated the pace of digital transformation. This is particularly true of advancements in modern artificial intelligence. Possibly due to this rapid advancement, there is great variance in how the industry categorizes the continuously evolving AI category. For the purposes of this discussion, we offer the following definitions:

Artificial Intelligence

AI applications are developed to enhance human cognitive performance or completely replace people in the execution of non-routine tasks by enabling machines to emulate human intelligence processes including:

- Learning: gathering information and acquiring the rules needed to use that information
- Reasoning: drawing conclusions; and
- Self-correction: improving future outcomes based on feedback to past reasoning.

Essentially, instead of writing rules that require vast amounts of lines of codes to cover every potential criminal behavior, data science experts can develop an analytics engine that enables the machine to apply logic and learn from previous decisions.

Machine Learning

Machine learning is an application of artificial intelligence. After a model is established and the computer is empowered to adjust the model based on the data it encounters. Machine learning provides computers the ability to learn and change without being explicitly programmed.

For example, machine learning algorithms are used to distinguish objects in autonomous driving applications. In this instance, a machine learning algorithm is provided sample images vehicles, pedestrians, or animals. When the system is tested, incorrect guesses are removed from the algorithm and new images are added to improve the accuracy and to help the algorithm “learn.”

For AML, the pattern detection capabilities of machine learning are well-suited to differentiate between legitimate and illicit transactions through a set of training data fed to the algorithm. For example, a scoring model can be established based on high-risk customers, entities, and geographies. Important for the highly regulated financial services industry, machine learning can also report the logic it used to reach conclusions and document new learnings it adds to the consideration of cases in the future.

There are three ways that machine learning is classified:

- 1) Supervised learning: where the model is fed “labeled” data paired with a definition of that data. In the autonomous vehicle example, an image of a cat is provided with a specific “cat” tag attached. Equate this to showing a child an image on a flashcard while saying aloud what the image is called.
- 2) Unsupervised learning: where the model is provided “unlabeled” data and it is left to recognize patterns on its own.
- 3) Reinforcement learning: where the model is graded based on the outcomes it produces. This is the bleeding edge of machine learning that encompasses neural networks that emulate the way brain neurons are trained and deep learning which InfoWorld succinctly described as “many neural networks working together.”

Financial institutions are incorporating these AI approaches into their regulatory and compliance frameworks to identify and prevent financial crimes such as money laundering and terrorist financing.



SHOWING YOUR WORK: THE DOCUMENTATION IMPERATIVE

The decision-related documentation and reporting required by AML investigators and regulators raises important considerations where AI strategies are considered. When clearing a case, or explaining and documenting a suspicious case, machine learning can provide the same level of abstraction as a human investigator might.

In the QuantaVerse Financial Crime Investigation Report (FCIR), AI decisions are accompanied by explanations – a confidence level, the nature of regulatory violations, the scope of a suspicious behavior – and, if required, the QuantaVerse platform can cite cases from which it learned and based its conclusions.

Powered by QuantaVerse's decision engine, a nonrecurrent neural network, a technique employed to explain the individual predictions created by its machine learning models is called Local Interpretable Model-Agnostic Explanations, or "LIME." LIME creates surrogate models that approximate how the machine is making decisions. These surrogate models are easily understood where the actual models they represent may have hundreds of features and thousands of parameters.

In a simple analogy, a model trained for health diagnostics reviews a patient's case. The model receives a long list of current symptoms along with the patient's demographics, health history, medications, persistent conditions, etc. All this data is considered, and the machine/model predicts that the patient has the flu. The LIME explainer parses from myriad data only those observables that led to its flu prediction – sneezing, headache, no fatigue. A doctor reviews the explainer model and makes a final determination.

HOW AI TECHNOLOGY INTEGRATES INTO THE AML PROCESS

The application of AI for AML is a logical one. With an AI system, AML data points can be pulled and consolidated automatically, the transactions scored for risk and the anomalies documented for AML investigators that can now evolve from researchers desperately fighting against the clock to unearth relevant data into analysts presented with automated financial crime investigation reports that allow them to be better informed and more accurate with their determinations.

An AI-based AML solution can analyze massive amounts of transactional and client information from a variety of sources such as transaction monitoring systems, KYC databases, Lines of Business (LOB) customer information, as well as investigative databases, public Internet sources and the deep web where criminals

often interact and transact business. To conduct such an analysis, AI solutions utilize agents which are highly specialized algorithms responsible for collecting and interpreting data, modeling behaviors, detecting anomalies, inferring relationships, and identifying issues. These agents report issues to a machine learning engine by delivering both the alerts and all necessary supporting evidence.

The machine learning engine accepts the collected observables and assigns risk scores. These scores embody the level of suspicion around transactions, transacting entities, and entity networks. These three areas represent the what, who, and why of financial activities, and provide a holistic view of transacting entities and their motives. The score also includes a measure of confidence about the decision. Confidence is calculated based on the number of alerts and anomalies detected, as well as similarity to past cases. This also allows the AI system to constantly evolve, learning from past decisions.



QuantaVerse Alert Investigator™ automates every step of the investigation process producing a Financial Crime Investigation Report which investigators can quickly assess and speed the development of SARs as indicated.

Specific AI and machine learning techniques that are employed to identify transactional anomalies worthy of further investigation include:

- Collaborative filtering: capable of finding transactions with missing, matching and/or odd information
- Feature matching: utilized to identify transactions above and below a specific monetary threshold
- Fuzzy logic: used to find data matches with slight changes to names or addresses
- Cluster analysis: detects abnormalities in transactions benefiting a single person or entity
- Time series analysis: detects transactions benefiting a person or entity over an extended period
- Focused keyword searches: ability to dynamically monitor, screen and filter transactions based on keywords from high-risk AML, CTF and financial crimes typologies
- Ability to learn from an AI-identified suspicious activity to enhance transaction monitoring and KYC platforms

Let's consider how round-dollar transactions would be handled in an AI-enabled environment. Financial institutions are warned that these types of transactions are telltales of illicit drug payments, however, legitimate round-dollar transactions are also very common. An AI-enhanced system can instantaneously check the round-dollar transaction flags from the transaction monitoring system against other indicators such as non-complementary lines of business, KYC data, history of transactions between entities and structuring behaviors to accurately eliminate round-dollar false positives.



COMPARING RULES-BASED TRANSACTION MONITORING SYSTEMS TO ARTIFICIAL INTELLIGENCE

While transaction monitoring technology continues to be the tool of choice for financial institutions, there are many inherent limitations. In a rules-based environment, it is impractical for financial institutions to create all the rules required to effectively identify every suspicious activity. It would be an arduous and costly process to manually address the multitude of slight deviations in transaction behaviors with new lines of code on a continuous basis. Even if, somehow, all suspicious behaviors could be identified and transaction monitoring system rules were updated, delays would allow bad actors execute money laundering schemes for months or even years before a system could be tuned to successfully flag the new criminal activity.

Additionally, rules-based solutions cannot distinguish between normal and illicit transactions that break the same rule. For example, although transaction monitoring systems are commonly programmed to flag all round dollar transactions, the majority of these types of transactions are not criminal in nature. What's more, criminals have evolved to mimic normal transactional behavior to prevent their illicit activities from being flagged by transaction monitoring systems. Smart money launderers know the rules commonly programmed into transaction monitoring systems and avoid them.

Rather than writing code to identify every potential financial crime, AI-based engines identify the patterns in transaction data and use that to identify when a transaction is behaving differently from the others it has encountered.

For example, North American Industry Classification System (NAICS) codes can help banks identify the type of business that they or their intermediaries are servicing and ensure that transactions from those businesses have valid economic perspective. It would be impossible to write transaction monitoring system rules that make use of NAICS codes to account for every possible relationship between all businesses. However, when NAICS are provided to an AI system, it learns common relationships, as well as transactional direction, frequency and amounts. Based on that knowledge, it can identify anomalies.

AI IN ACTION FOR AML: PROTECTING AGAINST FALSE NEGATIVES

False negatives, or instances of illicit transactions not flagged by transaction monitoring systems, represent significant risk to financial organizations. An alarming number of financial crimes trafficked through the banking system pass through transaction monitoring systems unnoticed.

Unlike static rules-based TM engines, AI systems can detect patterns of behavior, analyze the intent of those patterns and expose anomalous activities.

For example, transactions that do not follow the usual frequency and directional patterns expected for a given type of account may not be flagged by a transaction monitoring system but would be identified with an effective AI solution. An AI solution can learn the baseline of normal reported payroll account activity and thus identify any irregularities in payroll transactions as potentially fictitious and worthy of further investigation.

While there is no economic purpose for a Yemen-based government fire protection agency to purchase fertilizer from a farm in the UK, that business relationship would not be flagged by a transaction monitoring system. However, by automating the process of comparing entities' NAICS codes, an AI solution could quickly determine that the two entities were not engaged in complementary lines of business triggering the system to further investigate those entities and their business transactions.

Its ability to efficiently evaluate large numbers of transactions means that an AI system can also be used to examine transactions that currently go unexamined as part of Above-the-Line/Below-the-Line practices.

AI IN ACTION FOR AML: IDENTIFYING AND REDUCING INTERMEDIARY RISK

The ability to send and receive payments internationally via correspondent banking is vital to the global economy. According to The World Bank, overall global monetary transfers from migrant workers and others hit a record-high \$714 billion in 2019, and remittance flows to low- and middle-income countries reached \$554 billion that year. However, high remittance volume can bring increased regulatory scrutiny, risk, and compliance costs.

The result, unfortunately, is that institutions often abandon revenue sources by de-risking foreign correspondent relationships rather than deal with the inherent risk and problems of maintaining correspondent banking accounts. The financial institutions that choose not to de-risk will often file defensive SARs because the data is not available for them to establish the economic purpose and verify complementary lines of business for their correspondent banking customers. Effective entity resolution and entity relationship investigation are integral to curbing the de-risking cycle.

An invaluable capability of an AI solution is its ability to monitor customers' relationships to other customers and entities and learn from their associated behavior. An AI-based AML solution can automate the transactional analysis of these intermediary relationships to find anomalous behaviors and identify the end clients causing those anomalies. An AI-enhanced solution can account for seasonality, mergers and acquisitions, randomness and other legitimate variances to find the illegitimate anomalies that are presenting significant risks to financial institutions. An AI solution can also provide predictive insights into transactional behaviors and automate the required regulatory analysis and reporting.

CONCLUSION

In the field of AML, AI and machine learning have proven to effectively reduce the time associated with financial crime investigations, scale to the volume and velocity of the modern financial system, and counter criminals' evolving approaches to money laundering.

For financial institutions, the time is now to deploy AI into their AML ecosystems. AI and machine learning hold the key to reducing risk related to financial crimes, addressing regulation, driving out operational cost through improved efficiency and, most importantly, effectively preventing criminals and terrorists from using the banking industry for their evil agendas.

ABOUT QUANTAVERSE

QuantaVerse is the leader of artificial intelligence (AI) and machine learning solutions purpose-built for identifying financial crimes. QuantaVerse utilizes its AI Financial Crime Platform to reduce financial crime risk by identifying patterns and discerning anomalies that current approaches and systems regularly miss. The QuantaVerse solutions have helped customers more efficiently comply with AML (Anti-Money Laundering), KYC (Know Your Customer) and FCPA (Foreign Corrupt Practices Act) regulations. Most importantly, QuantaVerse is helping to rid organizations of money laundering and other financial crimes that support our greatest global ills – the drug trade, human trafficking, terrorism and political corruption.

To learn how QuantaVerse's AI-powered solutions can benefit your financial institution, contact QuantaVerse at (610) 465-7320 or visit <http://www.QuantaVerse.net> for more information.
