AI AND MACHINE LEARNING IN REGULATED INDUSTRIES

DRIVING VALUE ACROSS PUBLIC SECTOR, FINANCIAL SERVICES AND HEALTHCARE
INTRODUCTION

The hype around artificial intelligence (AI) and machine learning (ML) is at all time high — so much so that it can eclipse the actual applications and outcomes organizations are driving. Grandiose promises of what the technology might be overshadow the actual, pragmatic benefits it can offer to any organization, in any industry, that is generating a lot of data. The benefits are real and it’s time to harness them.

Before you can get value from AI and ML, you must understand the role it can play at your organization, the problem it solves and how it maps to your intended outcome. This is where many AI and ML initiatives are stalled. To overcome this, you need a place to start from.

Let’s take a look at the pervasive issues plaguing organizations. Fraud is rampant, IT and equipment downtime is costly and lack of visibility into stakeholder behavior plagues organizations across industries. Applying AI and ML to these heavily data-dependent challenges presents an opportunity. Imagine smart algorithms helping to protect the organization and its stakeholders, optimize for uptime and deliver data-driven insights and results.

In this ebook, we look at the common problems that AI and ML are successfully addressing in public sector, financial services and healthcare — and how you can get started.
Usage Monitoring and Analysis for Utilities

PROBLEM
Many utilities experience variable rates of consumption from customer to customer. As such, it is often difficult to determine potential issues such as leaks because what is normal for one customer is anomalous for another. Without the ability to establish an expected range of baseline volumes and proactively identify anomalous consumption that falls outside this range, utilities run the risk of having water or gas leaks go undetected. Not to mention the issue of rolling brownouts, among other issues, all of which are costly, potentially hazardous and detrimental to customers.

SOLUTION
With automation and machine learning algorithms, utilities can take proactive and predictive actions and have alerts generated when consumption falls outside of the baseline range for a specific customer. These early warning alerts enable IT to more quickly find and resolve root causes of potential problems that might result in water waste or damage, gas explosions or brownouts. With machine learning, utilities can accrue knowledge of expected consumption at specific times of day, week, month and year to flag anomalous volumes and take preemptive action to ensure they are doing their part for conservation and safety efforts.

DATA SOURCES
Customer care and billing records, customer self-service portals, rate/flow data from IoT devices and SCADA systems

Eight key U.S. market segments forfeit about $27 billion per year due to power outages.*

* Source
LEARNING ANALYTICS AT UNIVERSITIES

Monitoring Student Learning for Better Outcomes

PROBLEM
With increased scrutiny around funding, questions on the value of higher education and increased competition from cheaper and more flexible sources like online instruction, higher education institutions are under pressure to improve student outcomes and ensure higher graduation rates. Institutional leaders have been using traditional analytics that help them understand student learning patterns and resulting outcomes, but by the time they gain any insights it is too late. To make any real impact, educators need real-time insights based on learning patterns as they occur so they can provide guidance and make adjustments for measurable improvements in the current session.

SOLUTION
Higher education institutions can collect the relevant data from across the learning continuum to analyze student behavior, learning activities and patterns with real-time data analytics powered by machine learning. Because learning habits vary widely, there is no one model that might fit the success profile. Going through mountains of disparate data and connecting them to gain insights is a task that is beyond human abilities. Automated data correlation and analysis capabilities can handle the tedium of filtering through the data while machine learning identifies patterns that are not easily discernible through human review. As more information is fed, regardless of the source, the solution “learns” and prediction capabilities improve and become more accurate. This allows educators to identify deviations from established success models earlier in the session, so they can provide prescriptive guidance to students. Students who may, without intervention, fail a class, are given an opportunity to improve their grades. This results in better student outcomes, increased confidence in continuing their studies and, ultimately, higher graduation rates from college.

DATA SOURCES
Learning management system, student scores, learning applications, Active Directory

CUSTOMER EXAMPLE
The education research team at University of Nevada, Las Vegas (UNLV) was looking for ways to predict and improve student performance. With the help of the IT team, the education team built a prediction model to report on students at risk of poor performance. Timely insights allowed instructors to identify at-risk students and customize learning resources to help them change course, improve their grades and graduate with confidence.

See how they did it.
Predictive Analytics in Transportation

Predictive Maintenance for Efficient Fleet Management

PROBLEM
With the impetus to go green, lower fuel costs and improve efficiencies, coupled with tighter budgets, public sector fleet managers have to operate in a uniquely challenging environment. Managers are often faced with finding ways to extend the life of existing vehicles while also ensuring compliance with environmental mandates. They must also manage costs of aging fleets and long-term horizons to acquire new systems or make major modifications. In the case of military or humanitarian operations, operational availability and assurance of mission readiness is critically important. Component or capability failure in a theatre of operation can lead to major safety incidents or mission failure.

SOLUTION
Fleet managers need the ability to ensure maximum performance and avoid failures during critical operational phases — all while extending the life of the fleet. Machine learning can be leveraged to train systems with data from telematics, driver monitoring, weather, terrain and events from previous missions, to accurately predict the status of a vehicle, including the likelihood of failure. This not only improves safety, but also increases mission success. Additionally, data-driven fleet management capabilities result in decreased downtime, contributing to cost savings since predictive maintenance is typically cheaper than emergency maintenance.

DATA SOURCES
Commercial standard onboard diagnostics (OBD II), flight control data, telematics data, data from various cloud or edge devices, GPS, vehicle cameras, traffic cameras, weather, GIS/terrain data, driver monitoring applications, logistics and maintenance/repair/overhaul data from ERP systems
INDUSTRY
FINANCIAL SERVICES
TRANSACTION MONITORING FOR ONLINE BANKING PORTALS

PROBLEM

Many banks and other financial institutions experience variable traffic cycles in their online financial transaction websites. They experience higher traffic volumes at different times of the day or week. Without the ability to establish an expected range of baseline volumes or proactively identify anomalous transactions which fall outside this range, financial institutions run the risk of having their websites go down, causing customer dissatisfaction and revenue loss.

SOLUTION

With automation and machine learning algorithms, financial firms can be alerted when transactions fall outside of the baseline range. These early warning alerts enable IT to more quickly find and resolve root causes of potential problems that might cause the banking portals to go down. Although creating this baseline may seem daunting, machine learning can use accrued knowledge of expected traffic at specific times of day to flag anomalous volumes and take pre-emptive action to ensure high availability of the banking portals.

DATA SOURCES

Web servers, application servers, financial messaging, access logs, InfoSec logs, banking portals, storage, network

CUSTOMER EXAMPLE

“We were excited to utilize machine learning to establish our customer activity baseline and help with performance monitoring of our applications.” - Edward Bailey, TransUnion

→ Learn more about how TransUnion is applying machine learning.
Electronic Trading Platform Monitoring

PROBLEM
Electronic traders at investment banks and other trading firms rely on their central trading applications to deliver high performance and availability. If there are performance issues the business may not be able to trade, potentially risking revenue opportunities. The health of the applications is critical and trading teams need a centralized, real-time view, as well as the ability to deliver information about system performance quickly and simply to business stakeholders.

SOLUTION
With machine learning, it is easier for trading teams to correlate data across the IT stack to improve incident management and resolution. Teams don’t have to create thresholds manually to measure performance of each server; they can adapt them dynamically to account for expected performance variances. This eliminates the cost of frequent configuration and tuning and frees the IT support team to focus on triage of actual incidents before they impact the trader’s experience with the trading platform.

DATA SOURCES
Sybase, MongoDB, Azure, Windows, Proxy, SQL Server, Active Directory, reverse proxy, firewall, applications

CUSTOMER EXAMPLE
Smart capabilities have made it easier for Engie Global Markets to correlate data across the IT stack to improve incident management and resolution.

Learn more about how Engie uses machine learning to keep its trading platform running.
Fraud Detection and Cybersecurity Protection

PROBLEM
Banks and other financial institutions are primary targets for cybersecurity breaches and fraudulent actions by hackers and cyber criminals. To combat this, firms need the ability to monitor the safety of their servers, networks and applications. This monitoring needs to provide deep visibility into their environment to detect both internal and external threats, and to collect forensic evidence to understand and neutralize those threats. One common example of such threats is debit card fraud, where criminals obtain stolen cards and PINs and use them to make unauthorized purchases or withdraw funds from ATMs.

SOLUTION
To combat debit card fraud, administrators and security specialists can integrate an anomaly detection solution into their deployment. Using statistical modeling based on machine learning, firms can discover abnormal activities, incorporate transaction characteristics such as location, amount, time of transaction, and the risk profile of the vendor. The combination of these dimensions determines a risk score for each transaction. Based on the severity of the score, financial firms can take appropriate action, such as disabling the debit card or issuing a proactive customer notification.

DATA SOURCES
ATMs, debit card transaction history, firewalls, VPN servers, internet proxy, routers, web servers
Detecting Healthcare Fraud

PROBLEM
Detecting and finding patterns of anomalous and concerning behavior among a massive number of healthcare providers and specialties is difficult and time consuming — taking months or years to complete. Finding the source of illegal prescriptions and monitoring it more closely presents an additional challenge. There have been numerous incidents of healthcare fraud scams, including the prescription and distribution of opioids, which is the source of one of the nation’s deadliest substance abuse epidemics.

SOLUTION
Machine learning can help discover anomalous and potentially fraudulent providers, that would be difficult and time consuming for humans to sort through and detect. By aggregating claims data, it’s possible to get a full view into opioid purchases. With machine learning organizations can see patterns across that data and when they deviate. This allows healthcare organizations to shift to preventing and detecting fraud, versus a “pay and chase” approach.

DATA SOURCES
Electronic health records, Health level 7 messaging, medical devices, desktops, servers, storage, network, portals, billing systems, patient management systems

*Alleged fraud and false billings collectively accounted for 13 million illegal opioid dosages in the US.*
Using Artificial Intelligence and Bioinformatics

PROBLEM
The equipment in a laboratory, from robotic microscopes to computer-controlled instruments and cameras, generate massive amounts of data. While that data is valuable, it is difficult to log and track and can pose a challenge to lab productivity, which can delay important discoveries.

SOLUTION
With machine learning, it’s possible to analyze terabytes of data daily to discover new treatments for critical diseases. Additionally, deep-learning algorithms can help analyze and process the results from experiments and AI algorithms to help determine which drugs merit further study.

DATA SOURCES
Electronic health records, Health level 7 messaging, medical devices, desktops, servers, storage, network, portals, billing systems, patient management systems

CUSTOMER EXAMPLE
Recursion Pharmaceuticals found it difficult to manage large amounts of data collected from laboratory equipment. With machine learning they can now analyze terabytes of experimental image data daily to discover new treatments for critical diseases, and understand correlations in real time.

→ Learn more about how Recursion Pharmaceuticals has seen value from AI and ML.

CONCLUSION
The massive opportunity for benefitting from AI and machine learning is in the practical application of it. It starts with identifying the problem you’re looking to address, and leads to new efficiencies and insights. Discover more about how you can leverage AI and machine learning to drive these changes at your organization.

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