



This whitepaper discusses Feedzai's machine learning and behavioral profiling capabilities for payment fraud prevention. These capabilities allow modern fraud systems to move from broad segment-based scoring to very fine-grained individual scoring. Feedzai technology delivers this capability at Big Data scale utilizing modern machine learning techniques.

WHITE PAPER: Machine Learning

Modern Payment Fraud Prevention at Big Data Scale

Executive Summary

Banks, credit card brands, payment processors, and e-commerce companies regularly launch new products and services that have new, unforeseen fraud risk factors. These new fraud threats require mitigation approaches that extend well beyond the capabilities of older payment fraud prevention software. Most existing fraud solutions are inflexible and not built for today's line of business, and are not easily reconfigurable to support emerging omnichannel commerce. Businesses that lack a cost effective and flexible fraud prevention technology platform are at a severe competitive disadvantage, ultimately running the risk of slowing revenue growth.

This white paper discusses the technical approach employed by Feedzai, the market leader in the newest generation of fraud prevention solutions built using modern big data technology such as Hadoop. Feedzai Fraud Prevention™ delivers sub-second, fraud-blocking and monitoring capabilities by executing ultra-efficient and multi-dimensional analytics over big data, producing the industry's lowest percentage of false positives. By using sophisticated machine learning technology, Feedzai adapts to fraudsters' schemes in real time and stops fraudulent transactions at the very first

instance. Feedzai does this running on readily available commodity hardware that can be deployed by most companies within two weeks. The following white paper describes how Feedzai works.

The New Paradigm for Fraud Prevention

New fraud rings come at if from a data perspective, and the volume, variety, velocity and veracity of data can be harnessed by data scientist to be used for bad as well as good. To fight fire, you need modern artificial intelligence and technology.

Older fraud prevention solutions, such as those offered by FICO, SAS, and Actimize, were designed and built years ago to exploit then-current technologies. Today, maintaining these solutions is expensive, but more importantly, extremely inflexible when relied on to prevent fraud across the ever-expanding portfolio of new financial products and channels. Built upon proprietary technology that in many cases is 15 to 20 years old, these solutions can fail to accommodate the speed at which business is transacted in today's global Internet economy. In almost every case they are unable to support the dynamic business requirements of global financial services organizations that must process tens of millions of transactions each hour while protecting against fraud. E-commerce companies also suffer from a dynamic, large-scale threat. By the very nature of Internet commerce, these businesses are susceptible to fraudsters around the world, who continually probe and breach older generation fraud defenses with modern machine learning software.

Feedzai utilizes a starkly different approach to fraud detection and prevention, providing an agile, flexible and high performing technology platform (See

Machine learning models have detected 61% of fraud earlier than existing “rules-only” solutions and without increasing false alarms.

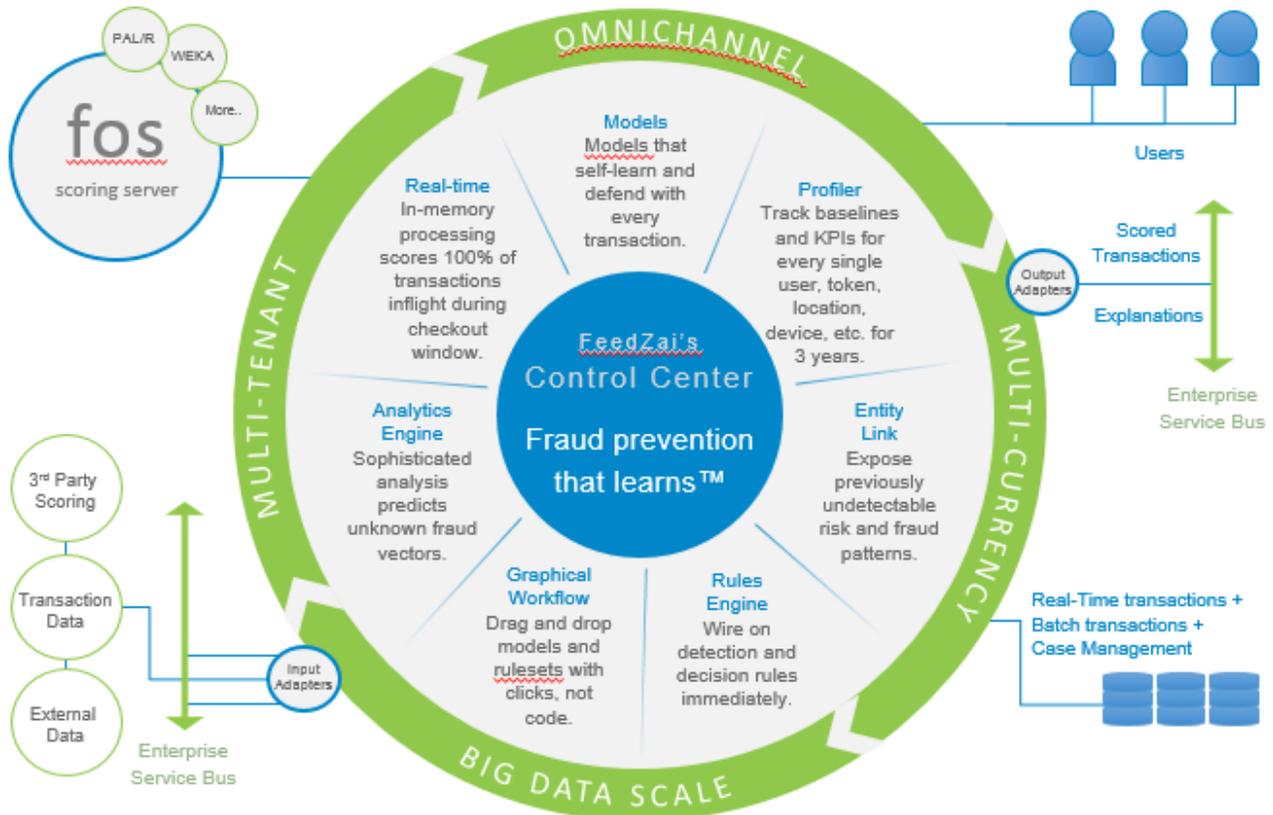
*Omnichannel:
online, instore,
mobile—anywhere
and anytime
payments occur.*

Figure 1). Feedzai's approach is characterized by several factors that differ widely from traditional solutions on the market, and which will be discussed in greater detail in this white paper, namely:

Highest fraud detection rates with lowest false positive rates

While rules-based solutions rely on limited data sets and score transactions based on one or two different perspectives, Feedzai Fraud Prevention employs real-time behavioral profiling as well as historical profiling, offering a multi-dimensional approach that has been proven to detect 61% more fraud earlier and without increasing false alarms.

Figure 1. System Components



Adaptive models detect “first-use” fraud for thin-file profiles or where there is no transaction history.

True real-time processing

Feedzai not only scales to include three years of historical cardholder and merchant data, but also continuously updates real-time data within the same second. Standards for real-time processing differ widely. Only Feedzai processes fraud scores in 25 milliseconds against vast data sets as measured at the 99th percentile, enabling instances of elusive ‘first-time fraud’ to be detected and blocked.

Machine learning:

Machine learning models rapidly learn from every transaction. The ability to process large data sets in a few milliseconds uncovers patterns in granular detail for specific clients, users and operators over a much longer time period and deeply learn personal behaviors, ensuring greater accuracy than segmentation or sampling data approaches.

Runs on readily-available hardware

Modern technology stacks such as Hadoop, NoSQL and Java allow modern Internet search engines, high frequency stock trading platforms, and even surveillance systems to run on readily-available hardware. When deployed on premise as an appliance, Feedzai runs on low-cost, commodity hardware – the cost of which is about as much as a week of processing power for other solutions deployed on mainframe computers.

Non-intrusive system

Feedzai’s monitoring and alerting functions can operate independently from its inflight transaction interdiction capabilities. For systems that require only “detect/escalate” functions or work in batch mode, Feedzai can be completely de-

coupled from live enterprise authorization systems. Feedzai can be easily configured using a graphical workflow interface, without stopping transactions or impeding other systems.

Easily deployed

Whether deployed as an appliance on premise, as a service, or as a hybrid appliance-service model, Feedzai's machine learning models can be trained and actively detecting fraud within hours. There are no follow-up service engagements required to fine tune rules because the models self-update.

Feedzai Halts Fraud from the Very First Instance

Feedzai Fraud Prevention addresses payment fraud by integrating within its single system of real-time fraud prevention and detection, fraud case management, and an online monitoring engine that profiles and scores all transactions against a rich and highly customizable set of key performance indicators (KPIs).

Feedzai's profiling outputs are based on machine learning behavioral models, enabling it to continuously learn, preventing many kinds of fraud from the first instance.

In competitive lab tests, Feedzai was found to have 92 percent higher fraud protection compared to the market-leading "neural-network" product at the same false positive rate. At a 20 percent false positive rate Feedzai delivered a 75% fraud detection rate against the same competitor's 39% rate.

Among the most typical use cases, current Feedzai customers address are:

- Card cloning and account take-over schemes
- Card Not Present ("CNP") transactions

Baselines for up to 3 years for every account dramatically reduces blocking of good transactions.

- Ecommerce/mobile omnichannel transactions
- Fraudulent merchant schemes

Feedzai creates deep profiles based on data gathered over the preceding three years for each credit card, merchant, automated teller machine (ATM), terminal, user, and historic fraud cases, analyzing far enormous data sets than previously possible. Real-time transactions are then scored against these rich active baselines, and transactions are replayed against predictive global models in order to detect “first fraud” transactions where little or no historical data exists.

Processing Big Data at the Speed of Payment

Feedzai Fraud Prevention is a real-time, big data operational intelligence platform that integrates streaming data with historical information. Its core is an optimized in-memory analytics engine for real-time streaming of structured, semi-structured, and unstructured data.

Feedzai computes real-time and historic profiles of users, cards, merchants and fraud cases for a comprehensive view of all available data when scoring a transaction. Other solutions often utilize averages and proxies for analytic models due to performance bottlenecks, yielding lower fraud detection rates and significantly higher false positive percents.

In Feedzai's case, an in-memory analytics engine updates profiles for customers, merchants, and banks every second, while processing multi-dimensional fraud scores based on 250,000 KPIs in the same second, every second. This provides a new industry standard for real-time fraud protection.

Drag and drop models and rulesets with clicks, not code.

In addition to a high performance engine, Feedzai Fraud Prevention takes advantage of big data by leveraging Hadoop and NoSQL for highly scalable data storage and processing. As a result, Feedzai can maintain and access 10 million historical profiles or more with a very low latency rate.

Real-Time Machine Learning

Feedzai automatically improves detection and minimizes false positives by continuously retraining analytic models with data from the perspective of the client, the card, the card user's behavior, and the merchant, in stark contrast to the industry practice of updating rules every six months. While other enterprise fraud management solution providers may also employ machine learning, their models are frequently limited by small data sample sizes that are defined by market segments or regions. On the other hand, because Feedzai easily processes larger, global data sets, it produces richer profiles that help improve fraud detection. *The key difference is that the same individual transactions being scored are also used to train the models.*

By comparison, other solution providers process their machine learning algorithms at a much slower rate than Feedzai and don't reveal how individual scores are determined, merely providing a score number that fraud analysts must investigate manually. Conversely, Feedzai's rich profiles and scoring approach enable analysts to quickly understand the specific reasons why a particular transaction has been flagged. As a result, Feedzai's machine learning system learns and automatically updates its algorithms, necessitating minimal manual intervention.

*In-memory
processor scores
100% of
transactions
inflight during
checkout window.*

Low-Cost Hardware Provides Processing Firepower

Feedzai Fraud Prevention runs on Intel-based commodity hardware. Typically, when installed on premise, the solution can be deployed on four or five inexpensive computers. With commodity machines capable of processing 100,000 events per second, Feedzai runs optimally.

Conversely, competitors' systems are deployed on mainframe computers. In cases where financial institutions lease hardware and pay for processing power based on each individual transaction, the cost of deploying and running these solutions are significantly greater when compared to Feedzai. With such a high total cost of ownership, it's not surprising that some financial institutions resort to turning off competitors' enterprise fraud management solutions at certain times of the day to save costs, subjecting their organizations to additional risk.

Expose previously undetectable risk and fraud patterns with entity link analysis.

Feedzai is a Non-Intrusive System

Feedzai is decoupled from existing enterprise systems, providing a completely non-intrusive solution. Easily configurable to dovetail with existing core systems and business processes, Feedzai Fraud Prevention connects with enterprise messaging systems so that it can be turned off at any time.

For instance, while Feedzai can block any transaction, it can also be configured to merely report transactions with higher fraud scores without blocking them. Essentially, a financial organization's fraud team can determine how Feedzai should

operate to best serve the business. Because Feedzai is decoupled from enterprise systems, it can be turned off with zero impact on latencies.

Deploying Feedzai: Time-to-Market in Weeks

Feedzai Fraud Prevention is deployed either as an appliance on premise, a service, or a hybrid appliance-service model, depending on the requirements of the financial institution. Irrespective of how the solution is deployed, it is up and running, preventing fraud quickly. Feedzai's time-to-market is swift and has only three deployment steps. They are:

Feedzai detects and prevents fraudulent transactions in 25 milliseconds.

Step 1: Evaluating data sets and models

Understanding a business' data samples is the most time-consuming portion of deploying Feedzai, ordinarily taking from one to two days, but in more complex environments as much as two weeks. During this process transaction types are reviewed and models adjusted to accommodate the business, whether it is a credit card brand, bank, e-commerce company, or payment processor

Step 2: Evaluating data sources

This step involves connecting Feedzai to any one of three data sources: either a messaging queuing system, a socket, or directly to any number of databases. Approximately 90 percent of all Feedzai customers connect the solution to message queuing systems. Feedzai uses dozens of off-the-shelf connectors that make this process simple, without incurring incremental development costs. Ordinarily, this step may take as little as two hours, but sometimes up to two days, depending on the number of business processes the customer has in place.

*Feedzai's software
intelligently
prevents more
fraud—earlier
prevention, higher
detection, lower
false alarms.*

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Step 3: Connecting to case management systems

If a case management system is in place, Feedzai will be integrated with it. A business may use a web interface where analysts view alerts and specific cards, or it may use a custom case management system developed internally. In either case, this step is usually completed within a day.

Feedzai's simple installation process is yet another way it differs from other commonly used enterprise fraud management solutions that require as much as a year to deploy and refine rules, in addition to periodic service engagements for further tuning.

Conclusion

Banks, credit card brands, payment processors, and e-commerce companies launching growth initiatives are dramatically reducing fraud by as much as 80 percent while reducing false alarms with Feedzai Fraud Prevention. No other enterprise fraud management solution on the market today is built on big data technology and can analyze as much historical data against hundreds of thousands of KPIs.

Lightweight enough to run on readily available hardware, flexible, and easily configured, Feedzai detects and prevents fraudulent transactions in 25 milliseconds. When compared to enterprise fraud management solutions that have been on the market for more than a decade, Feedzai offers a starkly different approach to fraud detection and prevention, providing an agile, flexible and high performing technology platform.