

# McKinsey on Payments

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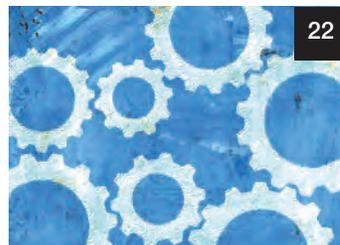
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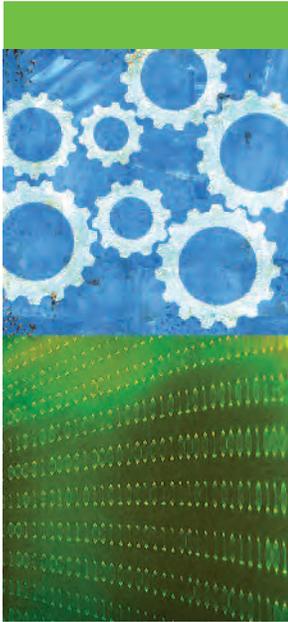
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Beyond the buzz: Harnessing machine learning in payments



## Beyond the buzz: Harnessing machine learning in payments

Machine learning is one of many tools in the advanced analytics toolbox, one with a long history in the worlds of academia and supercomputing. Recent developments, however, are opening the doors to its broad-scale applicability. Companies, institutions and governments now capture vast amounts of data as consumer interactions and transactions increasingly go digital. At the same time, high-performance computing is becoming more affordable and widely accessible. Together, these factors are having a powerful impact on workforce automation. McKinsey Global Institute estimates that by 2030 47 percent of the U.S. workforce will be automated.

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Payments providers are already familiar with machine learning, primarily as it pertains to credit card transaction monitoring, where learning algorithms play important roles in near real-time authorization of transactions. Given today's rapid growth of data capture and affordable high-performance computing, McKinsey sees many near- and long-term opportunities to expand the use of machine learning in payments. These include everything from using Web-sourced data to more accurately predict borrower delinquency to using virtual assistants to improve customer service performance.

### **Machine learning: Major opportunities in payments**

Rapid growth in the availability of big data and advanced analytics, including machine

learning, will have a significant impact on virtually every part of the economy, including financial services (Exhibit 1). Machine learning can be especially effective in cases involving large dynamic data sets, such as those that track consumer behavior. When behaviors change, it can detect subtle shifts in the underlying data, and then revise algorithms accordingly. Machine learning can even identify data anomalies and treat them as directed, thereby significantly improving predictability. These unique capabilities make it relevant for a broad range of payments applications.

Machine learning has already established a strong foothold in credit cards, particularly in fraud management. PayPal's Braintree Auth payments tool, for example, uses PayPal's consumer transaction data in conjunc-

tion with software developer Kount’s fraud detection capabilities to authorize high volumes of transactions and verifications in near real-time. Each credit card transaction or verification is analyzed in milliseconds using hundreds of fraud detection tests.

There are several other areas in the payments value chain where machine learning is adding significant value:

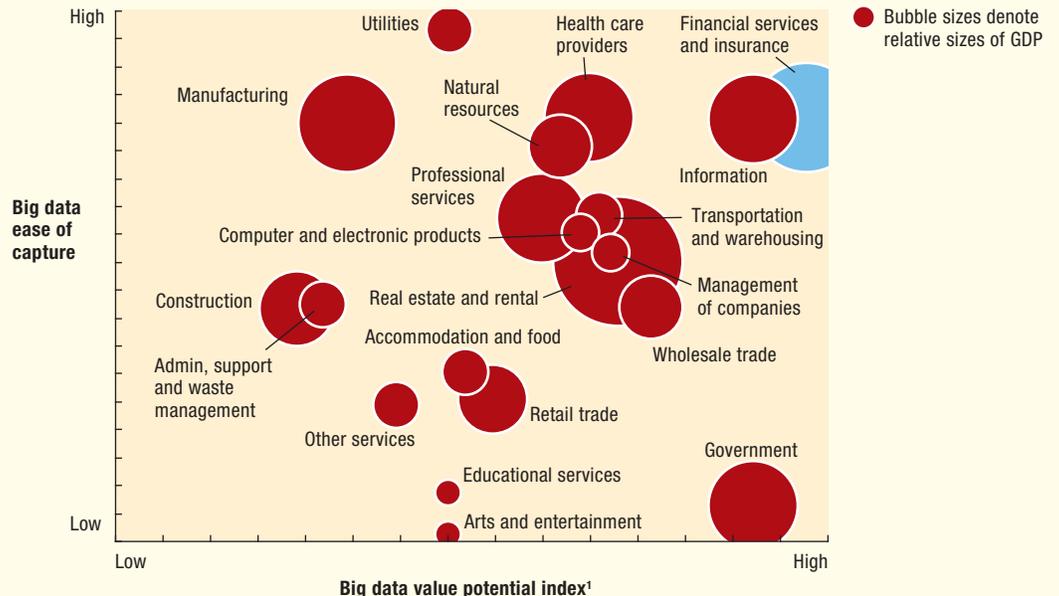
- **Product sales:** Machine learning can be a powerful tool for developing deeper insights about customers and sales prospects because it can draw upon a wider variety of internal and external data than marketers have traditionally used. It can more accurately cluster customers and prospects into segments according to their profiles and probable needs. This deeper insight can reveal new opportunities for cross-selling and up-selling among both

customers and prospects. McKinsey finds that with machine learning payments providers can increase revenue from existing customers by 10 to 15 percent.

- **Customer retention:** Companies typically monitor and forecast customer churn based on changes in account status; when churn rates rise they take steps to address the problem. Now, through machine learning, they can identify those customers they are at risk of losing and act quickly to retain valuable customers. For example, 47Lining, an Amazon Web Services partner, uses a combination of site behavior, demographics and media-sentiment measures to predict customer churn with 71 percent accuracy. Companies using machine learning to address customer churn have achieved reductions of as much as 25 percent.

Exhibit 1

**Big data and advanced analytics will affect virtually every part of the economy, especially financial services**



<sup>1</sup> Determined by industry average of transaction intensity, amount of data per firm, variability in performance, customer & supplier intensity, and turbulence

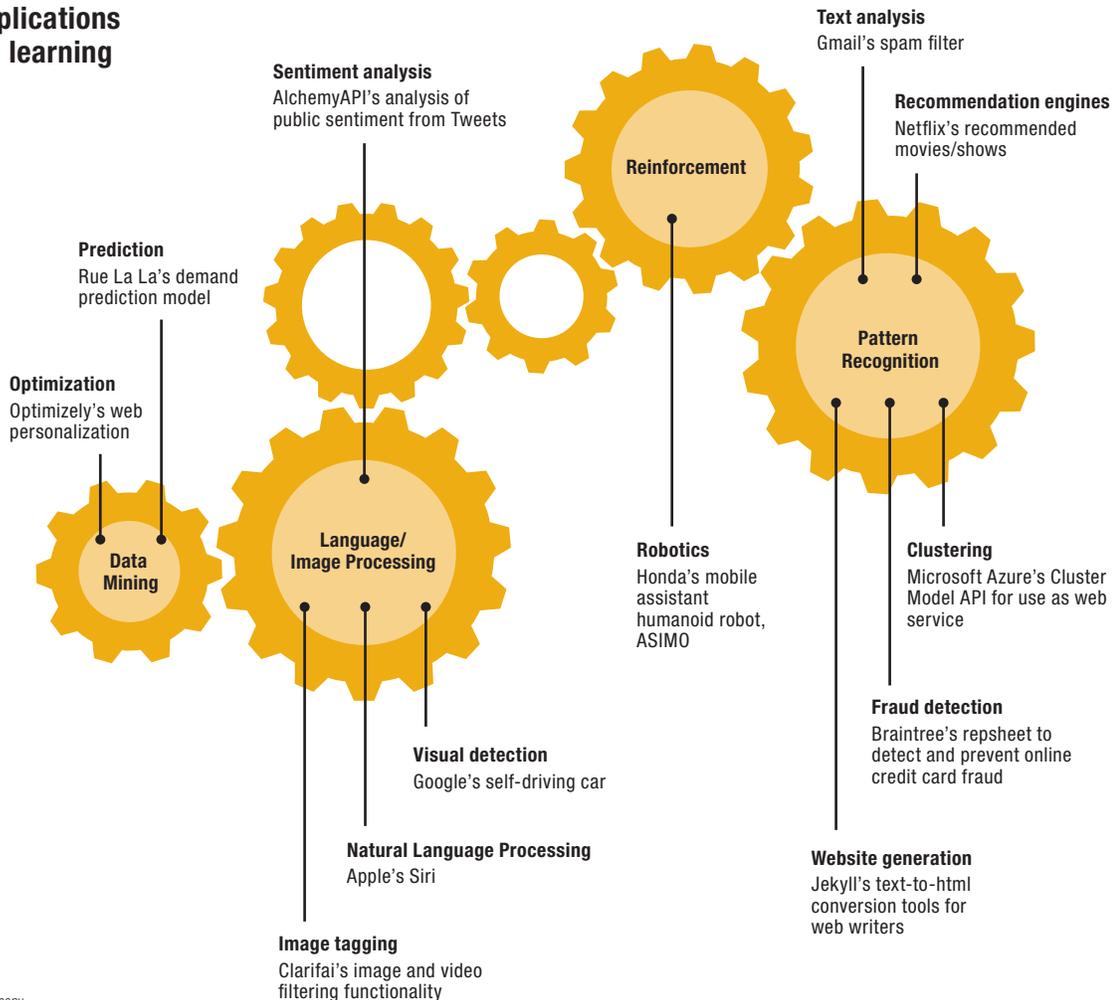
### What is machine learning?

Machine learning is the area of computer science that uses large-scale data analytics to create dynamic, predictive, computer models. Powerful computers are programmed to analyze massive data sets in an attempt to identify certain patterns, and then use those patterns to create predictive algorithms (Exhibit). Machine learning programs can also be designed to dynamically update predictive models whenever

changes occur in the underlying data sources. Because machine learning can extract information from exceptionally large data sets, recognize both anomalies and patterns within them, and adjust to changes in the source data, its predictive power is superior to that of classical methods.

Exhibit

### Popular applications of machine learning



Source: McKinsey & Company

- **Collections:** Collection practices and debt restructuring work best when closely aligned with borrowers' changing circumstances and propensity to pay. Machine learning can help companies build robust dynamic models that are better able to segment delinquent borrowers, and even identify self-cure customers (that is, customers that proactively take action to improve their standing). This enables them to better tailor their collection strategies and improve their on-time payment rates. TrueAccord's HeartBeat, for instance, is a machine learning tool that helps lenders customize personal interactions in real time, based on its ability to detect why a customer's payments are late. Companies using machine learning have been able to reduce their bad debt provision by 35 to 40 percent.

To minimize delinquencies, issuers can use individual-account pattern recognition technologies, and develop contact guidelines and strategies for accounts that are already delinquent.

- **Treasury pricing:** In commercial payments, companies can capture 10 to 15 percent more revenue through optimized treasury pricing. In the near term, advanced analytics can identify quick-win opportunities to reduce price leakage (such as discounts exceeding authorized limits) and billing errors. Over the long term, clustering techniques built on machine learning can significantly improve

customer segmentation and lead to more appropriate pricing models.

- **Customer care:** Over time, McKinsey expects to see a gradual increase in the automation of many customer services. This is an area in which the cognitive intelligence capabilities of machine learning are particularly well suited. Among the benefits are: lower servicing costs, enhanced agent performance, more efficient capacity management, improved digital customer experience, reduced risk and elimination of waiting times. A variety of relevant applications are already available, including virtual assistants that use natural language processing, deep insight tools like IBM's Watson, and cognitive engines that can do things presently handled by humans, such as IPSoft's Amelia, which can understand and interact with people (see sidebar, "Cognitive agents," page 27).

### Machine learning in the card collection environment

In card issuing, machine learning is already having a valuable impact. This is especially true in collections, where McKinsey has seen 10 to 15 percent improvements in recovery rates and 30 to 40 percent increases in collections efficiency. To minimize delinquencies, issuers can use individual-account pattern recognition technologies, and develop contact guidelines and strategies for accounts that are already delinquent. Following an account delinquency, issuers allow a brief time window (usually 90 days) before they write off the receivables and turn collection over to third-party providers. This brief period is an ideal time for issuers to apply collection strategies that draw heavily on the capabilities of machine learning.

Here are a few of the ways machine learning can significantly benefit the collections value chain:

- **Pre-delinquency:** Create early-warning indicators that activate upon pattern recognition.
- **Collections intelligence:** Use collection scores and other analytics to identify self-cures and develop appropriate contact strategy.

Although payments providers have made significant investments in advanced analytics, actual use of them remains low. So driving adoption, ownership and accountability is essential to realizing timely improvements.

- **Treatment design:** Use behavioral clustering to segment customers, and then to design more appropriate strategies.
- **Late-stage collecting:** Combine multiple variables to generate maximum-value predictions at the collector level that can be used to monitor performance and maximize returns.
- **Outreach:** Use machine learning to design, test and optimize communications approaches, such as best communications channels and call times.
- **Contact strategy:** Optimize call queuing rules and caller-agent matching based on borrower and agent characteristics.
- **Operations:** Manage workforce and plan capacity based on predicted needs.

### **Building machine learning capability**

To implement machine learning successfully, it is essential to devote close management attention to several key areas. For example, although payments providers have made significant investments in advanced analytics, actual use of them remains low. So driving adoption, ownership and accountability is essential to realizing timely improvements. McKinsey increasingly sees chief data officers and dedicated leaders of analytics becoming core roles in bank operations. While these positions could exist externally, their mandates should always include generating business results that are closely aligned with the organization's strategies and objectives.

Simultaneously building core technical talent and a team of analytics-savvy business leaders adept at developing business solutions is also important. McKinsey often finds significant gaps of understanding between management and IT, which hinder their joint ability to devise and successfully launch new machine learning business solutions. Consequently, building a team of solution developers that not only thoroughly understand machine learning and advanced analytics, but also the payments business, is vital.

Closely related to team building is the need to develop intuitive user tools that will improve customer service and operating efficiency without distancing customers and prospects. While there are situations in which machine learning could be used to fully automate decision-making, there is a general industry consensus that retaining a manager support role is preferable. Direct

## Cognitive agents

Cognitive agents like IPSoft's Amelia combine natural language and deep insight technologies to complete tasks typically handled by humans. Using a three-step process, they help companies intelligently automate a variety of tasks:

- 1. Understand:** Cognitive agents can rapidly absorb and comprehend a diverse range of datasets, from complex manuals to call logs and flow charts.
- 2. Learn:** Cognitive agents absorb data from the customer language they process, and can refer the customer to a live agent when uncertain about how to react. They also learn from cases

they refer to agents, further improving effectiveness as they continue to record interactions and data.

- 3. Resolve:** Finally, cognitive agents can directly resolve customer inquiries received through online chat, mobile and voice channels. Alternatively, when connected to a backend system they can support live agents in resolving customer issues.

Service automation tools can help payments providers increase customer satisfaction, enhance financial performance and improve compliance.

customer contact at key decision points, after all, is still key to maintaining customer satisfaction.

Establishing business-risk controls is another vital task. Proper controls are needed to ensure that machine learning models continue to learn and produce the desired results. Having the right controls can facilitate performance tracking and making any needed adjustments early on.

Where, when and how machine learning will be integrated into the business also has strong implications for how the business will be managed. Roles and responsibilities will likely change, and usually call for organizational changes, re-training and new skills development. Performance objectives, metrics and incentives might also need to be realigned.

### New to machine learning?

For payments industry participants whose knowledge and experience in machine learning is limited, determining where to begin is usually the first concern. In these cases,

McKinsey finds an agile test-and-learn approach is highly effective. Begin by establishing a multi-discipline team that has professional training and experience in technical areas such as computer science, data architecture and advanced analytics. These should be complemented with individuals having strengths in sales, marketing and product development and management.

The team's initial primary responsibility should be to identify, evaluate, define and prioritize opportunities for the potential application of machine learning throughout the organization. This effort would typically be followed with initial development and testing of concept prototypes. In machine learning, testing is first done to assess the predictive capabilities of proposed algorithms. The results are then compared with those achieved through traditional methods.

Once proof-of-concept has been established and appropriate controls developed, projects advance to the pilot stage in which they are tested on a very limited basis with actual customers. After further refinement

and adjustments, the concept is ready for a phased rollout.

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Machine learning is a tool that until recently was available only in the higher echelons of academia and computer science. Now it is rapidly coming within reach of companies and institutions around the globe. For the payments industry, its promise of increased automation, fewer errors, lower cost and improved customer satisfac-

tion will be difficult to ignore. However, machine learning is a powerful tool that requires considerable time and experience to reach its greatest potential. As recent experience demonstrates, early adopters will most certainly be the first to reap the benefits in the world of payments.

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