According to the Economist Intelligence Unit’s report, 85% of banks have a clear strategy for adopting AI. Once expensive and risky to implement, artificial intelligence and machine learning solutions have finally matured enough, so banks seek them to improve their critical business functions. In the last decade, many financial institutions heavily invested in cloud technologies and modernization of their core legacy systems, overcoming legacy technological barriers to the deployment of machine learning algorithms and are now able to fully harness machine learning capabilities.

In this article, we explore the most potent use cases of machine learning in the banking industry, provide real-life examples, highlight the value of [ML consulting services](https://www.itransition.com/machine-learning/consulting) and outline a four-step machine learning implementation roadmap.

**What is machine learning in banking?**

In the banking context, machine learning can be used to generate actionable insights using enormous databases that banks collect. Whether it’s a history of transactions, chat logs with bank representatives, or corporate documentation, machine learning models can help banks process and analyze this data to have a deeper understanding of their consumers and internal processes. With machine learning in banking, financial institutions can streamline fraud detection, optimize credit underwriting, improve regulatory compliance, and strengthen customer engagement.

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**How is machine learning used in banking?**

Now let’s discuss some of the most potent use cases of machine learning in the banking industry.

**1. Credit underwriting**

A survey conducted during the NACUSO Network conference in 2021 revealed that six out of ten credit union professionals consider the industry’s underwriting technology outdated, while eight out of ten said that the implementation of AI and machine learning would lead to better risk scoring. Compared to legacy credit risk models like FICO, well-built machine learning models can assess borrowers’ risk much more accurately. With the help of machine learning engines, banks can extend their outreach to underserved customer groups and approve more loans faster while keeping risks at a minimum.

5Point Credit Union, a Texas-based organization that serves 50,000 credit union members and manages $830 million in assets, joined forces with Zest AI to develop a custom machine learning credit scoring model. As a result of the implementation, 5Point now gets an additional $1.5 million in profit every year. The success of the project can be largely attributed to the extensive model training. Besides historical consumer loan data, the model was also injected with FCRA-compliant data from telecom and utility companies, which sufficiently increased the output accuracy.

**2. Fraud detection**

According to PwC’s *Global Economic Crime and Fraud Survey 2022*, 46% of organizations have experienced fraud, corruption, or other economic crimes in the last 24 months. With the accelerated adoption of online banking and payment digitization, the number of transactions has significantly increased, which has created a pressing need for financial institutions to adopt better fraud protection mechanisms.

Given that most banks use rule-based systems for fraud detection, it’s no surprise the wrongdoers can always come up with new tactics to exploit the system’s vulnerabilities. But with the help of machine learning, financial institutions can adapt to constantly evolving fraudulent methods almost in real time. Sophisticated deep learning models, trained with enormous sets of data that most banks have at their disposal, allow organizations to find hidden relationships between a myriad of data points and quickly identify anomalies.

For example, Danske Bank, one of the largest banks in Denmark, implemented an ML-driven fraud detection system. Using the legacy rule-based system for fraud detection, Danske bank had 1,200 false positives per day and a 40% fraud detection rate. After [implementing machine learning for fraud detection](https://www.itransition.com/machine-learning/fraud-detection), Danske Bank reduced false positives by 60% and increased the detection of fraud by 50%.

**3. Hyper personalization**

Today, delivering superior customer experiences is one of the most important success factors in the banking sector, and machine learning can provide banks with a much deeper understanding of customers’ behaviors, needs, and wants. This allows financial institutions to increasingly personalize their offers, offer [AI assistance with wealth management](https://www.itransition.com/ai/wealth-management), increase customer loyalty, and deliver on customer expectations in real time.

For example, machine learning-based budgeting tools integrated into mobile banking apps can help customers to make better financial decisions. Based on the history of transactions, a machine learning algorithm can identify user spending patterns and suggest ways of improving budgeting. This way, TransUnion bank has partnered with ML-powered budgeting app Mint to provide its customers with tips on improving their credit scores. Such tools drive customer loyalty and increase customer lifetime value.

**4. Task automation**

Bank audit and documentation are notoriously tedious yet essential tasks every bank has to perform. Auditors spend hours on end routinely reviewing documents to ensure compliance with regulatory standards. Machine learning techniques can be applied instead to review thousands of pages and detect what’s important, saving banks thousands of billable hours.

Quontic, a NY-headquartered community bank, has adopted a new ML-powered task automation solution on top of their legacy platform. In this bid to improve [digital customer experience](https://www.itransition.com/blog/digital-customer-experience) as well as tackle the challenge of reaching the un- and underbanked, Quontic has seen remarkable growth across a range of metrics between October 2018 and November 2019:

* 210% increase in the total number of banking customers
* 100% increase in new personal banking customers
* 261% increase in retail deposits
* 15% increase in YoY funding growth

The project was instrumental in helping Quontic stay agile and competitive in a market dominated by big players. Since the start of the initiative, the bank has added 20,000 sq. ft of office space to its headquarters, ramped up a whole new mortgage lending team, and is about to open a new NY office to serve the Chinese American community specifically.

As a small community bank, we were very restricted to our legacy core provider and we have very limited negotiation power and flexibility to change or update our legacy banking platform. We understood that enhanced technology would foster innovation and also allow us to partner with other enterprises and expand our business. The key was to unlock the ability to do more with our data and unleash ourselves from our outdated systems. Innovating in this area was a foundational and very clear step for us.

My advice on ‘selling’ innovation to the stakeholders would be to start off by having a conversation with your regulators. They want to see banks evolve and perform, that is how we as banks stay healthy. I would also suggest talking to banks that are similar to yours, or have innovated or currently are involved in similar projects to get their insights, as it will help create buy-in.

After those steps, I think innovation feels a lot less scary. While there are multiple other follow-up steps that can and should be taken, I would say the next but most critical component is helping the internal staff understand why you want to innovate and make sure they have the education and experience with the new technology so they are comfortable and able to contribute to the team mission with their best efforts.”



Patrick Sells

Chief Innovation Officer, Quontic

**5. Cybersecurity enhancement**

[According to a 2022 study by IBM](https://www.ibm.com/downloads/cas/ADLMYLAZ), finance and insurance have been the most-attacked industries for the fifth year in a row. With the enormous amounts of highly-sensitive data banks have at their disposal, a major cyberattack can prove fatal. What is more, relying on customary security measures is no longer an option, since the cybercriminals’ toolkit is expanding and advancing faster than ever before. This is why financial institutions are increasingly turning to machine learning to enhance their security.

Greenhill, a global independent investment bank, uses a machine learning-enabled cybersecurity system Falcon, developed by a US-based security company CrowdStrike. The platform relies on a proprietary cloud-scale machine learning algorithm that continuously analyzes a myriad of events in Greenhill’s system to identify potential threats. As a result of Falcon adoption, Greenhill estimated a 75% decrease in false alerts and about $300,000 in annual savings.

**6. Risk management**

In the banking context, simulation is often the main enabler of decision-making. An accurate assessment of a bank's ability to withstand certain economic shocks is not only a regulatory requirement but also a powerful strategic instrument. While the traditional top-down approach to simulation has proven to be relatively effective, it can’t take into account small yet potentially crucial nuances in data. Well-tuned machine learning models, on the other hand, can detect non-linear relationships between banks’ financial and industry data.

Barclays, a British multinational universal bank, partnered with Simudyne, another British firm specializing in simulation platforms. Simudyne was one of the first companies that discovered the benefits of real-time cloud computing for commercial applications in banking, developing a proprietary machine learning-based technology that enables the rapid creation of computer simulations. Due to cloud and machine learning technologies, simulations can be scaled on demand, and their development becomes much less expensive. Besides assessing market and credit risk, Barclays uses Simudyne’s technology to predict and simulate 'default contagion', a situation when one bank's downturn spreads to others.

**7. Chatbots**

Owing to the remarkable progress in natural language processing over the past decade, virtual assistants have become reliable customer service solutions for many banks. However, today’s advanced virtual assistants can go beyond answering simple customer queries and offer increasingly more personalized and useful financial advice.

Bank of America’s machine learning-powered chatbot Erica has handled almost one billion interactions since its launch in 2018. After four years of continuous self-improvement, Erica can now answer more than a million unique customer questions. However, most importantly, Erica can provide actionable personalized financial advice to the bank’s customers, including insights on portfolio performance.

**8. Document processing**

Document classification is a notoriously labor-intensive, but essential task for financial institutions. Machine learning can substantially decrease the time it takes to label, classify, and organize financial documents, and when optical character recognition (OCR) is applied, machine learning models can help with paper documents as well.

Datamatics, an Indian-based company that provides data management services, helped a large US bank to classify over 1.8 million unstructured mortgage documents. After the merger of six banks, the organization also needed to merge the mortgage documents into a single document management system for further retrieval.

To automatically index and classify more than 35 million pages of mortgage documents into 275 categories, Datamatics built a workflow equipped with OCR, RPA, NLP, and machine learning. As a result, the bank improved classification accuracy by 87%, reduced operational costs by 50% and achieved savings of over 150 man-hours per month.

**The benefits of machine learning in banking**

Considering the capabilities of machine learning mentioned above, we can identify the following benefits of this technology in the banking sector:

1. Improved personalization

Machine learning can help banks to identify patterns in customer behavior, enable a deeper understanding of customer needs and wants, and help create highly personalized service offerings.

2. Reduced costs

With the help of machine learning and NLP, banks can automate back-office operations, speed up document processing workflows, and minimize operational costs.

3. Accelerated decision-making

Given that machine learning can process huge amounts of data much faster and more accurately than humans, banks can use ML-generated insights to make important decisions more frequently and with fewer risks.

4. Improved fraud prevention

Machine learning allows banks to proactively monitor customer behavior, identify anomalies in real time, reduce the probability of false positives, and prevent fraud.

5. Enhanced risk management

Machine learning’s ability to model how a bank will react to certain economic conditions allows decision-makers to create more informed strategies.

6. Streamlined customer support

With the help of machine learning-enabled virtual assistants, banks can handle significantly more customer requests without compromising service quality.

7. Improved credit scoring

By quickly and intelligently assessing customers’ credit profiles, banks can process more loan requests faster.

8. Refined document processing

Machine learning allows banks to make sense of unstructured data, automatically index and label documents, and improve document management overall.

**Machine learning in banking: 4 implementation steps**

Here is a four-step approach to machine learning implementation in banking drawn up by machine learning consultants from Itransition. It will give you an idea of the effort required and the risks to be aware of at each step.

**Step 1: Identify your business case**

While the AI hype is seemingly over, some bank leaders are still eager to implement machine learning because of market trends and competitive pressure. Instead, bank leaders need to first clearly identify strategic business goals and assess how machine learning can be used to help an organization to achieve these goals.

This technology becomes truly disruptive when its development is clearly communicated throughout the enterprise by a company’s main decision-makers and leaders. Then, with a clear vision at hand, it’s much easier for managers to identify machine learning opportunities in their respective divisions. Afterwards, managers should present these opportunities back to the organization’s leaders, who then can create a holistic machine learning strategy based on crucial, department-level information.

When the company doesn’t have much expertise with machine learning, it’s best to utilize the low-hanging fruit approach. Aiming for easy-to-implement solutions with fast ROIs helps the bank to reveal technological bottlenecks, understand how machine learning can be applied at scale, and finesse their long-term machine learning vision. According to another Deloitte study, a diverse portfolio of AI use cases is a common trait of banks that have successfully adopted this technology.

**Step 2: Prepare your data**

While preparing the data to be consumed by machine learning algorithms, banks need to pay attention to data quality and its compliance with regulations.

Insights derived from machine learning are as good as the data used in the process. Everyone who is familiar with data analysis has heard about ‘garbage in, garbage out’. Low data quality or incorrect storage that breaks applicable regulations can easily reduce to nothing the efforts spent on developing and installing machine learning tools.

Banks possess a vast amount of data such as customers’ incomes, spending patterns, demographics, and social and employment statuses. This data can deliver valuable insights and contribute to many aspects, from process automation to the creation of new products and services.

Simultaneously, banks are bound by regulations and the code of ethics in data usage as well as data storage. Not to mention that losing customers’ trust is a fatal mistake. For example, Bulgaria’s DSK Bank was charged $569,930 for a data breach affecting the bank’s loan holders through the exposure of their financial information to an untrustworthy third party.

Nowadays, customers seem to be willing to let banks use their data if this results in better services. According to the Accenture Banking Consumer survey, two-thirds of banking customers expressed interest in letting banks use their data. But there are limits to what they are open to accepting. The same survey showed that they are not comfortable with the bank gathering their data from social media.

It is an essential practice to implement a data quality management policy to enforce desired quality standards across all datasets used for analysis. Here are a few essential steps to take:

* Clean data at the point of capture: establish processes for cleansing data as well as  incorporating new data into your existing database.
* Properly label data if it is used for supervised machine learning.
* Assign a unique numbering system: many financial institutions store their data distributed across several databases. Using a unique numbering system facilitates cross-referencing, which in turn helps to get the full picture of available data rather than viewing disjointed parts.
* Maintain a “golden copy”: banks aggregate data from multiple sources such as credit rating agencies and data vendors. Keeping a cleansed golden copy of this data is essential for compliance reasons.
* Maintain available data: at a regular bank, data decay happens at the rate of 25% per year. There are many reasons for this, such as entry errors, incorrect updates, workflow changes, mergers and acquisitions, etc. To minimize the impact of data decay, update your data on a regular basis.

**Step 3: Understand your algorithms**

Algorithms deliver statistical truth. This implies a possibility of error in certain cases. In order to minimize the chance of error, one needs to select the most suitable machine learning methodology and type of algorithms, understand where bias may come from, and work toward minimizing its effect.

While enforcement by trusted computers, as opposed to unreliable humans, is leading to more reliable and cost-effective ways to do business, not every process or operation can be—or ought to be—implemented with machine learning. The zero-knowledge proof, where you can access data but not own it, is a technical problem we’re dealing with as well.



Dr. Michael Yuan

ML and blockchain technology expert, CEO at Second State

When selected right, [machine learning algorithms bring the most value](https://www.itransition.com/machine-learning/statistics). Understanding them can also help understand the harm those algorithms can unintentionally cause, and ways to minimize it.

**Catching and minimizing bias**

Algorithms are thought to reduce bias resulting from personal interactions and human sympathy. However, they open the door to other types of bias stemming from algorithmic settings and training data sets. If one particular group prevails and another group is underrepresented in the training data, the prediction results for the underrepresented group will be less accurate.

That’s why banks need to test machine learning algorithms for fairness and ensure that developers incorporate the necessary measures toward this end.

These steps are recommended for ensuring fairness in machine learning algorithms:

* Outline [a data strategy](https://www.itransition.com/blog/data-analytics-strategy), specifying applicable policies and standards
* Identify who holds responsibility for the end result and/or intermediate outcomes
* Follow an algorithm design process that eliminates bias
* Introduce assessment of training data sets
* Communicate the new strategy to all the stakeholders
* Test newly developed algorithms and continuously monitor the entire process

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**Step 4: Help your employees adapt to change**

When hearing about the arrival of machine learning to their workplace, employees might feel confused, especially if there is no unified strategic outline for its implementation and organizational impact.

This can make people feel either threatened by potential job cuts or light-hearted about artificial intelligence in general. They might assume it is some pilot project that will terminate soon, with everything returning to ‘normal’.

Employees’ willingness to accept the idea of change and adjust accordingly is crucial for the success of any long-term project. Employees need to understand, accept, and develop a sense of ownership toward such a disruptive initiative as machine learning in banking, and here is how you can make this happen.

Come up with a clear vision and communicate it across the organization

The first step is to understand where your organization is going and when it will reach the goal. For this, you need to develop a clear vision and a strategic path of how to incorporate machine learning into the daily routine of your bank. The vision and roadmap need to be communicated clearly to end users at all levels to make sure that everyone is on the same page, and that all key stakeholders are on board in this major initiative.

Reimagine the way work is done and promote a new culture around it

With the strategy in place, banks need to take steps to pivot their workforce toward the awaited change. This includes developing the mindset for working together with machine learning tools, and the flexibility to adjust when changes demand so.

While reimagining the workflow, keep in mind what humans do best, and what machines are good at. Additionally, as machine learning can take up most of the repetitive work, employees will take over more of the creative and significant assignments.

To complete those effectively, every employee needs to work autonomously and have decision-making skills. In this scenario, employees will also be likely to form teams more frequently. This requires faster team ramp-up or reorganization as necessary, which may contradict the traditional bureaucracy intrinsic to banks.

As machines start augmenting human work, human employees will become the source of guidance for those machines.

* Trainers: assisting machine learning algorithms in their learning process
* Explainers: interpreting results delivered by algorithms and ensuring they don’t break the rules
* Sustainers: ensuring that algorithms stay true to their purpose and do not drift toward bias and other unethical practices. Additionally, sustainers make sure that algorithms evolve as customer behavior changes

**Takeaways**

Machine learning offers opportunities to derive value from the lavish amounts of customer data, generate insights, and enable digital transformation in banking. To realize the full potential of machine learning, financial institutions need to be ready to restructure their organizational workflows, redefine data collection and processing standards, and help employees to adapt to change.