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DRIVING VALUE WITH MACHINE LEARNING IN BANKING

Your 4-step implementation roadmap

Note from authors

Banks are operating in an environment that is challenging but also full of opportunities. Accenture market research suggests that banks might lose 30% of their traditional revenue within the two coming decades due to competition from fintech startups and regulatory changes[1].

Therefore, it is vital for banks to pivot toward a new direction. Machine learning (ML) offers an excellent opportunity to capitalize on the vast amount of customer data stored by banks.

This guide offers a 4-step approach to incorporating machine learning into banking practices. It will give you an idea of the effort required and the risks to be aware of at each step.

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About the authors

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Use case identification

Decide on the machine learning application to focus on
Outline your expected results

1

Data gathering and preparation

Check your data against quality standards and privacy
regulations in your region
Make sure the training data is diverse and free of bias

2

Algorithm discovery

Eliminate internal risks
Make sure the results are explainable

3

Adoption risk management

Communicate your vision of machine learning value to end users
Promote the new culture and mindset
Facilitate learning of new skills
Invest in talent acquisition

4

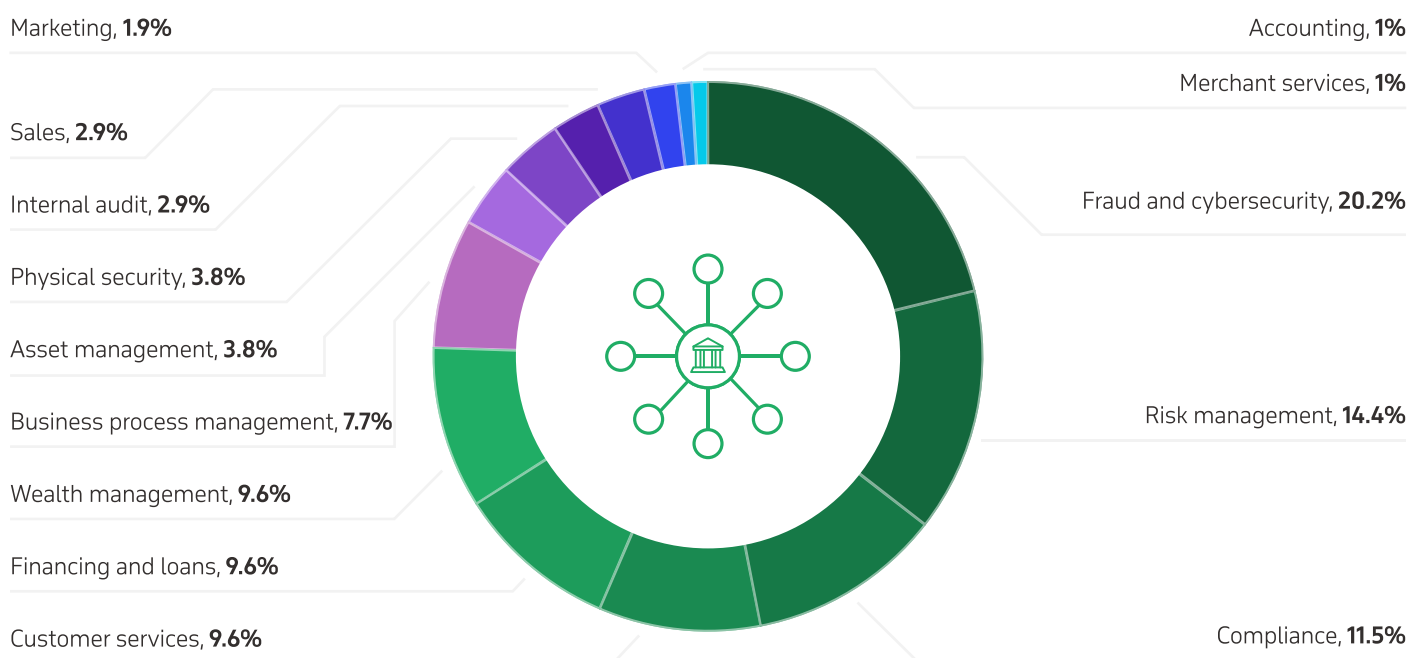itransition

Step 1:

Identify your business case

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Identify your business case

Machine learning has many applications in banking, and each of them has its specifics and requirements for achieving success.

Percentage of AI vendor products by function in the banking sector[2]

Marketing, **1.9%**

Sales, **2.9%**

Internal audit, **2.9%**

Physical security, **3.8%**

Asset management, **3.8%**

Business process management, **7.7%**

Wealth management, **9.6%**

Financing and loans, **9.6%**

Customer services, **9.6%**

Accounting, **1%**

Merchant services, **1%**

Fraud and cybersecurity, **20.2%**

Risk management, **14.4%**

Compliance, **11.5%**

Why is it important?

Selecting a business case(s) helps define a project scope and its destination in terms of results. The business case will impact the datasets and the machine learning algorithms to be used.

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Credit decisions

The traditional approach to credit scoring and decision making is time-consuming. It requires integration of data from various sources. This data includes personal information, payment history, and even credit histories from other banks.

ML-based credit decisions can be based on more sophisticated rules than traditional credit scoring, as well as use real-time data. One example is using natural language processing to gather data from social media. These measures can result in making more accurate decisions at lower cost.

For example, machine learning facilitates lending for the underserved population. Customers with no credit history might struggle to get credit approval in traditional credit scoring systems. This offers ML-equipped banks a competitive advantage and a new customer segment at the same time.

Case

Shortening corporate loan approval times

Citygroup is exploring the potential of using ML algorithms for corporate loan approval.

The algorithms scan financial statements of the applicants, automatically calculate the relevant ratios, and suggest the amount to lend (if any). This approach was tested in CityBank Hong Kong, and it shortened the time of corporate loan processing, which is usually 10-15 days, by at least 2 days[3].
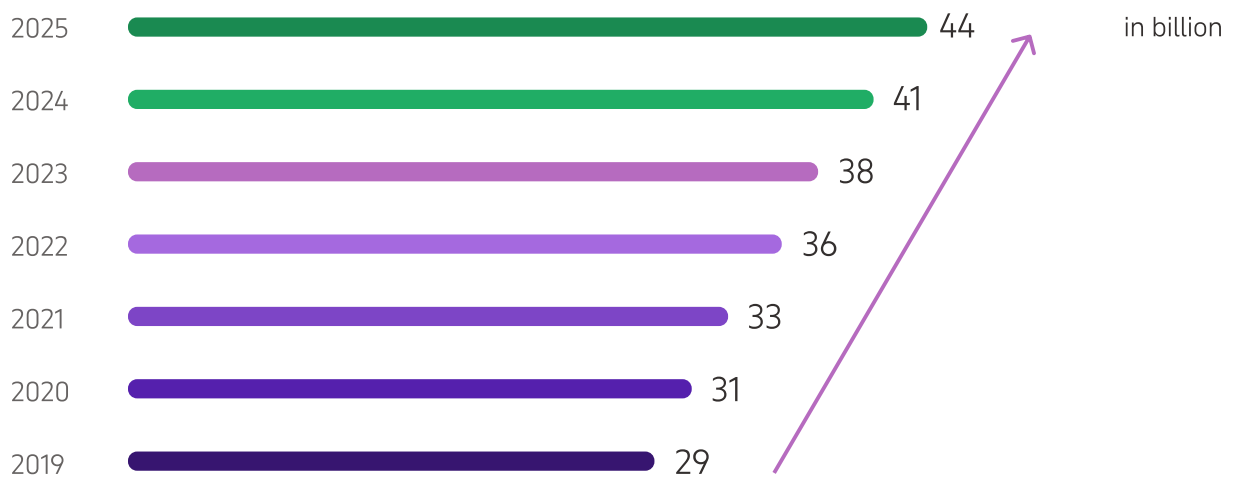
Fraud detection

Previously, fraud detection systems merely followed a set of complex predefined rules to do their job. The ML-based fraud detection mechanism is more powerful as it can learn and detect implicit correlations, find new anomalies, and flag them for a human fraud manager to review. The algorithm studies a customer's buying habits and detects any transaction that contradicts the established spending pattern.

Machine learning is particularly effective in detecting credit card fraud, which has been growing recently due to the proliferation of online transactions.

It's also applied for spotting duplicate transactions, for example, when a merchant is attempting to charge for a service twice by sending the same invoice to different bank branches.

With the use of machine learning, it is also possible to incorporate a new form of biometric authentication with voice and fingerprints instead of user names and passwords.

Credit card losses forecast 2019-2025, McKinsey[4]

Year	in billion
2025	44
2024	41
2023	38
2022	36
2021	33
2020	31
2019	29

Case

Anomaly detection in customer payment behavior

CitiBank is partnering with fraud and anti-money laundering software vendor Feedzai to integrate Feedzai's software into its fraud detection processes. The software will monitor customer payment behavior and search for anomalies. When finding an anomaly, the software will send an alert to a fraud analyst before clearing the suspicious transaction[5].

A heads-up to potential risks at step 1

An incorrectly defined business case may result in wasted time and effort.

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In search of a business case: Quontic's perspective

Machine learning brings the new agility to digital banking

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 deliver an outstanding digital customer experience as well as tackle the challenge of reaching the un- and underbanked, Quontic has seen a 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 square feet of office space to their 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.

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"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

Prepare your data

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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.

Why is it important?

Insights derived from machine learning algorithms 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, social and employment statuses. This data can deliver valuable insights and contribute to many aspects, from process automation to 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 exposing their financial information to an untrusted third party[6].

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 accept. The same survey showed that they will not be comfortable with the bank gathering their data from social media[7].

> **"** Data-intensive projects have a simple point of failure: data quality
>
> **George Krasadakis,**
> Senior Program Manager, Microsoft

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High-quality data supports accurate business decisions and saves operational costs. It is essential for moving forward and competing against more agile financial organizations.

At the same time, poor data quality results in decision-making errors such as incorrectly marketed products, problems with customer segmentation, and risky credit decisions, to mention a few.

With machine learning, data quality is becoming even more important, as machine learning allows performing data analysis on a large scale and thus magnifies any inherent errors. Additionally, in an automated setting, data errors propagate rapidly, becoming more pervasive and harder to catch.

Data quality and compliance

The Protection of Personal Information Act requires customer data to be of appropriate quality.

The Basel Committee on Banking Supervision's Standard No. 239 dictates that the accuracy of risk calculation must be verifiable.

Banks operating on the EU market need to adhere to the General Data Protection Regulations (GDPR).

Case

Modernizing data infrastructure

PNC has invested $1.2 billion in modernizing its data infrastructure. This included consolidation of data centers and development of an internal cloud environment. Currently, PNC is capable of developing machine learning algorithms in-house[8].

Steps to ensure data quality

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

1 Clean data at the point of capture: establish processes for cleansing data as well as for incorporating new data into your existing database.

2 Properly label data if it is used for supervised machine learning.

3 Assign a unique numbering system: many financial institutions hold 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 disperse parts.

4 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.

5 Maintain available data continuously: 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, merges and acquisitions, etc. To minimize the impact of data decay, update your data on a regular basis.

A heads-up to potential risks at step 2

Quality flaws left unrecognized in recently captured data.

Data storage and usage failing to comply with applicable regulations.

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Step 3:

Understand your algorithms

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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.

Why is it important?

When selected right, machine learning algorithms bring the most value. 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.

"

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 of Second State

SECOND STATE

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

Define a clear 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.

Recognizing the black box effect of machine learning algorithms

Machine learning algorithms don't offer an explanation to why they arrive at particular outcomes. This feature makes it challenging for the banking industry to rely on them in sensitive cases. Under the GDPR, for example, people affected by negative credit decisions, ML-based or not, may demand explanation of how those decisions were reached.

When human employees decide on a loan application, they can justify every step they took to reach the final decision. Similarly, traditional algorithms such as rule-based models are interpretable and well-understood by practitioners. However, they are slower and cannot incorporate as much data as more complex ML-based algorithms, which in their turn can't provide the human level of decision justification.

Banks need to invest in model interpretability research if they want to use machine learning while still abiding by regulations. Machine learning algorithms will also require constant monitoring and evaluation to ensure reliable outcomes. This is not only required by law but is a good business practice on its own.

A heads-up to potential risks at step 3

Inability to test and evaluate the algorithms, thereby allowing biased decisions.

Selecting incomplete or imbalanced data sets.

Overlooking the issue of explainability in machine learning predictions.

Help your people adapt to change

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Help your people adapt to change

When hearing about the coming 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 with 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 coming back to 'normal'.

Why is it important?

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.

According to Accenture, banks that invest in human-machine collaboration as much as top-performing businesses, are expected to increase their revenue by 34% on average, and their employment by 14% by 2022[9].

Case

Machine learning helping financial advisors

Morgan Stanley Bank has enriched the work of its financial advisors with machine learning algorithms, which continuously learn information about clients and communicate to human advisors when clients' financial situation changes. This enables the advisors to contact clients at the right moment with customized financial offers[10].

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4 pillars of mitigating the human aspect

Strategy

Develop a vision for incorporating ML into your operations

Communicate this vision to everyone

Learning

Identify which skills are missing

Support your employees in acquiring them

People

Culture

Reimagine the way work is done so that people and machines are most productive together

Promote the new mindset to employees

Talent acquisition

Invest in hiring people who possess the talent you currently need

Strategy: 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 get there. 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.

Culture: 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.

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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.

While working alongside machines, humans can act as:

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.

Case

Cultural transformation toward machine learning

When it was time to employ artificial intelligence at Santander, the bank realized that a digital mindset will be key to this transformation. Santander established a corporate academy to teach its employees the skills as well as agile methodologies required in the digital era.

This academy contributed heavily to developing the digital mindset. Additionally, the bank implemented other supporting initiatives including a brand-new performance management system that helped leaders identify their goals and the ways to achieve them[9].

Learning: help your people acquire new skills

Re-training a large number of employees is a challenge. It can be tempting to assume that everyone will do their "homework" without having to invest in organized seminars and training sessions. Unfortunately, this approach might prove ineffective.

Here are some recommendations for re-training your employees and helping them acquire the necessary skills as painlessly as possible:

Identify skill gaps and make it clear what training is available. It is a waste of time and effort if your employees will be pushed to acquire skills they will not use.

Prioritize skills required at this particular moment. While identifying skill gaps, your team might tend to identify many skills that are nice-to-have rather than critical. However, your time is limited if you want to be ahead of the competition, so narrowing down may be necessary.

Pay attention to the employees' willingness to learn, and their confidence in their abilities.

Use digital platforms and innovative training methods. Online education is gaining popularity, and it offers banking employees the flexibility of learning at the time and place that suit them the most.

Let people practice their skills under supervision. This allows employees to make mistakes and learn from them early on.

Talent acquisition: create new roles and find capable people to fill them

As you increasingly incorporate machine learning into your bank, new roles will start emerging. Those roles include the supervisor of machine learning algorithms and those responsible for preparing the training data sets. Even when working hard on re-training your employees, sometimes it is not possible to teach your people everything demanded by the new roles.

For example, to develop machine learning algorithms in trading, one needs to be familiar with the trading domain, as well as have a solid knowledge of programming and a good understanding of machine learning methodologies.

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A heads-up to potential risks at step 4

- The new practices may fail due to bureaucracy and organizational rigidity which cannot accommodate the agility coming with machine learning implementation.

- The leaders can't explain how machine learning impacts employees' everyday tasks. As a result, employees don't understand the magnitude of change and have no willingness to adapt.

- Employees can't develop the mindset required to thrive in the new environment.

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Takeaways

Machine learning offers opportunities to finally derive value from the data your bank has accumulated, and generate insights that will help you thrive in the age of competition.

While proceeding with their machine learning initiatives, bank leaders need to consider the following:

Assess your current situation. Identify any outdated practices and the aspects you want to improve with machine learning.

Ask your data science team to review data quality and establish data cleansing and maintenance procedures.

Determine which machine learning algorithms are the most appropriate to deliver results for your use case.

Make sure to invest in algorithm interpretability research, which will depend on the selected use case(s) and regulations in your country.

Communicate your machine learning-related vision to the employees and promote the appropriate mindset.

Help your employees adapt by acquiring skills necessary to stay productive in the new ML-driven environment.

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About Itransition

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