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Mining intelligent insights with machine learning in Financial Services
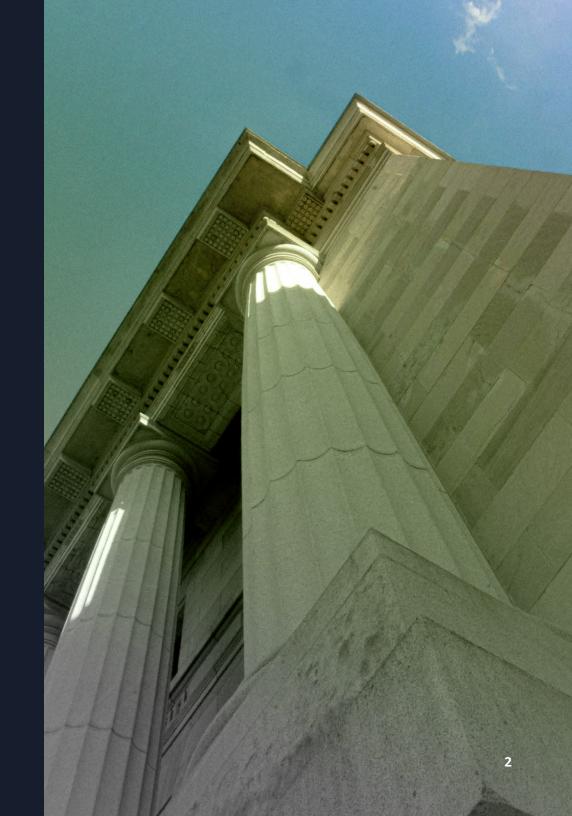
Reaching the AI/ML tipping point for Financial Services

The adoption of artificial intelligence and machine learning (AI/ML) has accelerated in recent years due to the availability of cost-effective and virtually unlimited capacity in data storage and compute power from cloud services. While the fundamental concepts of machine learning have been around since the 1950s, the success of machine learning workloads is directly linked to an organization's ability to collect, prepare, and process vast amounts of relevant data. Particularly within Financial Services, AI/ML is becoming a key component for business transformation. With the abundance of data collected by companies, as well as the labor-intensive, manual, and—in some cases—paper-based processes still used by many financial institutions, it is an industry ripe for product enhancement and disruption via AI/ML.

Cloud has removed many of the barriers to experiment and innovate with AI/ML

The hype of AI/ML has transitioned to real impact on businesses. From core processing to client-facing applications, AI/ML tools are powering devices and software used across Financial Services to solve problems and create opportunities. AWS provides the broadest and deepest set of AI/ML services for financial institutions of all sizes—from the largest enterprises to the most innovative startups—to help accelerate their ML journey.

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What do we mean by AI/ML?

You've probably heard artificial intelligence (AI) and machine learning (ML) described in a number of ways, so let's take a step back and review their exact definitions:

Artificial intelligence (AI) is a way to describe any system that can replicate tasks that previously required human intelligence. Almost always, this is related to some kind of complex decision-making task where human judgment would normally be required. Most use cases for AI are looking for a probabilistic outcome—making predictions, classifications, or decisions with a high degree of certainty and in ways that are similar to human judgment.

Almost all AI systems today are created using machine learning. Machine learning uses large amounts of data to create and validate decision logic. This is known as a model. The AI system feeds input data into that model, and then the model outputs human-like predictions or classifications. Essentially, machine learning is the underlying technology that powers intelligent systems.

Artificial intelligence
Any technique that enables computers to mimic human intelligence using logic, if-then statements, and ML (including deep learning)

Machine learning
A subset of AI that uses machines to search for patterns in data to build logic models automatically

Deep learning
A subset of ML composed of deeply multi-layered neural networks that perform tasks like speech and image recognition

Financial institutions embrace AI/ML for a competitive edge

Financial institutions are increasingly investing in AI/ML, thanks in part to the availability of cost-effective, easy-to-use, and scalable AI/ML cloud services. Banks are enhancing customer experiences through chatbots and customized product recommendations; capital markets firms are optimizing investment portfolios by mining alternative datasets and improving business operations to overcome expensive, manual, and time-consuming tasks; insurance companies are able to better assess risk and offer personalized quotes while streamlining the claims process; and payment companies are improving their fraud prevention algorithms.

1 Customer experience

Enhance the experience for new and existing customers. Computer vision helps streamline the customer onboarding process, while chatbots and an intelligent contact center platform using natural language processing (NLP) and speech-to-text analytics improve customer engagement with deeper customer insights.

2 Credit decisioning and underwriting

Enable organizations to make more accurate credit and underwriting decisions and to offer loans to a broader segment of the population.

3 Fraud detection and prevention

Identify anomalies in the data while reducing the number of false-positive alerts generated by rules-based models.

4 Intelligent document processing

Make it easy for organizations to process, analyze, and extract key information from documents to conduct due diligence, document reviews, and financial analysis.

5 Predictive analytics

Enable organizations to extract insights from their data to better anticipate customer needs, predict loan defaults, and identify new investment signals.

6 Personalized recommendations

Make customized recommendations and develop products tailored to the specific needs and behaviors of each customer.

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Customer experience

Financial institutions are leveraging machine learning in the form of computer vision, optical character recognition (OCR), and natural language processing (NLP) to streamline the customer onboarding and Know-Your-Customer (KYC) processes. These techniques are used to extract the images and text from a government ID and confirm the identity of that person, all within a few minutes. Machine learning is also used to enhance customer interactions via customer call centers, chatbots, and applications like Alexa.

Biz2Credit®

Streamlining customer onboarding

Biz2Credit is a fully managed lending platform that helps financial institutions extend credit to small businesses. Biz2Credit improves the process efficiency for loan applications by leveraging **Amazon Rekognition** to digitize and extract relevant fields from a scanned image of a customer's identification document, such as the taxpayer ID, which it can then validate through an online API.

John Hancock

Transforming the customer experience

John Hancock is one of the largest U.S. life insurers and supports approximately 10 million Americans with a broad range of financial products. To create more personalized experiences for their customers, John Hancock leverages **Contact Lens for Amazon Connect**, which automatically transcribes every single call and then runs that transcription through NLP to understand the sentiment and trends of customer conversations.

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Credit decisioning

Financial institutions are leveraging machine learning to make credit and underwriting decisions more accurately and more quickly. Additionally, with the use of alternative data sources, financial institutions are able to offer loans and other financial products to an entire population of individuals and businesses that do not have an extensive credit history.

OakNorth

Reach medium-sized businesses

OakNorth is a financial services and fintech platform focused on using data analytics to provide a better borrowing experience for small- and medium-sized businesses. Commercial lending within the $1M-$25M space presents a challenge to many financial institutions due to difficulty in gathering and analyzing the large amount of data needed to make good decisions. Using **Amazon SageMaker**, OakNorth Bank created a solution to automate the loan decision-making process and speed up the approval process for small- and medium-sized businesses.

CREDITVIDYA

Make credit decisions within minutes

CreditVidya is a startup headquartered in India whose underwriting technology is opening the country's loans market to over 250 million financially excluded citizens. CreditVidya's technology is reducing the cost of processing loans from about $2 to less than one cent while overcoming a lack of credit history or collateral by leveraging the loan applicants' digital footprints to measure their creditworthiness. To determine creditworthiness, CreditVidya runs its AI/ML platform, Medhas, on AWS and leverages payment data, financial behavioral data, and device data stored on smartphones to help determine the loan applicants' ability and intent to repay loans.

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Fraud detection and prevention

While financial institutions want to protect the customer by detecting anomalous behavior and suspicious transactions, banks also want to minimize a negative customer experience when they are declined when they shouldn't be. By leveraging AWS ML and analytics services, banking and capital markets firms, payment companies, and insurers can provide a frictionless customer experience while also preventing illegitimate transactions, protecting consumers as well as their own bottom line.

"Without the tools and techniques we have available on AWS, these would be much harder problems to solve."[1]

Robert Capps, Vice President of Business Development, NuData

EULER HERMES

Detect suspicious domains

Euler Hermes, part of the **Allianz group**, is a credit insurance company that uses **Amazon SageMaker** to quickly detect any suspicious domains registered that could be used to exploit the Euler Hermes brand or its products. In under seven months, it was able to launch a new internal ML service from ideation to production and can now identify URL squatting fraud within 24 hours after the creation of a malicious domain.

NuData Security
mastercard

Mitigate fraudulent attacks in real time

NuData Security, a behavioral biometrics company purchased by Mastercard, uses big data analytics and machine learning to verify that the person using a particular card is authorized to do so. NuData uses passive biometrics to authenticate account holders' identities by analyzing their digital profiles. As a user interacts with the system, hundreds of anonymized data points are analyzed in real time—from typographic rates to patterns in technology use—to detect anomalous activity before a fraudulent transaction occurs. With **Amazon SageMaker**, NuData reduced its machine learning development time by 60 percent and simplified its machine learning architecture by 95 percent.

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1 Original article published by The Wall Street Journal Custom Content: https://partners.wsj.com/aws/how-mastercards-nudata-keeps-identities-protected-with-aws/

Intelligent document processing

Financial institutions manage processes that require large amounts of documentation, like loan applications, tax filings, and SEC documents. These processes are often manual, time-consuming, error-prone, expensive, and not easily scalable. With ML, firms can extract text from millions of documents, understand the sentiment of, or relationships between, those documents and even include a human step to validate, correct, or augment the machine learning results for higher accuracy and compliance.

nib

ML-based computer vision helps insurance provider

nib is a health insurance provider in Australia that provides its 1.6 million members with the ability to submit photos of their claims receipts via a mobile application. nib integrated **Amazon Textract** into its pipeline to reduce manual data entry and speed up claims processing, resulting in an improved customer experience while increasing operational efficiencies.

PitchBook

Help private capital markets extract insights

PitchBook, a Morningstar company, tracks every aspect of the public and private equity markets, including venture capital, private equity, and M&A. PitchBook uses **Amazon Textract** to improve its processing of PDFs as a part of its research process by as much as 60 percent.

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Predictive analytics

Financial institutions are using machine learning in the form of predictive analytics to better anticipate customer demand and needs. For example, in banking, machine learning is being used to predict a customer's account balance so that the bank can better anticipate the needs and appropriate financial products that it can provide for its customers. In capital markets, machine learning is used in time-series forecasting to predict asset demand (prices) and derivative pricing and to develop new products to help broker-dealers and asset managers better manage their business.

Broadridge®

MERCURIA

Predict potentially contentious shareholder meetings

Broadridge uses machine learning to extract data points from SEC filings, including the board of directors, their length of tenure, and ESG proposals. It then uses these data points to build a custom machine learning model on **Amazon SageMaker** to predict potentially contentious shareholder meetings, which will be a new product (and a new revenue stream) that it can offer to its asset management and broker-dealer customers.

Make better decisions with data

Mercuria is a world leader in commodities trading and has been able to enhance its trading activities by detecting valuable insights in marketplaces where it operates. Mercuria is working on an ML Data Preparation Engine solution to assist with data merging, management, and surfacing. This solution enables Mercuria to retire their technical debt while also empowering their data teams to make better decisions based on patterns identified in the models.

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Personalized recommendations

Financial institutions are using machine learning to provide personalized experiences for individual customers. Instead of segmenting customers with a rules-based approach, machine learning allows financial institutions to develop models that deliver unique experiences, including customized lending or insurance products/rates, customized investment portfolios, and product recommendations.

Root
Insurance Co

Help good drivers save money

Root Insurance, a car insurance technology startup (Insurtech) uses technology to price car insurance based on how people actually drive—instead of purely their demographics. As Root has grown, the training and batch transform capabilities of **Amazon SageMaker** have become more relevant to the business needs. By standardizing its machine learning workloads on AWS, Root can analyze the telemetry from mobile phones and help good drivers save up to 52 percent on car insurance.

nerdwallet™

Connect customers with personalized financial products

NerdWallet is a personal finance startup that provides tools and advice that make it easy for customers to pay off debt, choose the best financial products and services, and tackle major life goals like buying a house or saving for retirement. Using **Amazon SageMaker** and machine learning, the company can more effectively match customers to the right financial products for them.

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Accelerate AI/ML skills

With the wealth of AI/ML opportunities that can transform the Financial Services industry, many organizations are asking, "how can we accelerate the growth of machine learning skills on our teams?" AWS provides a number of offerings to help customers with their journey to machine learning success. The content is based on years of proven success helping organizations adopt AI/ML, as well as Amazon's own journey to put AI/ML first in all areas of our business.

Training
AWS Machine Learning University

The AWS Machine Learning University (MLU) provides anybody, anywhere, at any time access to the same machine learning courses used to train Amazon's own developers on machine learning. Through sequential YouTube videos taught by Amazon scientists with hands-on practical examples, Jupyter notebooks, and slide decks, MLU provides a comprehensive self-service pathway to understanding the foundations of machine learning.

Engagement
AWS DeepRacer

AWS DeepRacer provides a fun and interesting way to get started with machine learning by developing a reinforcement learning model to drive a fully autonomous 1/18th-scale race car. The corporate AWS DeepRacer event is designed to motivate employees through an interactive, friendly competition. With the practical skills, knowledge, and motivation derived from the program, your company will be ready to take your machine learning journey to the next stage.

Development
Amazon ML Solutions Lab

The Amazon ML Solutions Lab pairs your team with AWS AI/ML experts to prepare data, build and train models, and put models into production. The Amazon ML Solutions Lab combines hands-on educational workshops with advisory professional services to help you work backward from business challenges, and then go step by step through the process of developing machine learning-based solutions.

Implementation
AWS ML Embark Program

The AWS Machine Learning Embark program is designed to start your company on the journey to machine learning success. Born out of thousands of successful customer implementations and Amazon's own experience scaling the use of ML in the organization, the AWS Machine Learning Embark program combines the training, coaching, and implementation support needed to launch your company's ML journey and transform your development teams into ML practitioners.

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Featured AWS AI/ML services for financial institutions

AWS offers the broadest and deepest set of tools for financial organizations to create impactful machine learning solutions faster. That's why financial institutions, from banks to insurance companies, choose AWS machine learning. Here are some key AI/ML services to get you started on your machine learning journey:

Amazon Comprehend

Amazon Comprehend is a natural language processing (NLP) service that uses machine learning to find insights and relationships in text. The service identifies the language of the text, extracts key phrases, places, people, or brands, understands the sentiment in text, and automatically organizes a collection of text files by topic.

Amazon Textract

Amazon Textract is a fully managed machine learning service that automatically extracts handwriting, printed text, and data from scanned documents. With Textract you can quickly automate manual document activities, enabling you to process millions of pages in hours and take action on it to initiate a loan application, tax document, or enrollment form.

Amazon Rekognition

Amazon Rekognition makes it easy to add image and video analysis to your applications using proven, highly scalable deep-learning technology with no machine learning expertise required. Financial institutions can use Rekognition to extract the images and text from a government ID and enable digital identify verification.

Amazon SageMaker

Amazon SageMaker helps data scientists and developers prepare, build, train, and deploy high-quality ML models quickly by bringing together a broad set of capabilities purpose-built for ML. SageMaker removes the heavy lifting from each step of the machine learning workflow to make it easier to develop high-quality DIY models for Financial Services use cases such as fraud detection, personalized recommendations, and intelligent document processing.

Contact Lens for Amazon Connect

Contact Lens for Amazon Connect enables you to better understand the sentiment and trends of customer conversations to identify crucial company and product feedback. You can also track the compliance of customer conversations in your contact center to help train agents and help replicate successful interactions.

Amazon Kendra

Amazon Kendra is an intelligent search service powered by machine learning. Kendra uses deep learning and natural language processing, so employees and customers spend less time searching through documents and more time discovering relevant information. Amazon Kendra is pre-trained across multiple industry domains, including Financial Services, so it can return exact answers, whether that's a text snippet, FAQ, or PDF.

Explore the full list of AI/ML services »

Additional resources to propel your AI/ML journey on AWS

AWS Partner Network (APN)

AWS Technology and Consulting Partners have demonstrated success in helping customers evaluate and use the tools and best practices for managing and optimizing AI/ML applications. Find APN partners that specialize in every stage of the AI/ML process, from data collection, data prep and parsing, and data visualization, to training and evaluating models, tuning parameters, managing models, and deploying, predicting, and integrating models. You can also discover partner solutions in the AWS Marketplace, a digital catalog that makes it easy to find, test, buy, and deploy software that runs on AWS.

For more information, visit:
https://aws.amazon.com/solutionspace/financial-services
https://aws.amazon.com/marketplace/solutions/financial-services

AWS Professional Services

AWS Professional Services provides strategic and technical guidance on security, governance, risk, and compliance to large enterprises that are migrating to AWS via executive support, enhancement of their security framework, and alignment of their risk operating models to cloud technology.

For more information, visit:
https://aws.amazon.com/professional-services

Helpful resources

Implement machine learning best practices

Learn about AWS Financial Services

Get support to launch your ML journey with the AWS ML Embark Program

Learn about AWS Machine Learning University

Enterprise machine learning guide

Contact AWS sales to talk about your Financial Services needs

Discover more customer stories with the AWS Machine Learning Hub

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