



Building Artificial Intelligence, Machine Learning, and Deep Learning Models for Financial Services Industry



Executive Summary

Artificial intelligence (AI) and its sub-branches of machine learning and deep learning have been rapidly adopted. Similarly, financial institutions are increasingly deploying machine learning (ML) and deep learning (DL) models for various aspects of the industry, such as asset management, trading, credit risk scores, portfolio management, enhancing customer experience, fraud detection, algorithmic trading, market predictions, credit underwriting and more. These advanced ML models are trained using data to automatically predict and learn through experience to provide highly accurate results.

Financial institutions are no longer implementing AI on an experimental basis, and forward-thinking organizations aim to integrate AI across different aspects of financial services. More recent studies have highlighted that AI utilization is among the top priorities for financial institutions.

A vast majority of business executives from the global financial institutions have the perspective that AI is an essential tool for the success of their companies, whereas 63% predict that AI is likely to witness growth due to increased efficiency, and 44% of them believe AI contributes to increased revenues at reduced costs¹.

AI is becoming the critical differentiator in delivering enhanced financial services with a personalized customer experience while boosting decision-making capabilities with better insights. Yet, few AI projects have achieved complete implementation, while the majority are pilot projects or proof of concept.

Moreover, several financial institutions do not possess the roadmap to infuse AI and appropriate ML or DL models in

operation due to challenges in attracting top professionals with the appropriate skillset and experience.

Essentially, AI models should be viewed as an opportunity to increase technical competency to address various obstacles in the industry. But in many ways, a critical element in AI adoption remains uninvestigated in terms of ethical considerations and identifying the appropriate model for employing in the operations.

To fully achieve the potential of AI in the financial service industry, these institutions must focus on attaining beyond the experimental phases soon by adopting evolutionary ML and deep learning models capable of handling complexities and providing efficiency. Moreover, the models should adhere to the governance framework to promote consistency, stability, and control over the outcomes of the models.

¹ McKinsey, "Survey: AI Adoption Proves Its Worth, but Few Scale Impact."



Introduction

With the surge of FinTech in the financial industry, it is evident that a paradigm shift is in the process due to changing customer needs and expectations for an enhanced customer experience. Consequently, the financial service industry has witnessed new competitors that can provide fast and easy-to-use products and services while maintaining a low cost of operations.

To remain competitive in the fast-paced transformations in the industry, retail banks and other financial service providers rethink their strategies and business models to provide better customer engagement and experience while using customer insights to improve the services and competitiveness.

The World Retail Banking Report 2022, published by Capgemini and EFMA, surveyed the effectiveness of Fintech to enable seamless delivery of services with a focus on improved digital banking services. This survey found that 95% of the executives highlight that outdated legacy systems and technologies in the financial sector lack the solutions to optimize, process, and analyze a vast amount of data for devising customer-based growth strategies.

Therefore, AI and ML have the potential to unlock new opportunities and possibilities to enable more customer retention and enable a better real-time experience². Given the potential of transformational technologies like AI, several international standards and regulatory bodies have jointly agreed on implementing responsible AI practice in developing advanced ML and DL models.

Group (AIGO), machine learning is a system trained with a set of human-defined inputs to achieve specific objectives, make predictions, and make recommendations to help make refined decisions in a real or virtual environment.



Essentially, machine learning and deep learning are subsets of AI, and these AI systems are designed to operate with different levels of autonomous capabilities. At the same time, deep learning comprises neural networks that are modeled to use similar to a human brain with various deep layers.

These models contain multiple layers of neural networks, and each model varies in terms of the number of layers they possess. Deep learning models can identify new patterns, make classifications and predictions, and operate well even with complex problems with various sub-features³.

According to the OECD AI Expert

² Lednarova, "World Retail Banking Report 2022: Incumbent Banks Must Embrace Data-Centric Capabilities to Drive Personalized Customer Experiences."

³ OECD, Sustainable and Resilient Finance.



The Growth of AI in The Financial Industry

Few would disagree that we are witnessing an AI-powered transformation facilitated by cost factors for data storage, processing, and increasing accessibility and connectivity⁴. Many financial institutions are integrating AI technologies like chatbots and other forms of conversational AI to enhance the customer service experience by enabling customers to engage with the chatbots to easily navigate the website and find the essential information.

Essentially, an estimated 72% of financial institutions opt for virtual assistants, out of which 56% of the chatbots are infused with natural language capabilities. These conversational AI-enabled technologies help customers accomplish a wide range of everyday tasks such as accessing account information, finding services, or obtaining product-based information effectively. As such, the automated chatbot integration help attains operational efficiency and reduces operating costs.

Digital transformation has created unprecedented challenges across the financial service industry due to immense data generation. In particular, asset allocation, risk management, capital optimization, credit scoring, insurance, client interactions, insurance, and regulatory compliances have become the focal point that requires efficiency and automation to process a large amount of data across various services.

As such, AI technologies are an integral part of the solutions to address the modern-day challenges and deploy these advanced technologies at scale to achieve a holistic transformation spanning different aspects of the financial sector.

According to the research by Mckinsey & Company, adapting AI-enabled solutions can facilitate cost-saving processing and improve accessibility and connectivity. Besides, AI deployment can increase automation and enhance decision-making, including speed and accuracy.

The potential value creation of AI in the financial service industry is one of the largest across sectors, with an estimated \$1trillion incremental value for banking institutions. Moreover, AI technologies can enhance the personalization of services to the end-users and lower operational costs with higher efficiencies resulting from automation, reducing errors, and appropriate resource utilization.

More broadly, AI technologies boost overall revenues by bringing efficiency to current operations while enabling to discover unrealized market opportunities by delivering business insights from a vast amount of data. Therefore, AI as a part of the core strategic planning and operations has the potential to be a distinctive factor in enabling change, innovation, and higher profits⁵. (refer to Figure 1)

⁴ Biswas et al., "AI-Bank of the Future: Can Banks Meet the AI Challenge?"

⁵ Biswas et al., "McKinsey: AI in Banking: Can Banks Meet the Challenge?"



Figure.1: Total Potential Value of Advanced AI Financial Services by Mckinsey & Company.

Advanced AI incorporation in financial services is driven by the industry's demand and supply aspects. On the supply side of the financial sector, AI-infused solutions with advanced machine learning and deep learning tools have assisted in achieving faster processing, lower costs of computing hardware, and improved accessibility with integrated cloud services.

With the inclusion of machine learning services on the cloud, the cost of storing data has significantly reduced. Due to the accessibility of databases and other data sources, advanced AI computing models can produce highly accurate predictions, including other analytical solutions and visualization.

Similarly, the demand side has witnessed increased ML and DL model implementation to achieve optimization, productivity, and efficient risk management. In addition, adopting AI helps financial institutions to meet the growing customer needs and maintain a competitive advantage. With increasing

compliances to support automation and new analytical tools for data analysis, the financial industry also views AI as an essential tool to achieve regulatory compliances.

Machine learning tools and models are built for performing various operations, including statistical computations such as regression and classification. Similarly, machine learning algorithms analyze datasets to identify hidden patterns and anomalies without human intervention.

In recent years, machine learning techniques for predictive analytics to understand future outcomes from past data have been beneficial for various tasks such as price prediction and risk assessments in the financial service industry.

As such, machine learning approaches are flexible, and patterns can be detected by these advanced algorithms. Moreover, autonomous



prediction, categorization, and optimization are vital takeaways of including machine learning in finance. On the other hand, as a promising sub-branch of AI, various conventional ML models such as Support Vector Machine (SVM) and k-nearest neighbors (kNN) possessed a broad range of benefits in terms of performance in the past years.

Recently, deep learning techniques have achieved remarkable success. But in many ways, these state-of-the-art algorithms have become critical in the financial service industry to gain a competitive advantage.

The integration of deep learning has witnessed an improved performance in predictive analytics by offering solutions that can include complex variables and provide accurate analysis beyond the capability of human analysts. For instance, Natural Language Processing (NLP) has enabled analysts to implement data from multiple sources for predictive analysis.

Combining data from different sources provides comprehensive insights that can benefit from financial advice, portfolio management strategies, trading, and risk management⁶.

Current DL models provide the advantage of unsupervised feature learning, which significantly contributes to building robust models to work with big data. These models enable comprehensive classification and prediction possibilities over the traditional ML methods.

Deep learning applications are increasing rapidly, and financial institutions invest in DL tools for text mining and sentiment analysis to help provide better customer services. Over the years, researchers have presented DL models such as CNN, Recurrent Neural Network (RNN), LSTM, and Reinforcement Learning (RL) for various financial services like market risk prediction, stock risk, credit risk and stock market predictions.

The computational challenges associated with DL models have been addressed with novel techniques to address these problems. Today, DL models are on the rise with developments of graphics processing units (GPUs), data storage mechanisms, distributed systems, and new technologies like Tensor Flow making a mark in the industry (refer to Figures 2 & 3)⁷.



⁶ Financial Stability Board (FSB), "Artificial Intelligence and Machine Learning in Financial Services."

⁷ Huang, Chai, and Cho, "Deep Learning in Finance and Banking."

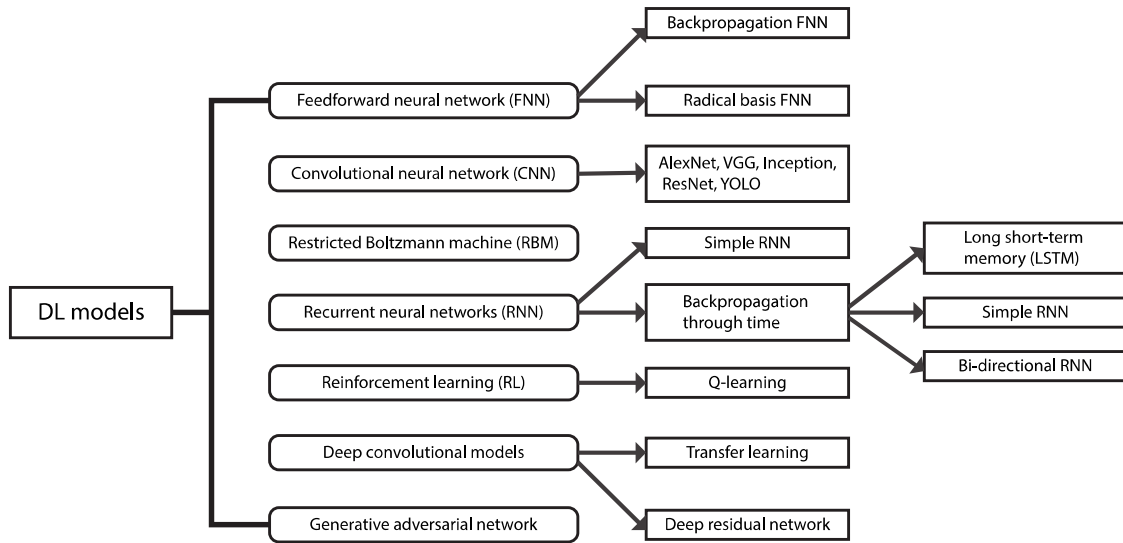


Figure.2: Recent Deep Learning models proposed for Financial Applications. (adapted from Deep learning in finance and banking by Jian Huang et al.)

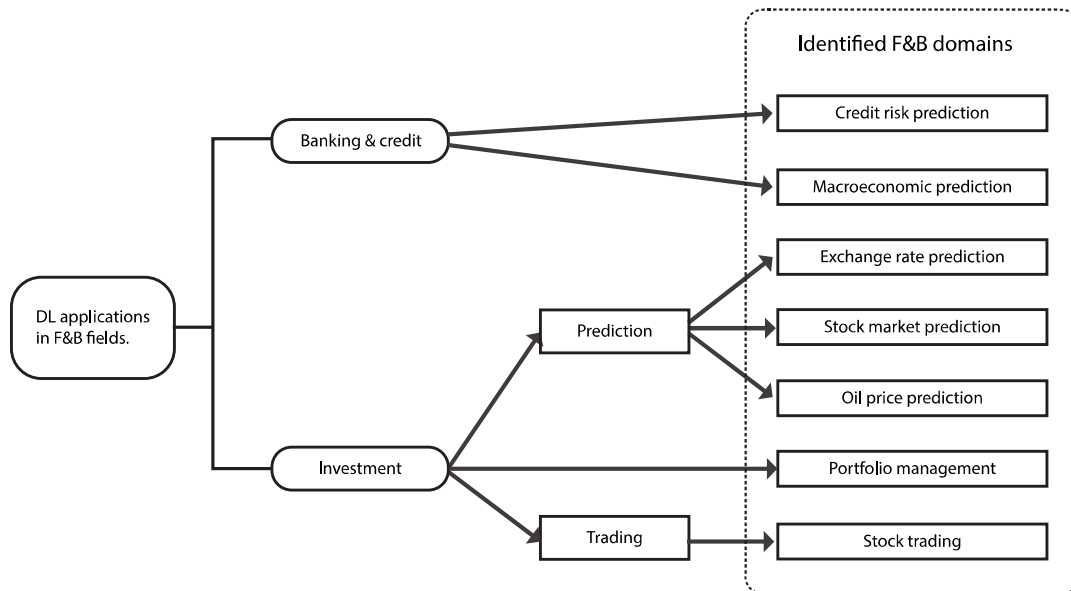


Figure.3: Deep Learning Models for Various Financial Services (adapted from Deep learning in finance and banking by Jian Huang et al.)



Case Study

In 2016, JP Morgan Chase, one of the largest banks in the United States, invested in AI technology to increase efficiency. The primary consideration for corporate law is to review documents which is time-consuming. Due to the efforts required to review these documents, JP Morgan had to pay a large sum of money to the legal and financial advisors to go through these documents and decipher credit arrangements. Therefore, the firm wanted a solution to cut the time spent reviewing different undertakings to produce the information on credit arrangements.

Solution

Consequently, JP Morgan introduced Contract Intelligence (COiN), an AI solution capable of analyzing multiple legal documents and deriving meaningful information from clauses. As such, the primary focus of the AI technological integration was to reduce the manual efforts to review credit agreements that require an approximate 360,000 hours. The preliminary stage of COiN included reviewing JP Morgan's credit contracts. For this purpose, the essential technique was to implement image recognition to compare and distinguish different credit arrangements.

The company claims that the initial part of image recognition uses an unsupervised learning approach to reduce human involvement once it is deployed. COiN operates within an AI framework connected to the bank's private cloud network that implements a robotizing procedure to archive the survey of a specific class of agreements.

Moreover, the algorithm can identify and categorize different repetitive clauses. JP Morgan emphasizes that the technology can classify other clauses into one out of 150 functional attributes of credit contracts within seconds instead of 360,000 hours of human efforts for manual survey for the same work. Besides, the firm states that the algorithm can produce more accurate results than human experts⁸. The company says that they have been working on extending the AI technology to cover other forms of contracts from credit arrangements and to classify new regulations formulated by authorities.

⁸ Legal ML, "JP Morgan COIN."



AI as Drivers of Changes in The Financial Sector

While AI is still new for many industries, the financial sector has the most extensive application of AI. The participants are not limited to technology companies offering their solutions but also traditional financial institutions and financial regulatory authorities that apply AI.

Moreover, the global financial institutions that apply AI have classified the use of AI as part of intelligent solutions for advisory necessities, customer services, risk control, and marketing solutions.

A critical area where AI excels in risk testing comprises customer insights, behavioral data, preferences, and asset allocation, where machine learning algorithms provide optimal performance instead of conventional quantitative approaches.

Furthermore, financial institutions implement supervisory data marts that enable advanced AI models to identify operation status, risk management, and compliance status to strengthen supervision and perform comprehensive analytics.

More recently, machine learning algorithms such as neural networks, Support Vector Machine (SVM), XGBoost, and Gradient-boosted decision trees (GBDT) are among the most preferred algorithms for risk monitoring and early identification and alert mechanism for improving risk identification and enhancing supervision automation capabilities⁹.

Similarly, deep learning architecture has been applied for Fintech models for smart investment with specialized buying and selling decisions of several

assets, markets, and risk identification.

In addition, there are hybrid algorithms where genetic algorithms are implemented to increase the learning capability of the model, while reinforcement learning is integrated to make faster local and current decisions.

In addition, the deep learning management clusters help make the final strategic decisions. On the other hand, several researchers have implemented Artificial Neural Networks (ANN) to make financial predictions such as bankruptcy prediction, financial distress, and stock and market index movement¹⁰.



⁹ Hu, "Research on Fintech Methods Based on Artificial Intelligence."

¹⁰ Serrano, "Fintech Model: The Random Neural Network with Genetic Algorithm"



Fraud Detection and Transaction Monitoring using AI

For several years, AI models are continuously improved for detecting financial fraud and money laundering activities. Especially, ML models in recent years have been effective in detecting credit card fraud by analyzing various attributes such as client behavior, location, and purchase patterns that trigger a security protocol in the event of unusual spending patterns.

Moreover, various financial institutions are actively implementing AI for detecting money laundering activities with intelligent alerts and segmentation of such transactions. In particular, AI technologies can help institutions detect abnormal transactions and identify various suspicious activities with the help of image recognition and risk models that can accurately identify false information and misrepresentations for transactions that do not meet the pre-defined norms for financial transactions.

in determining risk scores and improving the case of false positives in understanding the legitimate vendors. In addition, supervised learning models have been commonly implemented for fraud detection, indicating if a vendor's specific name, transaction details, and other sources indicate a fraudulent or non-fraudulent transaction. At the same time, fraud detection using machine learning models such as logistic regression, SVM, neural networks, and Naïve Bayes has been increasing in recent years¹¹.

AI has excelled with its performance

Case Study

With the increasing number of money laundering cases reported over the years, HSBC has collaborated with Ayasdi, an AI platform provider, to tackle the challenges associated with detecting various factors, including historical data that can point toward potential money laundering activities.

Solution

In 2018, HSBC implemented an AI-based anti-money laundering solution that can autonomously identify historical data patterns and help banks prevent any payments beforehand that violate financial regulations. The company claims that implementing AI helped reduce HSBC's false favorable rates to identify money laundering activities by 20% and detect various behavioral patterns directly related to fraudulent activities. The primary reason for the success of this model is the inclusion of the internal review team that helped Ayasdi create more accurate models with terminologies that banks were more familiar with. However, for the initial implementation, the AI solution was offered mainly for anomaly detection to identify various deviations from established norms of financial regulations¹².

¹¹ Nirav Prajapati, "Pirimid Fintech » Blog Archive Top 6 Fintech Use Cases of Machine Learning."

¹² Ayasdi, "HSBC Fights Back Against Financial Crime Actors with AI."



Case Study

Acquiring banks are witnessing losses due to card-not-present and friendly fraud, chargebacks, false declines, and merchant-based frauds. In 2019, an estimated \$19.21 billion was evaluated as a loss due to transactional fraud alone, while an additional 20% was lost due to chargebacks. Besides, conventional approaches include a rule-based fraud detection system to detect such frauds. However, these systems have a high false-positive rate, where at least half of the sales require manual reviewing, out of which three quarters are approved. As a result, investigators are overburdened and have less time to identify legitimate fraudulent activities. In fact, Aite Group reports that false decline is a significant problem resulting in 79% of merchants tracking false decline rates.

Solution

Brighterion AI, a MasterCard acquired company, has provided an AI-based solution for Worldpay, the largest global acquirer. The AI solution focuses on one-to-one analysis with the help of multiple data points, such as transactional and user history, and considering the current activities and account events. The advanced AI model is fine-tuned for merchant risk and transactional level fraud by enabling behavioral insights for every interaction. In addition, real-time decision-making helps in onboarding merchants and automating tasks associated with risk mitigation, monitoring, and reporting. Due to the provision of behavioral profiles based on historical transaction data, the AI solution develops a baseline risk score for which the profiles are created with scores for each merchant.

Furthermore, this AI offering can scan batch uploads and monitor unwanted spikes or declines in the number of transactions, especially for large purchases, to identify fraudulent activities. This real-time AI system helps predict financial fraud before the activity takes place. The benefit of the AI integration is that the AI system sends timely alerts about suspicious activities, and based on the alert, the appropriate teams can intervene, stop the transaction, and prevent chargebacks. The outcome of AI integration in their operational process has helped achieve immediate results such as increased detection (3x), reduction in false-positive rates (20x), reduced business rules (50,000 to 250), and replacing fraud prevention rules with supervised and unsupervised learning. Worldpay has also extended its AI implementation for risk monitoring, anti-money laundering, and credit risks¹³.

¹³ Brighterion AI, A MasterCard Company, "Reduce Transaction Fraud and Merchant Risk."



AI-Based Trading and Personalized Financial Services

AI can be used for algorithm-based trading suggestions to enable automated traditional systems with the potential to make accurate predictions and provide a suitable course of action for trades.

Furthermore, evolutionary AI technologies using ML and DL can help strategize an upcoming trade systematically by processing various interconnections between asset classes and geographic information for accurate trading decisions.

Furthermore, AI-assisted trading can help traders in risk management by autonomously adapting and learning from changing market conditions.

As such, the information can help improve the management of trade flows¹⁴. Companies like JP Morgan, Bank of America, and Morgan Stanley are working towards developing automated advisors using some of the most effective machine learning and deep learning models such as Recurrent Neural Networks (RNN), Long Short Term Memory Network (LSTM), Ensemble algorithms and SVMs.

Among various models in the industry, researchers have shown that SVMs offer the best performance for tasks related to financial trades, followed by Random Forests. However, in recent years, various progression in AI has revealed that hybrid approaches work best as they provide significant advantages for both methods included in hybrid solutions¹⁵.

Who is Implementing AI for Trading and Personalized Finance?

AI has had a transformational impact on providing personalized financial services. The financial institutions are harnessing the power of AI to refine how these services are offered to the customers.

Global leaders like Morgan Stanley are implementing AI for developing robo-advisors to provide solutions to perform financial priorities on the go. From paying off debts to saving and other expenses, these intelligent solutions offer significant information on long-term goals and even retirement planning.

Smart investing solutions allow


building a diversified portfolio with automated investing assistance. With the provision of basic customer information and their goals, the robo-advisor runs multiple simulations to provide information on investment opportunities that seek optimal returns.

The AI algorithms act as recommendation systems to recommend a portfolio consisting of mutual funds and Exchange-Traded Funds (ETFs) curated by experienced investment teams. Besides, the AI solution also allows monitoring performance and making adjustments to the investment plans online¹⁶. Similarly, Bank of America (BOA) has introduced their virtual financial assistant Erica, that helps with various

¹⁴ OECD, Sustainable and Resilient Finance.

¹⁵ Nirav Prajapati, "Pirimid Fintech » Blog Archive Top 6 Fintech Use Cases of Machine Learning."

¹⁶ Morgan Stanley, "Morgan Stanley Access Investing."



financial information such as alerts for merchant refund posts, notifications for duplicate charges, monitoring recurring payments and increments, bill reminders, monthly spending, monitoring past transactions across accounts and information on credit score changes.

Erica AI leverages advanced analytics and cognitive technologies to serve as comprehensive financial assistance and help connect with the Merrill advisor for investment decisions¹⁷.

AI for Meeting Regulatory and Compliance Needs

Financial market regulatory bodies and authorities are investigating the feasibility of AI integration as a SupTech tool for insights for improved supervision. On the other hand, these regulatory institutions employ FinTech solutions and applications for regulatory and compliance necessities and better reporting (RegTech).

Moreover, many financial institutions are infusing AI applications for internal control requirements and risk management. Besides, it has been identified that AI also presents an opportunity to prevent any misconduct by promoting preventing instead of post-event resolution.

However, the demand for AI-enabled RegTech and SupTech applications is mainly attributed to the supply and demand side of the financial industry, such as the wide availability of data, to lack of the resources for increasing gains with higher efficiency, and effective regulatory and insight mechanism for risk and compliance.

Therefore, although there are significant benefits to implementing AI, the regulatory and supervisory institutions are cautious about deploying AI due to potential risks associated with these technologies¹⁸.

AI for Portfolio Allocation in Asset Management

Adopting ML and DL models in asset management can increase the efficiency and accuracy of various workflows and enhance performance by appropriate risk management while improving customer experience.

The primary benefit of these advanced models is to autonomously monitor multiple risk factors daily and test the portfolio against different market scenarios to enhance risk management.

Similarly, using Natural Language Processing (NLP) based models, deep learning can help financial advisors communicate the data's analytical outcomes and report to clients with a human-centric approach.

¹⁷ Bank of America, "Erica - Virtual Financial Assistant From Bank of America."

¹⁸ OECD, Sustainable and Resilient Finance.

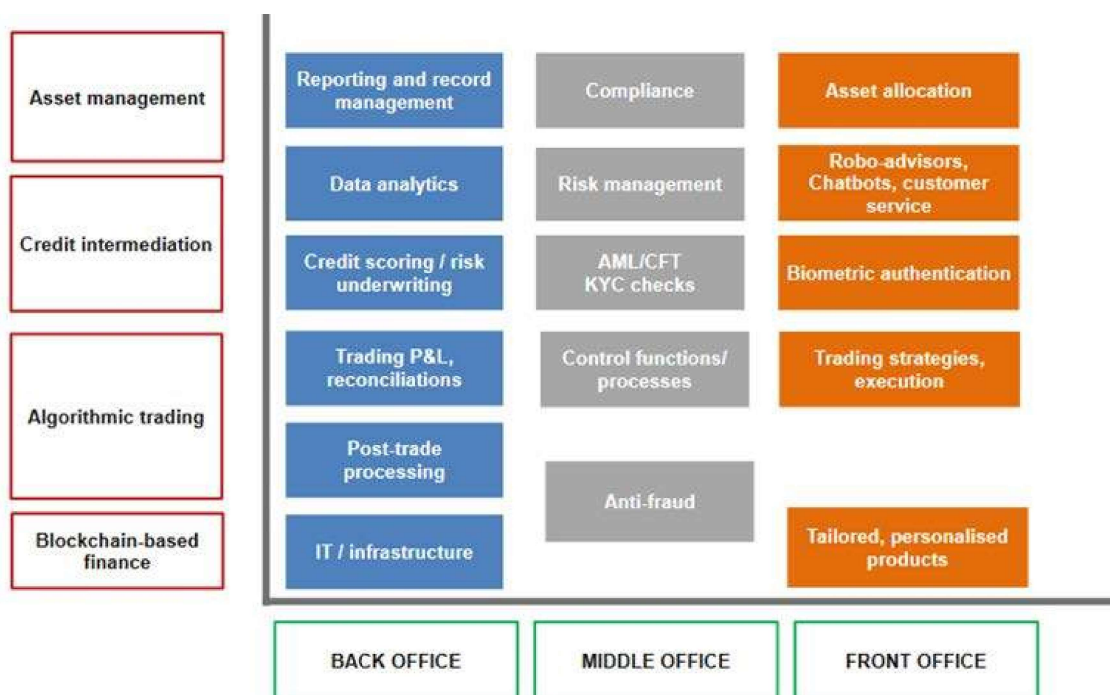


Figure.4: AI Applications for Various Financial Market Activities by OECD.

Moreover, operational benefits arise from implementing AI in the form of cost of operations of the back-office by automating manual efforts and delivering faster results at reduced costs¹⁹.

Data is the core of investment strategies that comprise various structured and unstructured data, and analyzing these vast amounts is critical for strategic trading decisions. However, the processing of such raw data introduces time constraints that can impact trading strategies.

ML models can provide critical insights from the investment processes and improve decision-making for portfolio management, stock selection, and more at shorter timeframes and improving efficiency.

Recently, Deloitte and the World Economic Forum presented a report, "The new physics of financial services: How Artificial Intelligence is transforming the financial ecosystem," highlighting the capabilities of AI models to reshape the operating models of the financial service industry.

Further, the report reveals ten AI-use cases in investment management that signify how AI enables next-generation capabilities previously challenging to achieve with the human workforce²⁰.

¹⁹ OECD.

²⁰ Deloitte, "Artificial Intelligence."



Portfolio Management

Automatic insight generation from earning transcripts and understanding the management sentiment.

Relationship mapping to identify various relations between securities and other market indicators.

Analyzing interrelated datasets to track container shipping and monitoring search engines to find specific topics for structuring hedging strategies.

Corporate website traffic monitoring to identify growth opportunities depending on client behavioral patterns.

Improving client outreach by using advanced ML-based analytics from different data sources.

Front, Middle, and Back Office Efficiency

Operational intelligence using ML models to automate various daily functions.

Risk identification by using ML algorithms to autonomously monitor any transactional anomalies to identify suspected activities and triggering response protocols.

Reporting by implementing NLP models to generate clients' reports, including portfolio and marketing materials with risk commentary.

Chatbots as a means to respond to customer and investor queries.

Employee insights to identify employees' morale by monitoring employee morale and performance.





Other AI-Based Uses in Financial Sector

Retail and Commercial Lending

ML and DL models have proven to help automate credit evaluation procedures. For example, by implementing these models, various documents such as payslips, invoices, and other financial documents can be processed to capture data from the papers to arrive at lending decisions faster. Similarly, institutions engaging with commercial lending can implement AI for extracting critical information from different financial documents like annual reports and cash flow statements²¹.

Claims

Claims processing comprises multiple tasks, from reviewing the customers' information to investigating the claims and adjusting remittance or denial. Essentially, these processes involve large volumes of data arising from different documents. AI can rapidly process these documents against the pre-defined categories and help detect any fraudulent claims. Further, DL models can be implemented for classifying and identifying accident images and estimating costs in real-time²².

Regulatory Compliance

Adhering to regulatory requirements is essential for financial institutions. These institutions can leverage AI for scanning different legal and regulatory documents for compliance necessities. Such AI integration can help introduce a cost-effective solution as AI can autonomously check and classify several documents for non-compliant issues²³.



²¹ Cem Dilmegani, "15+ AI Applications / Use Cases / Examples in Finance in 2022."

²² Cem Dilmegani.

²³ Cem Dilmegani.



Becoming an AI-Driven Financial Industry of the Future



To become AI-based financial institutions, it is essential to streamline the capabilities for value creation. At first, the financial institutions require to move beyond the standardized products and enable integrated offerings by answering a few critical questions such as what to offer, when to offer, and which channels to be used to provide them with. These form the value core of the value propositions for customer journeys beyond the core banking products.

The intelligent models in this context require automation decision-making capabilities and activities on behalf of the customer. Similarly, the financial institutions should provide non-banking services and core banking products to meet the needs of the end-users. For example, Fintech solutions offer customers various decision-making assistance tailored to provide automated forecasting of their monthly incomes and expenses and provide multiple investment opportunities.

The second aspect of becoming an AI-driven financial institution is to create a seamless ecosystem and

platforms for enhancing customer engagement. Finally, the ecosystem's redesign also requires the creation of omnichannel to enable multiple platforms such as web, mobile applications, branch-related interactions, and various interactions through smart devices²⁴.

Besides, the need to create real-time AI-based decision-making layers should include models based on focus areas such as higher accuracy and performance, enhancing customer experience, or gaining insights to understand the subsequent best recommendations. Therefore, it is critical to build a robust AI solution;

²⁴ Biswas et al., "AI-Bank of the Future: Can Banks Meet the AI Challenge?"



financial institutions should aim for continuous development to effectively deliver effective solutions.

However, equally important is to create explainable AI models for end-users and address various gaps from changing mindsets and skill gaps. Furthermore, to foster the development and improvement of AI-based decision-making and deployment of different advanced models, there is a need to establish the infrastructure, rewrite the business

processes, AI performance evaluation, and risk management of AI models for improved outcomes.

Moreover, AI models must evolve with increasing capabilities with new techniques such as NLP, advanced computer vision, and augmented and virtual reality to provide a well-established AI ecosystem capable of enhancing customer experience and bringing operational efficiency²⁵.

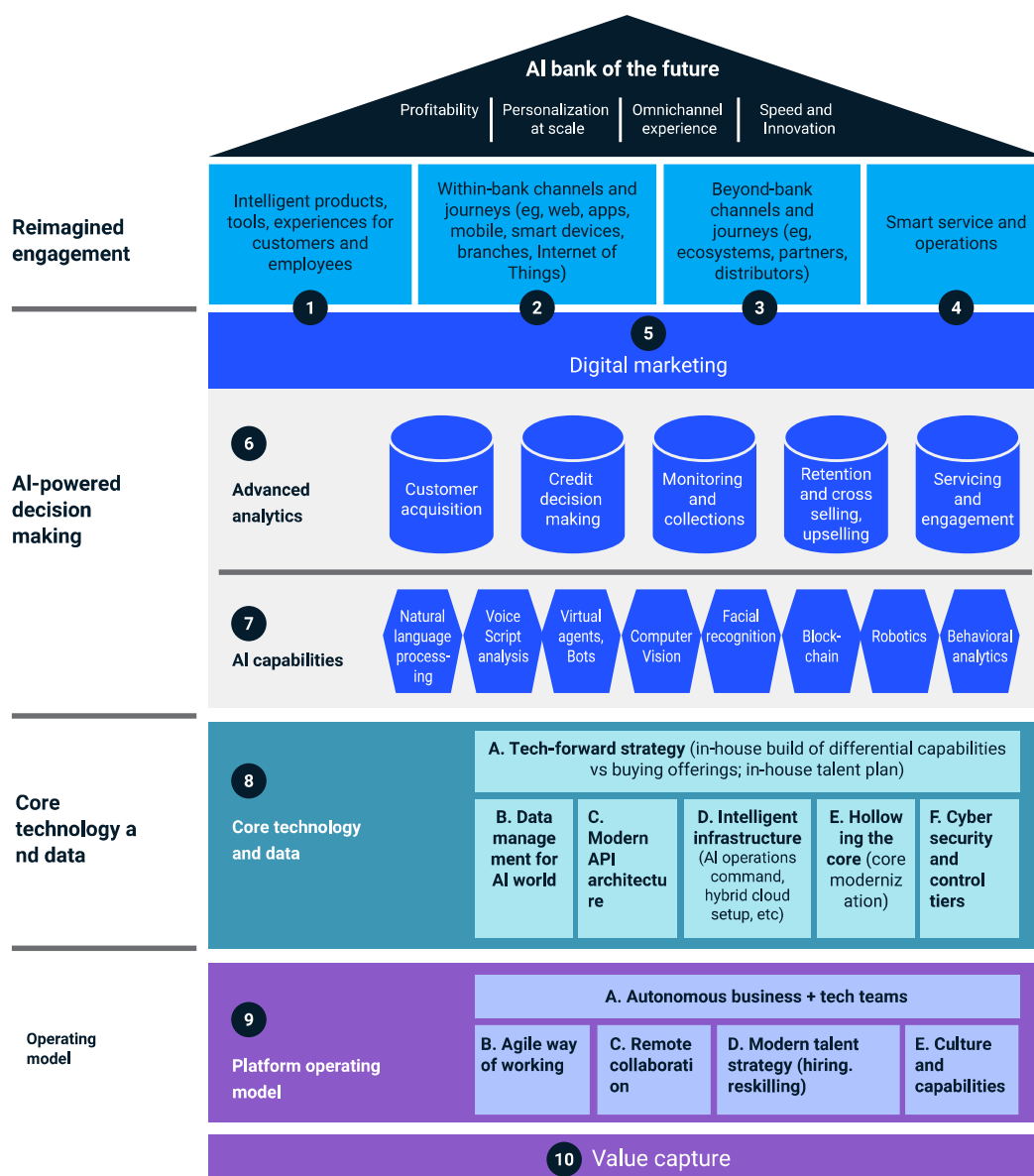


Figure.5: Redesigning the AI ecosystem to create the AI banks of the Future (adapted from Biswas et al.)

²⁵ Biswas et al.



Knowing the AI Limitations

Despite the benefits of AI and its autonomous capabilities, AI has its limitations like any other technological offering. Although AI has tremendous potential to provide efficiency, analytical accuracy, and faster outcomes for routine operations, various areas of the financial industry are not logical operations.

For instance, analyzing a market behavior requires experience, and several advanced AI can learn from experience and may make the process speedier, but it cannot replace the importance of human experience. Similarly, in credit risk and lending operations, a client with a high-risk appetite may not trust an algorithm-based investment decision.

Therefore, financial institutions and regulators require a lot of considerations for how decision flow is to be handled with AI integration. Moreover, regulatory institutions should encourage trustworthy and responsible AI inclusion that preserves the ethical viewpoint in operations.

On the flip side, AI is an incredibly effective tool for several processes that may seem challenging for humans to detect to identify anomalies and prevent fraud in shorter time frames. However, confidence and trust factors are yet to be thoroughly instilled in regulators to fully approve AI in the financial service industry²⁶.

What might appeal to AI integration because this technology can bypass several human factors such as sentiment or human bias. But, there is a possibility of bias in AI models due to the training data, which can broadly impact decision-making.

In this context, decisions must be reevaluated and audited to ensure no issues enabling AI-based automation

in the financial sector. However, it remains essential that regulators play a vital role as anchors in reshaping the financial service industry with AI for better decisions and improved customer experiences.



²⁶ CMS, "Banking on AI in Financial Services | Artificial Intelligence Insight | Technology, Media & Telecommunications | United Kingdom | International Law Firm CMS."



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