

Role of Machine Intelligence in Finance and Banking Industry

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ABSTRACT

Through increased productivity, better client experiences, and strengthened risk management, artificial intelligence (AI) is transforming the banking industry. AI is being used by financial institutions to automate procedures, identify fraud, and offer individualized services. The purpose of this study is to provide a clearer definition of artificial intelligence (AI) and its present use in the financial markets. while talking about the various subcategories of artificial intelligence, how machines learn, its benefits and drawbacks, its application to financial analytics, and the field's prospects. This publication combines studies from some of the leading experts in artificial intelligence to provide a comprehensive explanation of the future and significance of AI.

Keywords: Cyber Security, Financial Institutions, Financial Markets, Financial Services, Fraud Detection.

INTRODUCTION

Artificial Intelligence (AI), also known as Machine Intelligence, refers to the capability of machines and technology to demonstrate intelligence. It encompasses techniques like machine learning, deep learning, soft computing, and computational intelligence (Brandt, 2017). However, defining AI remains a subject of debate due to its broad and evolving scope. Stuart Russell and Peter Norvig, authors of *Artificial Intelligence: A Modern Approach*, identified four key objectives that can guide efforts in the development and pursuit of AI.

1. Systems that think like humans.
2. Systems that act like humans.
3. Systems that think rationally.
4. Systems that act rationally.

Norvig and Russell (1995) identified two key dimensions of artificial intelligence (AI): thought processes emphasizing rationality and behavior focusing on human-like actions. The concept of AI dates back to the 1950s when British mathematician Alan Turing introduced the idea of "thinking machines" capable of reasoning like humans (West, 2018). By 1956, AI research gained momentum, leading to the development of programs simulating human problem-solving (Anyoha, 2017). As technological advancements progressed, AI emerged as a rapidly evolving field, now integrated into numerous applications by companies like Apple.

ARTIFICIAL INTELLIGENCE CONTINUED

In finance, Artificial Intelligence (AI) focuses on software systems that enable machines to learn, adapt, and perform human-like tasks (SAS, 2020). AI enhances efficiency in sectors like legal services, healthcare, and retail. In banking, it aids fraud detection, credit scoring, and automates risk management, making processes faster and more accurate.

SUBGROUPS OF ARTIFICIAL INTELLIGENCE AND HOW MACHINES LEARN

Artificial Intelligence (AI) encompasses subfields such as Machine Learning, Machine Reasoning, and Robotics, with financial services focusing on the first two. Machine Learning enables systems to learn and improve autonomously by analyzing vast data volumes. Its key subsets include Deep Learning, inspired by neural networks; Reinforcement Learning, which optimizes decision-making through trial and error; Supervised Learning, using labeled data to predict outcomes; and Unsupervised Learning, where machines discover patterns independently. These technologies drive efficiency and innovation in financial markets.

ARTIFICIAL INTELLIGENCE IN FINANCIAL SERVICES AND MARKETS

As technology evolves, financial markets increasingly leverage AI for underwriting, risk management, quantitative trading, personalized banking, and fraud protection. AI has revolutionized underwriting by shifting from a "detect-and-repair" to a "predict-and-prevent" model, offering faster and more precise risk assessments (Shelly, 2019). In risk management, AI analyzes vast data sets to identify risks and enhance compliance (Fadlallah, 2018). For quantitative trading, AI-driven algorithms improve stock price predictions, helping traders make data-driven decisions (Butcher, 2018). These advancements are transforming financial services by boosting efficiency and decision-making.

AI has transformed customer interactions in banking by supporting personalized experiences through mobile apps and social media analytics. As digital services grow, banks use AI for product development, customer engagement, and risk management (Njegovanovic, 2018). AI also strengthens cybersecurity by analyzing incidents to detect threats, such as unusual account behavior, helping prevent system breaches and viruses (Palmer, 2020).

PROS AND CONS OF ARTIFICIAL INTELLIGENCE

The phrase "everything in excess is dangerous" applies to Artificial Intelligence (AI), which offers both advantages and challenges. AI boosts efficiency, reduces errors, and advances data analytics, providing valuable insights while creating global job opportunities (Wall, 2017). However, its high development costs, lack of creativity, and emotional intelligence are notable drawbacks. AI's rise has also led to job displacement,

with Wells Fargo projecting over 200,000 job cuts in the next decade (Colagrossi, 2019). Adaptability remains key as AI reshapes industries and daily life.

SOCIAL MEDIA ANALYTICS AND EQUATION (RETURN ON INVESTMENT)

Social media analytics is vital for tracking online conversations about products and companies, enabling businesses to monitor engagement and assess marketing strategies (Barnhart, 2020). By leveraging AI and analytics, companies refine their approaches and calculate ROI, which measures the financial return on marketing investments (Stelzner, 2020). Proper ROI tracking requires accounting for hidden expenses like internet access and software costs. Financial institutions, especially in banking, increasingly adopt social media analytics to gain insights into consumer behavior, market trends, and brand reputation.

FINANCIAL INSTITUTIONS LEVERAGING ARTIFICIAL INTELLIGENCE

Artificial intelligence is revolutionizing the financial sector, transforming how institutions operate and serve their customers. As AI capabilities continue to advance, financial organizations are leveraging these innovations to meet evolving business demands and enhance customer experiences. This section explores five key ways AI is reshaping the finance industry and highlights the companies leading this groundbreaking transformation.

AI'S ROLE IN CREDIT DECISIONS

Credit is essential in the financial landscape, influencing banking and financing options for consumers. Financial institutions rely on accurate assessments to determine lending risks. AI revolutionizes this process by analyzing applicants' financial profiles, enabling smarter and faster credit decisions. Innovative companies are driving advancements, making credit evaluation more efficient for lenders globally.

Zest Finance

Zest Finance, based in Los Angeles, is a global leader in machine learning for automated underwriting. Its technology allows financial institutions to assess borrowers with limited information while maintaining transparency. Zest supports major organizations like Safco, BNP Paribas, and Discover Financial Services.

Data Robot

DataRobot, a Boston-based company, develops machine learning software for various industries, focusing heavily on finance. Its solutions address fraud detection, digital wealth management, lending, and more, helping firms save millions, including \$18 million for Steward and \$33 million for a global financial firm.

Scienaptic Systems Scienaptic Systems, based in New York City, offers advanced underwriting solutions through its Ether platform, which integrates and analyzes data to deliver contextual insights. Serving over 100

million customers globally, it helps prevent \$200 million in credit losses and powers 45 million monthly credit decisions.

Under Write.AI

Underwrite.AI, a Boston-based company, helps financial institutions assess customer risk by analyzing thousands of credit applications. Its technology reportedly reduces default rates by 25% to 50%, including a case where it lowered a dental financing company's default rate from 17.8% to 5.4%.

AI'S ROLE IN RISK MANAGEMENT

Forecasting plays a crucial role in the financial sector, as it enables companies to make well-informed and strategic decisions. The ability to anticipate future trends and potential risks allows financial institutions to navigate uncertainties more efficiently. With the help of artificial intelligence, businesses can analyze patterns and assess trends, providing valuable insights to mitigate future risks. Here are some leading companies at the forefront of AI-driven risk management solutions.

Kensho, based in Cambridge, Massachusetts, uses cloud computing and natural language processing to help financial institutions anticipate trends and make data-driven decisions. Its clients include J.P. Morgan and Bank of America, with S&P Global acquiring Kensho in 2018 for \$550 million.

Ayasdi, headquartered in Menlo Park, California, combats money laundering and helps manage risks through AI-powered insights. It has identified \$45 billion in tax evasion and reduced investigative volume by 20% for a top global bank.

QUANTITATIVE TRADING

Quantitative trading leverages data-driven analysis to identify patterns and optimize trading strategies. With the rise of artificial intelligence, this sector has seen significant advancements as AI tools efficiently process vast amounts of data to uncover valuable insights. Many financial institutions are capitalizing on this technology to gain a competitive edge. Below are some leading companies revolutionizing quantitative trading through AI innovations.

Alpha Sense

AlphaSense, based in New York City, uses advanced technology to identify market trends, serving clients like J.P. Morgan, Microsoft, and Credit Suisse. It supports half of the S&P 500 and 70% of top hedge funds.

KavoutKavout, from Bellevue, Washington, specializes in quantitative trading. Its AI-driven Kai Score predicts stock performance by analyzing extensive data, serving clients such as Google and Baidu.

AlpacaAlpaca, headquartered in San Mateo, California, provides market trend forecasts using AI and deep learning. It powers Bloomberg's Forecast AI Prediction Market section for valuable market insights.

PERSONALIZED BANKING

Today, consumers expect 24/7 access to personalized banking services from their financial institutions. They want real-time financial data readily accessible at the push of a button. Thanks to advancements in artificial intelligence, financial institutions are now able to meet these expectations seamlessly. Below are a few companies that are revolutionizing personalized banking through the innovative use of AI.

Kasisto, based in New York City, developed KAI, a real-time chatbot enhancing customer experiences and reducing call volumes. Its clients include J.P. Morgan and TD Ameritrade.

Abe AI, from Orlando, offers virtual assistants integrated with Amazon Alexa and Google Home, enabling tasks like bill payments and financial management.

Trim, based in San Francisco, analyzes spending patterns to help users save money, reportedly saving customers over \$40 million since its launch.

CYBER SECURITY AND FRAUD DETECTION

Cybersecurity and fraud have emerged as two of the most significant threats facing the financial world today. As technology advances, so do the tactics of scammers who seek to exploit it for their gain. Artificial intelligence has become a crucial tool in combating these illegal activities. The following companies are at the forefront, providing cutting-edge AI-driven cybersecurity and fraud detection solutions for financial institutions.

Shape Security

Shape Security, based in Mountain View, California, is renowned for its advanced fraud detection and prevention solutions (Schroer, 2019). The company's innovative tools are designed to efficiently process large volumes of customer requests while distinguishing between legitimate and fraudulent activities. Upon detecting suspicious behavior, the system promptly alerts financial institutions (Shape Security, n.d.). According to the company, its technology mitigates over 1 billion fraudulent transactions daily while safeguarding more than 150 million legitimate ones (Shape Security, n.d.).

Dark Trace

Darktrace, headquartered in Cambridge, Massachusetts, specializes in detecting fraudulent activity for some of the world's largest organizations (Schroer, 2019). Leveraging advanced artificial intelligence, Darktrace analyzes data and performs complex calculations to prevent illegal activities. Its impressive client portfolio includes global leaders such as Jimmy Choo, eBay, T-Mobile, Rolls-Royce, CBS Interactive, Samsung, and K&L Gates, among many others (Darktrace, n.d.).

VectraVectra, based in San Jose, California, developed the cutting-edge tool Cognito (Schroer, 2019). Cognito assists companies in detecting cyber threats across their cloud environments, data centers, enterprise networks, and IoT devices (Vectra, n.d.). By analyzing user devices and traffic, it efficiently prioritizes threats, saving organizations significant time. Vectra boasts a customer base of over 400 clients, a 95% retention rate, and operations spanning 35 countries (Vectra, n.d.).

THE FUTURE OF ARTIFICIAL INTELLIGENCE

Artificial intelligence (AI) has already made a significant impact on businesses and individuals worldwide in its relatively short time of availability. As it continues to advance, AI is gradually transforming nearly every sector, including transportation, manufacturing, healthcare, education, media, and customer service. While these developments present tremendous opportunities, concerns linger about the potential effects on human productivity, autonomy, and free will. According to the Pew Research Center, "experts predict that networked AI will amplify human capabilities but may also threaten autonomy and agency" (Anderson & Rainie, 2018).

By 2030, society is expected to become increasingly reliant on AI-powered systems. With its potential to either revolutionize or disrupt industries, AI represents the next frontier of technological innovation where "the sky is the limit." From virtual assistants like Siri to self-driving vehicles, AI is advancing rapidly and reshaping the financial markets and services landscape. Dr. Kai-Fu Lee emphasized this transformative power, stating, "Artificial Intelligence is going to change the world more than anything in the history of mankind more than electricity" (Thomas, 2020).

As AI becomes the driving force behind emerging technologies, creating a "new normal" for everyday life, businesses, and markets, adapting to these changes will be critical for both workers and consumers seeking continued success.

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