The Roles of AI in Shaping up Financial Industry

Tony S. Wirjanto†
August 10, 2019

1 Introduction

The term Artificial Intelligence (AI) has increasingly become an integral part of financial industry. Forward-thinking executive managers and business owners have been actively exploring all sort of innovative AI usages in finance and other related areas in an attempt to secure a competitive edge for their companies in the market. It is remarkable to witness just how much AI has been already ingrained in various sectors of the daily financial services.

AI enables the financial industry to keep up with increasingly focal demands by customers who seek more intelligent, more convenient, and less risky ways to access, spend, save and invest their money. The rise of AI in the financial industry has been altering the business landscape rapidly and drastically even in traditionally conservative quarters. Below are a few examples of the roles of AI in shaping up the financial industry and beyond.

2 Credit Decisions

A recent study found that almost 77% of consumers in the U.S. preferred using a debit or credit card as means of their daily financial transactions compared to only 12% who still preferred to use cash as means of payment. But convenient payment options is not the only reason why the availability of credit is so important to consumers nowadays. Possessing a "healthy" credit history would enable consumers to have available to them a variety of favorable financing options, landing jobs and renting an apartment, to name just a few examples. With so many of life’s necessities depending on credit history, the approval process for loans and cards for consumers has become markedly more important to them than ever before.

AI provides a fast and accurate assessment of a potential borrower at a lower cost, and accounts for a far

---

*This note is prepared for ACTSC 974 / STAT 974: Financial Econometrics, under the theme: AI in Finance & Business Analytics for Fall 2019.
†Department of Statistics & Actuarial Science, Faculty of Mathematics, University of Waterloo, Waterloo, Ontario, Canada, email: twirjanto@uwaterloo.ca.
greater multitude of relevant factors, which in the end lead to a better-informed, data-backed decision. Credit scoring driven by AI can effectively help lenders to distinguish between high default risk applicants and those who are credit-worthy but lack an extensive credit history. Furthermore, digital banks and loan-issuing apps exploit ML algorithms on alternative data (e.g., smartphone data) in evaluating loan eligibility and provide personalized options. Thus, AI solutions are helping banks and credit lenders to make intelligent underwriting decisions by utilizing a variety of factors that are able to more accurately assess the traditionally underserved class of borrowers, in particular, the millennials, in the credit decision making process.

There are a few companies, which have been at the forefront at making an effort to shape the financial industry into seriously rethinking about the underwriting process. As an example, ZestFinance is the inventor of Zest Automated Machine Learning (ZAML) platform. This is an AI-powered underwriting solution that helps companies to assess borrowers with little to no credit history of its customers. The platform utilizes thousands of data points and provides transparency that other underwriting systems are simply not capable of doing. This helps lenders to better assess populations traditionally viewed a “at risk.” ZAML is an end-to-end platform that institutions can implement and scale relatively quickly. According to an article by ZestFinance, auto lenders using ML underwriting is able to cut losses down by 23% annually, more accurately predicted risk and reduced losses by more than 25%.

In addition to providing other financial-based services, Scienaptic Systems also provides an underwriting platform that gives banks and credit institutions more transparency, while they also manage to cut down losses for these companies. Currently, scoring over 100 million customers, Scienaptic Systems’ Ether connects a myriad of unstructured and structured data, smartly transforms data, learns from each interaction and offers contextual underwriting intelligence. Working with one major credit card company, Scienaptic Systems boasted $151 million in saving losses for this company in just about three weeks.

Underwrite.ai analyzes thousands of data points from credit bureau sources to assess credit risk for consumer and small business loan applicants. Its platform acquires portfolio data and applies ML techniques to find patterns and classify applications as “good” and “bad”. Thanks to its degree of accuracy, Underwriter.ai claims that it can reduce defaults by about 25-50%. According to a case study cited on the company’s website, since working with Underwriter.ai in 2015, a major online lender providing dental financing has been able to successfully reduce its default rate from 17.8% to 5.4%.

Lastly, DataRobot offers ML software for data scientists, business analysts, software engineers, executives and IT professionals. It provides assistance to financial institutions and businesses to quickly build accurate predictive models that enhance decision making on issues such as fraudulent credit card transactions, digital wealth management, direct marketing, blockchain, lending and more. An alternative lending firm Crest Financial is using DataRobot software to make more accurate underwriting decisions by predicting which
customers have a higher likelihood of default.

3  Risk Management

The impact of AI in financial industry is most eye catching in the area of risk management. Its enormous processing power enables a vast amount of data to be handled in a relatively short time period, and cognitive computing helps to manage both structured and unstructured data, a task which would otherwise have taken a far greater amount of time for a human to carry out. Algorithms analyze the history of risk cases and identify early signs of potential future issues. Accurate prediction of risk and better management of risk are critical to many companies. Nowadays, financial markets are turning to ML, as a subset of AI, to create more reliable and lean predictive models. These predictions help financial experts to utilize existing data to pinpoint trends, identify risks, conserve manpower and ensure better information for future planning.

There are a few companies which use AI to help financial and banking institutions to improve prediction of risk and to better manage risk. Kensho provides machine intelligence and data analytics to leading financial institutions, such as J.P. Morgan, Bank of America, Morgan Stanley and S&P Global. Its software offers analytical solutions by using a combination of cloud computing and natural language processing (NLP). The company’s systems can provide answers to complex financial questions in plain English. According to Forbes, traders with access to Kensho’s AI-powered database in the days following Brexit were able to use the information to timely predict a sustained fall in the British pound. In March 2018, S&P Global announced a deal to acquire Kensho for roughly $550 million.

Lastly, Ayasdi is a company which creates cloud-based and on-premise machine intelligence solutions to offer to enterprises and organizations to meet complex challenges. For companies in the FinTech space, Ayasdi is typically deployed in order to understand and manage risk, anticipate the needs of customers and even aid in anti-money laundering processes. Also, Ayasdi is helping banks to combat money laundering with its anti-money laundering (AML) detection solutions. The sheer volume of investigations has been a major strain on financial institutions. According to an article by Ayasdi, by using the company’s AML solution, one major bank was able to experience a 20% reduction in its investigative volume.

4  Algorithmic/High-Frequency/Quantitative Trading

Algorithmic/High-Frequency/Quantitative Trading is a process of using a large data set to identify patterns that can be used to make strategic trades. AI is especially handy in this type of trading. AI-powered computers can be used to analyze a large, complex data set faster and more efficiently than human can. The resulting algorithmic trading processes automate trades and can save valuable time.

This type of trading has been expanding rapidly across the world’s stock markets. In fact, data-driven invest-
ments have been rising steadily over the last five years or so and closed in on a trillion dollars in 2018. This is largely attributed to the fact that AI has been able to offer a multiple level of benefits to investors. Intelligent Trading Systems monitor both structured (databases, spreadsheets, etc.) and unstructured (social media, news, etc.) data in a fraction of time it would have taken for human to process it. Nowhere does the saying “time is money” ring truer than in trading: a faster processing means a faster decision. This, in turn, means a faster transactions. The predictions for stock performance are more accurate due to the fact that algorithms can test trading systems based on past data and bring the validation process to a whole new level before pushing it into life in action. AI puts together recommendations for the strongest portfolios depending on a specific investor’s short and long-term goals. Increasingly more financial institutions also trust AI to manage their portfolios. There are a few companies which use AI-infused technology to help financial institutions to make better trade decisions.

As an AI-powered search engine for the financial industry, AlphaSense serves clients such as banks, investment firms and Fortune 500 companies. Its platform utilizes NLP to analyze keyword searches within filings, transcripts, research and news to discover changes and trends in financial markets. AlphaSense is valuable to a variety of financial professionals, organizations and companies and specifically the platform is very helpful to brokers. The search engine provides brokers and traders with access to SEC and global filings, earning call transcripts, press releases and information on both private and public companies.

Kavout uses ML and quantitative analysis to process huge sets of unstructured data and identify real-time patterns in financial markets. One of Kavout’s solutions is known as Kai Score, which is an AI-powered stock ranker. The Kai Score analyzes a massive amount of data, such as SEC filings and price patterns. Then it condenses the information into a numerical rank for stocks. The higher the Kai Score, the more likely the stock will outperform the market. Kai’s "top picks portfolio" boasts a 21.9% compound annual growth rate (CAGR) since 2012, which vastly outperforms the S&P 500’s with a record of 13.3% CAGR.

Lastly, Alpaca combines a proprietary DL technology and high-speed data storage to provide short with long-term forecasting applications. Alpaca’s technology identifies patterns in market price-changes and translates its findings into multi-market dashboards. The company recently partnered with Bloomberg to provide users with its AlpacaForecast AI Prediction Market. The program predicts short-term forecasts for major markets powered by AI. It combines real-time market data provided by Bloomberg with an advanced learning engine to identify patterns in price movements for high-accuracy market predictions.

5 Personalized Banking

Today’s digitally savvy consumers look beyond traditional banking. A study by Accenture of some 33,000 banking customers found that 54% of them actively seek tools which can help them to monitor their budget
and make real-time spending adjustments. Additionally, 41% of them are said to be “very willing” to seek and receive a computer-generated banking advice. AI assistants, such as chatbots, use AI to generate personalized financial advice and NLP to provide instant, self-help customer service; that is, AI powers the smart chatbots to provide clients with comprehensive self-help solutions, while at the same reduce the call-centers’ workload. Voice-controlled virtual AI assistants powered by smart tech like Amazon’s Alexa are also gaining traction fast, which should be of no surprise to anyone. Boasting a self-education feature, they seem to become smarter by the day; so we should expect a further rapid improvement in this area. Both tools can check balances, schedule payments, look up account activity and more. A number of apps offer personalized financial advice and help individuals achieve their financial goals. These intelligent systems track income, essential recurring expenses, and spending habits and come up with an optimized plan and financial tips. The biggest U.S. banks, such as Wells Fargo, Bank of America and Chase, have launched mobile banking apps that provide clients with reminders to pay bills, plan their expenses and interact with their bank in an easier and more streamlined way, from getting information to completing transactions.

There are few companies which use AI to learn from customers and create a better banking experience. Kasisto is the creator of KAI, which is a conversational AI platform used to improve customer experiences in the financial industry. KAI assists banks in reducing a call center volume by providing customers with self-service options and solutions. Additionally, the AI-powered chatbots also give users calculated recommendations and help with other daily financial decisions. TD Bank Group has announced plans to integrate Kasisto’s technology into their mobile app, providing customers with real-time support and spending insights. Abe AI is a virtual financial assistant that integrates with Google Home, SMS, Facebook, Amazon Alexa, web and mobile to provide customers with a more convenient banking experience. The assistant provides services ranging from simple knowledge and support requests to personal financial management and conversational banking. In 2016, Abe released its smart financial chatbot for Slack. This app helps users with budgeting, saving plans, and expense tracking.

Lastly, Trim is a money-saving assistant that connects to user accounts and analyzes user spending. The smart app can act, on behalf of the user, to cancel money-wasting subscriptions, find better options for services such as insurance, and even negotiate bills. According to a 2016 VentureBeat article, Trim has saved $6.3 million for more than 50,000 people.

6 Fraud Detection and Fraud Prevention

Every day, a large amount of quantities of digital financial transactions is taking place as users move money, pay bills, deposit checks, trade stocks and other activities via online accounts and smart phone applications. The need to strengthen cybersecurity and fraud detection and fraud prevention efforts is an urgent necessity for
any bank or financial institution, and AI is playing a critical role in improving the security of online finance. AI has been successful in battling financial fraud. AI is especially effective at preventing credit card fraud, which has been growing dramatically in recent years due to the increase of e-commerce and online transactions. Fraud detection systems analyze clients’ behavior, location, and buying habits and trigger a security mechanism when something seems out of order and contradicts the established spending pattern. Banks also employ AI to uncover and prevent financial crimes such as money laundering. Machines are built to recognize suspicious activity and help to cut down the costs of investigating the alleged money-laundering schemes. A case study reported a 20% reduction in the investigative workload.

There are a few companies, which offer AI-based cybersecurity solutions to major financial institutions. Aggregators such as Plaid, which works with financial giants like CITI, Goldman Sachs and American Express, take pride in their fraud-detection capabilities. Its complex algorithms can analyze interactions under different conditions and variables and build multiple unique patterns that are updated in real time. Plaid works as a widget that connects a bank with the clients’ app to ensure secure financial transactions.

Shape Security is utilized by top banks in the U.S. to curb credit application fraud, credential stuffing, scraping and gift card cracking by pinpointing fake users. The company’s ML models are trained on billions of requests, allowing the software to effectively distinguish between real consumers and bots. Shape Security’s Blackfish network also provides AI-enabled bots to detect compromised login credentials, and alert both customers and companies to security breaches instantly. According to the company’s website, Shape’s solutions helped a major bank to protect its customers from account highjacking and detected one million credential stuffing attacks in the first week of its implementation.

Darktrace offers cybersecurity solutions to a variety of industries including financial institutions. The company’s ML platform analyzes network data and provides probability-based calculations. It detects suspicious activity before it can cause any serious damage to some of the world’s largest financial firms. In a case study reported on the company’s website, a global financial software firm, called Ipreo, deployed Darktrace to protect its customers from sophisticated cyber attacks. Ipreo was reported to be able to enjoy instant results in real-time threat detection and effective defense against its internal and external threats.

Lastly, Vectra is the company which creates Cognito, an AI-powered cyber-threat detection and hunting solution. Vectra’s platform automates threat detection, uncovers hidden attackers targeting financial institutions, accelerates investigations after detecting the incidents, and identifies any compromised information. A Vectra’s case study provides an overview of its work to help a prominent securities exchange to ward off malware attacks. Cognito immediately identified a misconfiguration in the exchange’s authentication systems that would have otherwise gone unnoticed.
7 (Business) Process Automation

Nowadays, forward-thinking industry leaders look to a robotic process automation when they plan to cut operational costs and boost productivity in their companies. An intelligent character recognition makes it possible to automate a variety of mundane, time-consuming tasks that used to take thousands of work hours from human and inflate payrolls. AI-enabled software verifies data and generates reports according to the given parameters, reviews documents, and extracts information from forms (applications, agreements, etc.). Employing a robotic process automation for high-frequency repetitive tasks eliminates the room for human error and allows a financial institution to refocus workforce efforts on processes that require human involvement. Ernst & Young has reported a 50%-70% cost reduction for these kinds of tasks, and Forbes calls it a “Gateway Drug To Digital Transformation.” A leading financial firm, JP Morgan Chase, has been successfully leveraging Robotic Process Automation (RPA) for a while now to perform tasks such as extracting data, comply with Know Your Customer regulations, and capture documents. RPA is one of “five emerging technologies” JP Morgan Chase uses to enhance the cash management process.

8 What to Expect from AI in the Financial Industry

It is clear that AI has been rapidly and drastically reshaping the business landscape of the financial industry. Thanks to this trend, there are high hopes for increased transactional and account security, especially as the adoption of blockchains and cryptocurrency in the financial industry continues to expand at a rapid pace. In turn, this might drastically reduce or altogether eliminate transaction fees due to the disappearing role of financial intermediaries in the market.

Digital assistants and apps will continue to perfect themselves thanks to cognitive computing. This will make managing personal finances increasingly more convenient, since the smart machines will be able to plan and execute short and long-term tasks for us, from paying bills to preparing tax filings. We can also expect to see a better customer care that uses sophisticated self-help Virtual Reality systems, as NLP advances and learns more from the expanding data pool of past experience. A new level of transparency will stem from more comprehensive and accurate know-your-client reporting and more thorough due - diligence checks, which would otherwise have taken a large amount of work hours from human.

As we can see, the tangible benefits of AI in the financial services are multiple and hard to dismiss out of hand. According to Forbes, 65% of senior financial management expects positive changes from the use of AI in financial services. This said, as of late 2018, only a third of companies in the U.S. have taken concrete steps to implement AI into their company processes. Many still are inclined to err on the side of caution, fearing the time and expense of such an undertaking. There will still be numerous challenges to implement AI in financial industry ahead of us. However, one thing is already abundantly clear to us. We cannot not shy away
from technological progress forever, as not embracing it now may eventually cost more to all of us in the long run.