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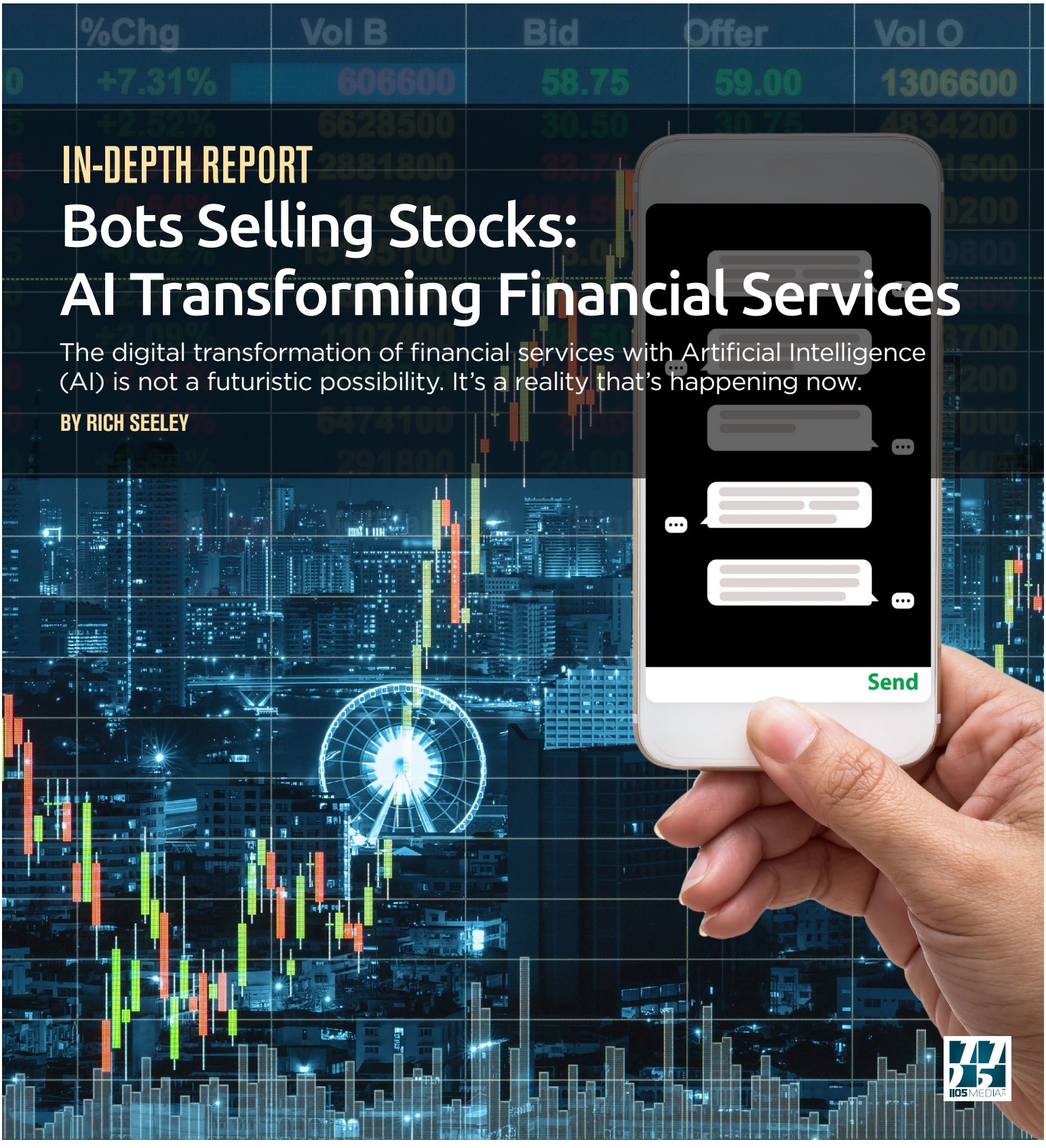

IN-DEPTH REPORT

Bots Selling Stocks: AI Transforming Financial Services

The digital transformation of financial services with Artificial Intelligence (AI) is not a futuristic possibility. It's a reality that's happening now.

BY RICH SEELEY

Unless you are keeping your money in a jar or under your mattress, you are dealing with AI. In Financial Services, AI appears almost everywhere. Go to your online banking app and a friendly chatbot will offer to help you change your password. Log onto Twitter and a chatbot will help you buy stocks. As has been true for some time, credit lines are being raised and loans are being processed and approved not by your friendly neighborhood bank branch manager but by AI because your bank has an app for that. Programmed trading is nothing new on Wall Street. But data scientists are busy creating AI-powered stock brokers that can power their way through Big Data at speeds no human stock analyst could duplicate or probably even imagine. AI is picking winners and avoiding losers by identifying trends beyond the cognitive powers of the human brain. Even on your investment site, your portfolio might be balanced with the aid of an AI financial planner that is working to help you avoid loses even in a mercurial market.

"Given high volume, accurate historical records, and quantitative nature of the finance world, few industries are better suited for artificial intelligence."

—Daniel Faggella

While the possibility of AI replacing humans is somewhat controversial, the cost savings of deploying a chatbot versus hiring customer service representatives is obvious to any bank executive. Much of the negative press about AI focuses on replacing humans who take long lunches, call in sick, and loaf on the job, with bots that are low maintenance and never need a break. That's all about what people do that bots don't do. But the larger story is about what AI can do that humans cannot possibly do.

Machine learning already has a history in the financial industry, noted Daniel Faggella of TechEmergence in Machine Learning in Finance—Present and Future Applications: "Machine learning has had fruitful applications in finance well before the advent of mobile banking apps, proficient chat bots, or search engines," he noted. "Given high volume, accurate historical records, and quantitative nature of the finance world, few industries are better suited for artificial intelligence."

As computing power and machine learning tools become more accessible, use cases for AI in the financial industry are growing, Faggella noted. This includes the growing role of machine learning ranging "from approving loans, to managing assets, to assessing risks."

AI and Big Data are taking a prominent role in the financial industry including:

- Stock trading over social media
- Revenue leakage detection via machine learning
- Asset management automation
- Investment strategies using powerful algorithms
- Asking Alexa to pay your mortgage

Stock trading meets social media

Depending on your point of view chatbots can be cute and helpful or tedious and annoying but TD Ameritrade is betting they can become digital stockbrokers. The company for do-it-yourself traders opened up a chatbot brokerage on Twitter in February 2018. This is an attempt to attract younger investors who are now able to make trades via Tweets 24-hours a day during the Monday through Friday business week. The discount broker's Twitter chatbot is similar to one launched last summer via Facebook Messenger, according to an article in the *Wall Street Journal*. The chatbot employs an algorithm that produces what WSJ called "social signals."

"The algorithm sifts through tweets and then rates the relevance of the information to provide 'intelligence' to investors, such as volume spikes, live trading quotes and company news," the article stated. "The bot is accessible via direct message over Twitter; whether a client or not, a Twitter user can interact by asking questions and requesting information on specific stocks. Users with an Ameritrade account can execute a trade through the bot after being prompted to log in to their account."

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—Wall Street Journal

Machine learning detects revenue leakage

From Twitter bots to machine learning applications that pore through voluminous contracts and government regulations, AI can be found working throughout the financial industry.

There is no denying the business value that can be derived from AI applications that can do things that are beyond what even a human savant could accomplish such as finding a key pattern to increasing business value that is eluding managers and executives.

A recent article in Application Development Trends highlighted the ways AI can go places and find things that might elude even exceptional humans: "What can you learn from what you don't know?" asks Pedram Abrari, CTO of Pramata Corp., which specializes in applications of AI designed to help Fortune 500 companies detect "revenue leakage." Are you suffering financial losses because you're not charging rates allowed in the fine print of

"That's where machine learning and data mining come into play because they go to places where it's difficult for humans to go."
—Pedram Abrari

a voluminous contract? Are you at financial risk because of fine print buried deep in a government regulation?

"That's where machine learning and data mining come into play because they go to places where it's difficult for humans to go," Abrari said. "That's because we can't digest that much information and we can't find patterns in unstructured data quite as well as machines can."

Machine learning is gaining traction, he added, because it can uncover patterns in data and provide valuable insights. This can lead to awareness of business conditions that are not readily apparent to humans, but can help executives and managers understand things that could have a major impact on their business.

"However, to gain those insights you just can't go looking for a needle in a haystack," Abrari explained. "It has to be a controlled search. You have to be able to apply the technology in a controlled fashion. To some extent you have to have a sense of what you are looking for. It can't just be a random search for anything. You've got to be targeting something that you want to optimize."

This is where—as is true in other AI applications in the finance industry—humans play a key role.

Determining what to optimize and how to target the machine learning technology to find the data and insights needed is a job for data scientists, who need to train and retrain machine learning models. With refinement by data scientists machine learning can progress from a baseline of perhaps 50-to-60 percent accuracy to 90-95 percent accuracy.

Once 90+ percent accuracy is achieved the AI technology can be used for business decision making, Abrari said. But he notes that data scientists are needed to get to the place where AI applications can achieve success for the business.

AI managed assets

One example of using AI for managing assets and assessing risks is Schwab Intelligent Portfolios® as the financial firm explains in Rebalancing in Action:

"As part of the program, portfolios are monitored daily for rebalancing purposes, and automatically rebalanced when asset class weightings drift too far from their targets—that is, when their size in the portfolio becomes either too large or too small, as can happen when a particular group of securities experiences a significant price increase or decline."

Along with its AI component, the Schwab rebalancing system also has a place for knowledge workers.

"Schwab Intelligent Portfolios uses the power of technology along with human oversight to rebalance your portfolio as needed," writes David Koenig, CFA, FRM, Chief Investment Strategist at Schwab Wealth Investment Advisory, Inc. But he notes that AI can analyze a stock portfolio in ways that might elude an individual investor:

"The broad diversification within Schwab Intelligent Portfolios—up to 20 asset classes in any portfolio—means that implementing this rebalancing process could be complex and challenging for an individual investor trying to manually manage his or her portfolio. This is one of the areas where the power of technology shines, by allowing us to simplify the portfolio management process and make important features like rebalancing more efficient."

"Schwab Intelligent Portfolios uses the power of technology along with human oversight to rebalance your portfolio as needed."

—David Koenig

Investing with algorithms

Walnut Algorithms, which provides "Artificial Intelligence for Investment Management: Advanced machine learning and applied mathematics for absolute return quantitative investment strategies," is an example of a new generation of investment management firms that are built upon AI.

"We apply the latest advances in artificial intelligence to systematic investment strategies," explained Guillaume Vidal, co-founder and CEO of Walnut Algorithms, in an interview in Dataconomy. The "incredibly powerful algorithms" the investment management firm uses are of recent vintage, "five years old at most." Vidal said. The industrial strength they bring to financial investing are also made possible by the availability of Big Data, programming languages for AI development, and the huge computing resources available in the cloud.

Why is there so much more computing power for these algorithms than was available when programmed trading first hit Wall Street a decade or more ago? MIT researchers Andrew McAfee and Erik Brynjolfsson, attribute it to Moore's Law, which famously stated that "the number of

transistors in a minimum-cost integrated circuit had been doubling every 12 months, and predicted that this same rate of improvement would continue into the future." In a Research Brief, Race Against the Machine, McAfee and Brynjolfsson also offer an example of the geometric outcome of constant doubling using the myth of the inventor of chess.

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—Guillaume Vidal

When the emperor found the game amusing, he asked the inventor what he wanted in payment for it.

"The clever man asks for a quantity of rice to be determined as follows: one grain of rice is placed on the first square of the chessboard, two grains on the second, four on the third, and so on, with each square receiving twice as many grains as the previous. The emperor agrees, thinking that this reward was too small. He eventually sees, however, that the constant doubling results in tremendously large numbers … a pile bigger than Mount Everest."

The MIT researchers note: "Exponential increases initially look a lot like standard linear ones, but they are not. As time goes by—as we move into the second half of the chessboard—exponential growth confounds our intuition and expectations. It accelerates far past linear growth, yielding Everest-sized piles of rice and computers that can accomplish previously impossible tasks."

Computing capacity reaching Everest heights powers the Walnut trading algorithms to go beyond the fixed traditional rule-based systems found in earlier programmed trading.

"What we're building," explained Walnut's Vidal, "is a machine that does not have fixed rules, they are more flexible. A machine learning algo can continuously evolve and actually look at market configurations, classifying buy or sell signals with confidence levels. It's a bit like a trading floor where you have a number of traders, and in our case it's a number of robo-traders which are individual AI algorithms, and we have a portfolio manager which is the cash allocator which uses those underlying signals provided by the different AI algos and optimizes the capital to allocate to those individual signals based on the risk constraints and the exposition constraints, long and short and per instrument, per geography et cetera."

Alexa, Pay My Mortgage

Mortgages are all about money and calculations and data like credit scores and copious amounts of regulations, so it seems a natural for AI. Forbes recently profiled a new escrow company that sees this as an opportunity.

"Unisource is a national title and escrow company that uses machine learning and artificial intelligence to provide tailored lending solutions for mortgage and real estate agencies," writes Julian Mitchell. Machine learning with its ability to find patterns in Big Data from the U.S. home buying marketplace is ideal for poring through all the documents, regulations and mortgage terms and tailoring a loan for an individual buyer. Machine learning offers an agile way to keep up with ever changing government rules. In the Unisource profile, Mitchell writes: "Their proprietary technology also allows mortgage and real estate firms to automate the lending process and adapt to regulatory changes while maintaining compliance."

For tech savvy consumers who don't want to bother with paperwork, Quicken Loans has teamed up with Amazon's Alexa so you can just ask the sophisticated chatbot to make your Rocket Mortgage payment. With online banking, who writes checks anymore? But this is about as convenient as it gets.

Quicken Loans has teamed up with Amazon's Alexa so you can just ask the sophisticated chatbot to make your Rocket Mortgage payment.

Paying loans isn't the only thing Loan Officer Alexa can do for you. According to Quicken's announcement of this latest FinTech application:

By simply asking Alexa, Quicken Loans clients will be able to:

- Review nearly all account details such as current loan balance, monthly payment amounts, payment due dates, and more
- Listen to Alexa deliver current interest rates for all Quicken Loans mortgage programs such as 15-year and 30-year Conventional, FHA, and VA loans
- Make a monthly mortgage payment with a simple and secure voice command in a matter of moments

No more waiting on hold for a customer service rep—one of those scarce human resources—Alexa is there at your beck and call. And you don't have to strain your eyes poring over all that fine print, the perky chatbot will read it to you.

Conclusion: Expect Exponential Growth in AI

The financial industry is at the dawn of the AI revolution. Since financial products are in the final analysis numbers, it has been deploying computers since the era when water-cooled mainframes and punch card readers were state of the art. Since then computing power has continued to grow exponentially as has data. And there is no end in sight for that trend. An IDC executive summary of data growth states: "It is doubling in size every two years, and by 2020 the digital universe—the data we create and copy annually—will reach 44 zettabytes, or 44 trillion gigabytes." We have already passed the point where the human mind can wrap itself around the enormous treasure trove of data to find the kinds of information that can save or make money for financial institutions and investors. The increasing speeds at which data can be analyzed are transforming everything from stock market investing to processing real estate loans. A recent *Wall Street Journal* article reported that FinTech companies are expanding their office space in Manhattan, which in 2017 was triple what it had been in 2014. The article stated: "The big drivers of demand have been the established financial-services firms and banks, which are adding space for digital operations aiming to shake up the status quo." With AI growth new innovations and disruptions in the financial industry are on the horizon.

Rich Seeley is Custom Editorial Manager, Enterprise Computing Group (ECG), 1105 Media and also covers AI for Application Development Trends.