

WHY WALL STREET NEEDS TO MAKE INVESTING IN MACHINE LEARNING A HIGHER PRIORITY

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It seems like you cannot read the news these days without stumbling upon an article on machine learning. From Alexa invading every living room, to self-driving cars picking up and dropping off passengers during “in-the-wild” autonomous driving tests, machine learning is becoming ubiquitous. In capital markets, the deployment of machine learning is still in a nascent stage, but it’s becoming clear that it will have a large impact in the long term.¹ Already, there are dozens of examples where both buy- and sell-side institutions are investing in trials and full-production deployments to help identify trading strategies, optimize collateral management, and improve the measurement of counterparty risk.

To be sure, complex hurdles still must be overcome before Wall Street firms can deploy machine-learning techniques at a scale that will have significant impact on their businesses. To start, institutions will need to have a well-structured big data program and associated infrastructure. Even if they have invested in their data capabilities, global data privacy regulations may make it difficult for them to leverage the information effectively unless they think strategically. Financial services institutions must also improve their ability to recruit scarce tech talent as they are competing with the likes of Google, Amazon, and emerging fintechs for talent.

But financial services firms would do well to begin to familiarize themselves with where machine learning is taking hold, and consider investing in areas where the new technology could eventually provide them with a competitive advantage.

To assist with this process, we examine the potential applications for machine learning below and list where we are seeing it start to make a meaningful difference.

¹ <https://www.ft.com/content/b497a134-2d21-11e8-a34a-7e7563b0b0f4>

WHAT MACHINE LEARNING IS – AND ISN'T

To understand machine learning's impact on capital markets, and on our world more broadly, one must first understand what machine learning is — and isn't. At its core, machine learning enables computers to learn complex rules by analyzing and interpreting massive amounts of data. Machine-learning algorithms improve on traditional predictive models by being able to consume many more dimensions of data and by mathematically improving the accuracy of their predictions once properly trained. They also support continued improvement based on input so they “learn” from their mistakes.

Using a non-capital markets example, if you want to teach a machine-learning model to recognize a banana in a photo, you feed it millions of pictures that include fruit (and no fruit) and manually flag the pictures that include bananas. The resulting “trained” model will be very good at recognizing yellow fruit of a specific shape. That same process can be applied to developing trading strategies or mitigating operational trade breaks, or any other similar capital-markets use case that a bank or asset manager can dream up.

REVENUE IMPROVEMENT AND COST REDUCTION OPPORTUNITIES

Deploying machine learning technology can reduce labor costs across both the front and back office. In back-office tasks, where there are many repetitive processes that require significant human intervention such as trade validation, smart order routing, exceptions processing, fraud detection, and regulatory compliance, the application of machine learning can lead directly to headcount reductions. These tasks do not require significant discretion or complicated decision-making and as such, are excellent candidates for machine learning techniques.

However, it is the very ability of machine learning to make complex decisions that will enable firms to improve their revenues, and the reason why the technology may ultimately become widespread. Once firms tap into that potential, asset management and trading businesses may not look anything like they are today. Machines will play a much bigger role in supporting traditional capital markets roles, such as traders, portfolio managers, and equity analysts. Firms led primarily by executives with financial acumen may transition to leadership teams who know how to take advantage of market intelligence via technology.

BUY-SIDE FIRM INVESTMENTS

It's no longer news to hear of money managers using machine-learning tools to scour social media feeds when forming bearish or bullish views on a company's stock.² Increasingly, both quantitatively focused asset managers and those that use more fundamental research are exploring more ways that machine learning can help them make investment decisions. Examples include:

- JPMorgan leverages data from Orbital Insight that analyzes satellite images of the number of cars parked in a retailer's parking lot to form a bearish or bullish view on foot traffic and revenues.³
- Castle Ridge Asset Management claims a 32 percent average annual return by using a machine-learning system similar to that used to model evolutionary biology.⁴
- Hull Tactical, a high-frequency trading shop, uses machine-learning algorithms to determine its market-timing strategy.⁵
- BlackRock is proposing a new suite of 12 ETFs that are actively managed by machine-learning models.⁶
- After 2019, those who want to become a Chartered Financial Analyst (CFA) will need to be conversant in machine learning to pass the necessary exams.⁷

Machine-learning algorithms are now being deployed to assist with research, make trade recommendations, and identify new trading strategies. State Street created a tool called Quantextual to help customers conduct research more efficiently,⁸ while Saxo Bank used machine learning to create a tool that can personalize a user's trading and investment experience by understanding their behavior and risk profile, similar to the way Netflix recommends movies.⁹

Recently, some firms have even deployed robo-advisors to manage money. These machine-learning tools have the potential to radically change the very nature of the financial advisory business, especially in the mass-affluent category. It is very possible that if machine-learning model-managed portfolios start to outperform human money managers, those firms that integrate machine learning into their advisory business will see increased profitability even in a landscape of falling management fees.

2 <http://www.ibtimes.co.uk/ai-machine-learning-social-media-data-giving-hedge-funds-competitive-edge-1571119>

3 <https://www.zerohedge.com/news/2016-12-09/satellite-imagery-reveals-sharp-retail-spending-slowdown-after-election>

4 <http://castleridgemgt.com/meet-w-a-l-l-a-c-e/>

5 <http://www.hulltactical.com/about-us/>

6 <https://www.bloomberg.com/news/articles/2017-11-20/blackrock-king-of-indexing-ditches-passive-for-bot-built-etfs>

7 <https://www.ft.com/content/28d94422-3588-11e7-99bd-13beb0903fa3>

8 <http://www.statestreet.com/solutions/by-capability/ssgx/investment-insights/quantextual.html>

9 <https://www.watertechnology.com/people/3403346/saxo-bank-ceo-kim-fourmais-the-technology-artist>

Indeed, at some point in the future, it is possible that customers could be paying 2 percent management fees and giving 20 percent of their returns to an algorithm rather than to a hedge fund manager. Already, major asset managers like BlackRock have reduced the number of their traditional portfolio managers¹⁰ in favor of an increasing focus on machine learning-led quantitative strategies. The traditional, staid money management business is slowly becoming a playground for data scientists with newly minted PhDs.

That's not to say that all buy-side firms are using some form of machine learning. For most, it is still in the early days. However, as high investment fees continue to come under attack, buy-side firms will be pressed to look for more additional areas where technology can help them extract cost from their investment management processes. Algorithms that sift through massive amounts of information in search of alpha are clearly a good area to place some bets.

SELL-SIDE FIRM APPLICATIONS

Machine-learning investments on the sell side are currently more focused on cost reduction than on revenue improvement. Replacing people with machines can make back-office processes more efficient and less error-prone. But, similar to the buy side, there's also an early, experimental trend toward using machine learning to predict what clients are going to want to buy.

Today, machine-learning models that focus on natural language processing (NLP) are taking unstructured information and turning it into structured data that can be more effectively used in decision making. For many types of tasks that a bank would normally use humans for, the automation via machine learning can lead to fewer errors and lower costs. Mizuho Bank recently launched a project to automatically extract ISDA contract information.¹¹ Other banks are leveraging a similar approach to meet Resolution Planning requirements or the FDIC's Recordkeeping Requirements for Qualified Financial Contracts.

Machine learning is also being used to support the automation in trade execution, settlement, and clearing where information flows are unstructured. As an example, Finastra (formerly Misys) offers a capital markets product that provides same-day over-the-counter trade validation.¹² It uses a machine learning algorithm to correct validation errors in the trading workflow, helping to limit errors, lower processing time, cut down labor costs, and reduce reputational risk.

¹⁰ <https://www.nytimes.com/2017/03/28/business/dealbook/blackrock-actively-managed-funds-computer-models.html>

¹¹ <https://www.finextra.com/newsarticle/30900/mizuho-and-nri-use-ai-to-eliminate-tedious-derivative-contract-procedures/risk>

¹² <https://www.finastra.com/solutions/treasury-capital-markets>

In other regulatory and risk management operations, machine learning is being used for model risk management to ease the burden of certain regulatory requirements, such as SR 11-7. Nomura uses machine learning for model validation and to restrict what products the model can be used for. In the anti-money laundering (AML) and fraud space, there are a whole range of new fintechs and established companies vying to replace traditional rules-based approaches with machine learning engines. In July, 2017, Nasdaq acquired Sybenetix, a regtech firm that uses machine learning to predict people's behavior in order to flag suspicious activities, expanding its capabilities in the regtech space.¹³ RBC is using machine learning to help its customers manage counterparty risk by combining trading data with other kinds of counterparty information.¹⁴

In areas such as investment banking, machine-learning models are starting to support activities that can also improve revenues, such as pitch creation, pricing, and validation. They are assisting bankers with scouring the market for companies that could become potential acquisitions for clients by grinding through and structuring the masses of information released by public companies.

On the trading side of the business, machine-learning models are being deployed on trader's desktops to analyze everything known about a client's trading history, potential future needs, and customer-relationship strategies before the trader even picks up the phone to take an incoming call or reaches out to generate business. The aim of these investments is to increase trader productivity and optimize client relationship management.

¹³ <http://ir.nasdaq.com/releasedetail.cfm?releaseid=1034236>

¹⁴ <https://www.cnbc.com/2017/03/29/rbc-capital-markets-machine-learning-trading.html>

GETTING AHEAD

Despite the promising opportunities that machine learning offers to capital markets players, only a handful of sophisticated players have truly invested in this form of artificial intelligence. Most financial institutions are still experimenting, with few having made the necessary organization-wide changes to derive competitive advantage from machine learning.

We hope these examples have provided a flavor of the potential applications of machine learning in capital markets. Firms should prepare for the coming transformation of Wall Street by deepening their understanding of machine learning capabilities and start to test the waters, including hiring in-house talent or forming partnerships with technology firms to perform these tests. Otherwise, once the trend begins to accelerate, some firms may find the cost to catch up to be prohibitively high.

In the near future, we expect to see greater adoption of machine learning in all facets of capital markets. Financial services firms will first tackle the low hanging fruit, starting with implementing machine learning to enable more sophisticated rules-based approaches to automation (like RPA). Then, they will progress to trying out simple machine-learning use cases, such as document processing and research aggregation. Next, as banks invest more into machine learning, we expect it will impact traditional capital markets roles. The world in which intelligent robots replace humans at scale is still imaginary – for now – but the line between how traditional capital markets firms operate and the techniques in common use by technology companies will only continue to blur.

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