



"32% of the financial sector jobs in the UK are at high risk of automation. "[1]

With the rise of AI coverage in the media, such headlines are becoming more commonplace. While they hold a degree of truth, there are quite a few nuances to think about when considering the impact that AI will have on the financial services industry. This article will take a deeper look at those nuances to elicit a better understanding of the pace and place of disruption as it unfolds over the next few years.

The adoption of AI in different fields is driven primarily by the tremendous efficiency gains that are made possible via automation and possible cost savings that are realized as labor is replaced. Given the massive promise that this technology has to offer, finance has also tapped into deep learning techniques to gain an edge in a highly-regulated, fiercely competitive landscape.

For example a survey in 2015 found that **false declines, legitimate transactions that are wrongly rejected, cost retailers \$118 billion**; automated and more efficient fraud detection can help to mitigate these losses. [1a] Automation also allows reduction in costs to meet compliance and regulatory requirements which are currently estimated to cost the industry **\$270 billion a year**.

Specifically, in this article, we'll use the term AI-enabled automation to emphasize the difference that this wave of automation has over the previous ones. When making a comparison with

the automation that happened in the Industrial Revolution and using that as a benchmark to make future predictions, we fall into the trap of comparing things that are not similar. **What we're experiencing with AI-enabled automation is an automation of cognitive labor whereas previously it was just physical labor.** This wave of "white-collar automation" renders specialized fields irrelevant in a short while. In 2000, Goldman Sachs' U.S. cash equities trading desk in New York employed 600 traders. Today, that is down to 2 humans while the rest is done by machines.



Labor impacts of AI raise ethical and moral concerns in terms of responsibility that they employers have towards training their employees.



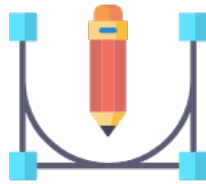
How do we better prepare senior management to understand the trends? To take informed decisions, our research has found that right off the bat, people need to understand the differences between AI, machine learning and deep learning. This wonderful resource from Jason Meyes (Google) is a great starting point. [3] Secondly, we can look at the underlying machine learning techniques, the types of datasets available and research advancements on platforms like arXiv [4] to gain a more thorough understanding of this rapidly evolving domain. Finally, understanding the degree of autonomy, from human-controlled, semi-autonomous to autonomous will also help to delineate the actual impacts that the deployment and use of new systems will have.

LOW HANGING FRUITS RIPE FOR DISRUPTION:

Due to the availability of structured data and the nature of tasks being strictly codified and repeatable, the following areas are:



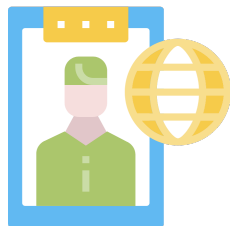
Credit Scoring



Asset Management



Fraud Detection



Compliance

Historically, we had seen similar needs arise that created the first push for automation, in fact, an article from 1928 in the NYT talked about how automation could lead to unemployment. [5] There was a huge growth in paperwork after World War 2 which created a growing need for systems that could automate some of this work. [6] However, researchers also recognized the risk that it could lead to job loss. [7] In the early days of the use of statistics in finance, work by Robert Schlaifer on Bayesian Decision Theory (applying Bayesian statistics to make informed decisions based on probabilities) helped to push for more research into using statistics and other techniques to create efficiency and gains in finance. [8]

This was, in the 1980s, followed by the rise of Expert Systems, which were basically automation systems that made heavy-use of preprogrammed rules. There was some preliminary interest in using neural networks [9] and fuzzy logic [10] but the popularity of expert systems put those approaches in the shadows within the field of finance.

One of the biggest drivers of Expert System Development was in its use of providing tailored financial plans. One of the first systems to do so was called **PlanPower created by Applied Expert Systems (APEX)** which was conceptualized in 1982 and commercially shipped in 1986 provided tailored financial plans for individuals with incomes over \$75 thousand. [11]

The possibility of using **AI in financial fraud detection** was something which garnered a lot of interest in the 1990's. In an era where a lot of transactions were handwritten, the US Department of Treasury developed a system called FinCEN Artificial Intelligence system (FAIS) which helped them sift through 200,000 transactions a week by doing handwriting analysis and identifying discrepancies. Over the period of 2 years, FAIS was able to identify 400 potential cases of money laundering equaling \$1

Ultimately, what led to the demise of Expert Systems in the field of finance was their sheer complexity and a mismatch between the expectations and reality of what these systems could accomplish. [13]

This quick sojourn to see what happened with the use of AI in finance in the past is a good way to inform our decision making about the use of these systems today – especially not to think of them as a panacea and to understand the actual capabilities and limitations of the systems is quite important in framing policies around the use of AI in finance.



THIS ARTICLE WILL NOW LOOK AT...

...a few functional areas that are seeing widespread use of AI. We will also analyze some ethical consequences to consider with each of these functional areas.

Deep learning techniques are helping to power some impressive upgrades, improvements in performance and customer experience as highlighted by the companies discussed here.

Financial institutions and vendors are using AI and machine learning methods to assess credit



quality. Firms are able to leverage data now from social media streams and perform things like automated entity recognition as a way to feed more context into their

decisions. **But non-traditional financial information could introduce biases.** [14] There is a bright side to this where use of these non-traditional sources can benefit people who don't have access to formal credit and financial markets, essentially help in extending banking services to the approximately

A similar argument can be made for the use of personal assistants in the form of chatbots that increase accessibility of financial

planning services to individuals that are more comfortable with a conversational interface rather than a complex financial product offered



online. Additionally, such an interface, if operated by voice can also serve to extend these services to people who can't read. Automating these services could also lower price points, allowing the financial institutions to offer these up to a larger number of their clients. [16]

The use of automation also lowers the price point of financial information which can help more people access investment opportunities, in fact, companies like Quantopian [17] allow people to sign up and upload their algorithms to trade in markets. Some other firms like Numer.ai [18] provide proprietary market data on a platform to data scientists and machine learning engineers around the world (this is something that firms like to hold dear because it helps them get an edge over their competitors in the market) via a technique called homomorphic encryption [19]. This obfuscates the actual data but still retains the underlying mathematical properties of the dataset allowing the people using the platform to apply state of the art algorithmic approaches to make predictions on the dataset. Numer.ai in return provides a cut of the profits generated to those that build the most successful models.

There has been a general push for stricter regulatory compliance meaning that firms need to find more efficient ways to comply and maintain profit margins while not being bogged down by compliance costs. Automation can go a long way in meeting these compliance requirements and exceeding in some places the quality of work that would be done by human agents. [20]

The total RegTech market is expected to reach \$6.45 billion by 2020, growing at a compound annual growth rate (CAGR) of 76% [21]

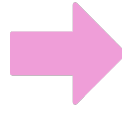
With all the great opportunities coming up with the use of AI in finance, we must keep our eyes open to new ethical concerns that these systems might create:



LACK OF INTERPRETABILITY in machine learning models will create barriers [22] in terms of audits of these systems that could limit their deployment and acceptance.

Adequate testing and ‘training’ of tools with unbiased data and feedback mechanisms are important to ensure applications do what they are intended to do—robustness of the results that are produced from these systems must be ensured, especially when taking decisions on personal finances for an individual, e.g. loan applications processing.

When thinking about the stability and resilience of a largely automated financial system, there can be an exacerbation of negative outcomes triggered by false information—automated systems that act at sub-human comprehension level can trigger massive market panics—e.g. 2013 tweet on White House explosion caused market panic. [23]



This will hinder a substantial amount of the **AUDIT REQUIREMENTS** that financial firms face and in case of potential discrimination cases, it will be hard to justify one way or the other.

Ultimately, we must dedicate adequate resources towards understanding the ethical and societal impacts of deploying AI-enabled automation to make sure that the benefits are equitably distributed.

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LEARN MORE:

Keen to learn more about how AI is being applied in the financial sector and how you can ensure you're implementing it in the most ethically sound and efficient way? Join RE•WORK at the [Deep Learning in Finance Summit](#) in **London** this March 19 - 20, and at the [AI in Finance Summit](#) in **New York** this September 05 - 06. Topics covered will include Investment, Pattern Recognition, Stock Market Prediction, Financial Compliance, Financial Forecasting, Retail Finance, Robo Advisors, Neural Networks and more.

Global AI experts from the following companies are confirmed to present their most cutting edge work:



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