The Big Picture: AI

Diary of a Quant

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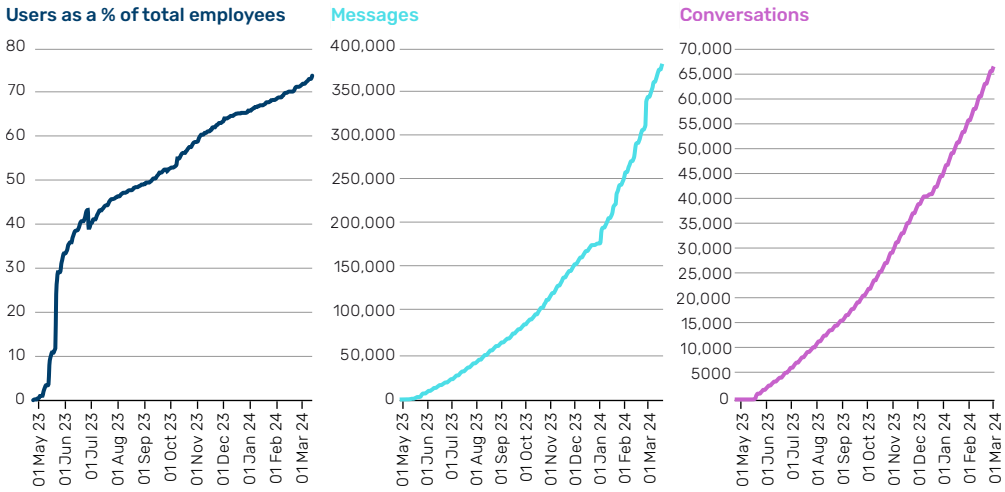
As Chief Investment Officer at Man AHL, I've witnessed first-hand the impact of artificial intelligence (AI) on the world of quantitative investing. Despite machine learning (ML) methods being available back then, the limitations of compute power and data rendered most of these techniques useless in the face of low signal-to-noise ratios. But as the trifecta of data, methods and processing have grown, so too have applications. True ML approaches let the data speak and have been part of the fabric of AHL for over a decade. As we sit here today it is clear that AI – in its various guises – has the potential to disrupt traditional asset management as it will other industries. The high adoption rate of AI across our business – be it for data analysis, strategy development or execution – really speaks to its functionality, as well as its potential. It is therefore a worthy topic for this first edition of *The Big Picture*.

Figure 1. Cumulative usage of ManGPT



Source: Man Group, as at March 2024. ManGPT was developed for use by Man Group employees and leverages Microsoft's ChatGPT application programming interface

Before diving in, I should be clear on what I mean by AI. Since Chat-GPT took the world by storm in November 2022, AI has become synonymous with generative AI. However, large language models (LLMs) like Chat-GPT are only a subset of deep learning models, which are, in turn, a subset of machine learning (ML) models, all of which sit under the broad umbrella of AI techniques. My colleague Martin Luk wrote a comprehensive review of Generative AI so I won't repeat his findings here, but will rather share some of what we've learned during 10 years of AI implementation at AHL.

AI in data science

Let's start with data. This is fundamental to systematic strategies, representing the starting point for any trading system. The integration of AI, specifically through tools like GPT, increases the utility of information contained in a variety of forms including text. With the ability to process vast amounts of previously unstructured data – such as company filings and social media posts – GPT offers a cost-effective alternative to traditional, labour-intensive data cleaning and modelling methods. It also allows us to further rationalise our workflow, handling preliminary analysis steps like data quality checks and plotting with ease, thus freeing our analysts to delve into more complex inquiries.

What's more, GPT can efficiently sift through reports from data aggregators, not only summarising new datasets on the market but also spotlighting the most pertinent for our teams' research. This capability outperforms manual efforts, processing and condensing information with better efficiency.

AI in systematic strategy development

It's important to highlight that AI is one of many tools we use when developing our strategies. It's fair to say that automatically discovering uncorrelated signals at scale is a diversifying approach to traditional quant that can work well on certain types of data. A typical quant may discover one signal a month by developing a hypothesis and testing it, whereas a machine can discover hundreds of signals. However, the danger with the machine learning approach is obviously data mining. So, how does it work?

An AI model would typically search a universe of parameters selected by human researchers. When assessing the results, we can train models not to cherry pick, but rather blend results. The models compare the alphas found in a dataset against the signals that one would find in random noise. How is the information decay? Is the out-of-sample a high proportion of the in-sample? These are some of the questions that need to be investigated after the simulations.

As an example, imagine you are looking at some quarterly company cash flow ratio. You may reasonably believe that there is value in this data, but you need to measure some type of change, or acceleration, or seasonality, normalise it to its peer group, smooth this effect, etc. You have two options:

1. Believe there is a single, gold-standard way to do this and spend some time building it; or
2. Assume there are many weak effects and that it would be beneficial to take an average.

Now, say you tried 10,000 formulas and found 10 that look good. You'd have expected to find this in random noise, so you don't trust it. But say you tried 10,000 and found a quarter of them worked – well that's a different story.

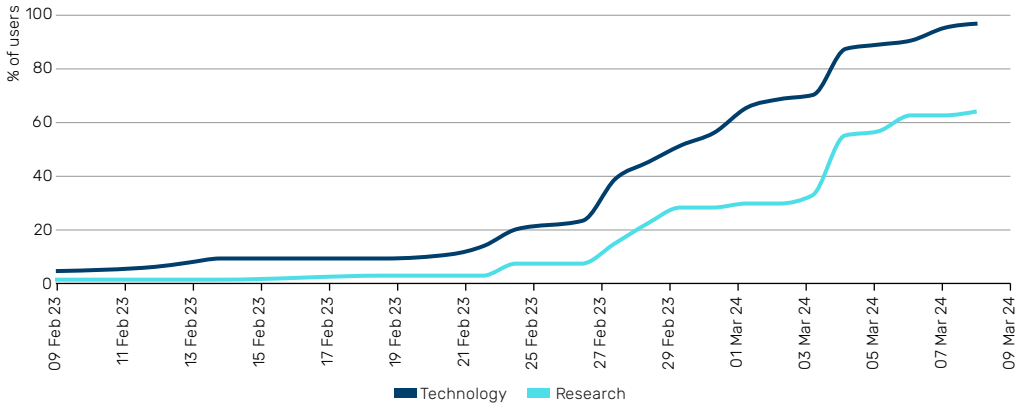
Once you combine the representative specimens, you'd still need to test whether this combination generalises on unseen data. If it does – well now you've got something to really explore. Such functionality empowers our researchers in making discoveries more quickly and effectively.

AI in code development

AI can also significantly enhance the productivity and efficiency of code developers. By automating repetitive tasks, AI allows developers to focus on more complex problem solving. Researchers historically spent approximately 80% of their time coding and 20% thinking, but this is starting to shift in the opposite direction.

AI-powered code completion tools predict and fill in lines of code, speeding up the development process and refining algorithms for better code execution. Debugging becomes less time-consuming with AI identifying and suggesting fixes for code anomalies. In an internal survey of our developers and researchers on AI tools, almost all responded that they would be disappointed if AI tools were not offered or were scaled back.

Figure 2. Copilot adoption at Man AHL



Source: Man Group, as at March 2024. Copilot is an AI companion developed by Microsoft.

However, the use of AI in code development is not without risks and dangers. Over-reliance on AI can lead to complacency, with developers potentially overlooking errors that AI fails to catch. The "black box" nature of some AI systems can obscure the reasoning behind code suggestions, making it difficult to fully trust the automated solutions. Additionally, AI-generated code may inadvertently introduce bias or errors that are difficult to detect, and debugging AI-generated errors can be more complex than traditional bugs.

With all of that said, the potential here is really very exciting. The ability to explore ideas without all the labour-intensive coding work can be revolutionary for the research process.

AI in execution

AI techniques are also extensively applied in execution at Man Group. Here, we benefit from our affiliation with the Oxford-Man Institute of Quantitative Finance (OMI), where experts in the field of machine learning work together with our own researchers.

Specifically, we use a branch of machine learning known as reinforcement learning to help us find the best route to market for a given trade. It is rarely a straightforward exercise. There are several challenges to navigate when attempting to optimally route trades: one cannot observe the outcome unless one chooses the option; the results can be variable; and the environment could change (to name just a few). Additionally, the process of continually analysing all possible choices is labour-intensive.

A potential solution to these challenges is to utilise what is known as adaptive intelligent routing (AIR) algorithms. These algorithms work to balance the exploration of possible trading routes with the exploitation of what appears to be the best route to trade. The idea is, in general, to favour the most promising option, but with a sensible amount of exploration. There are a number of AIR algorithms to choose from and finding the optimal balance of exploration and exploitation is non-trivial, particularly in a non-stationary setting such as in the world of trading.

And the downside?

Any discussion of AI would not be complete without reference to the risks and challenges it poses. Earlier, I underscored the importance of human oversight and this is particularly pertinent in relation to 'hallucinations', essentially model generated answers which may look correct but which are, in fact, plain wrong. Intellectual property risk, privacy issues, the lack of established ethical standards, biases compounded by AI consuming large amounts of human-produced data are just some of the other risks that we need to remain alert to and seek to mitigate.

Parting thoughts…

We have come a long way since the launch of our first actively managed ML strategy in 2014, and we expect the future of quant investing to be heavily influenced by advances in AI. Today we are seeing progress and making discoveries at a faster pace than at any stage in the past. To say that AI has remodelled the investment landscape at this point would be premature, but it is clear that its usefulness is only going to increase – and with it a wave of innovation that it is difficult not to be excited about.

Authors

Russell Korgaonkar
Chief Investment Officer, Man AHL

Russell Korgaonkar is Chief Investment Officer of Man AHL, with overall responsibility for investment and research. He is also a member of Man AHL's management and investment committees, and a member of the Man Group Executive Committee. He was previously Director of Investment Strategies of Man AHL, responsible for Man AHL's Liquid Strategies unit, which creates and runs scalable systematic strategies, as well as the Institutional Solutions business. Russell joined the firm in 2001 as a researcher and later portfolio manager focused on systematic cash equity strategies, before becoming Head of Portfolio Management in 2011. Russell holds a BA/MA (First Class) in Physics from the University of Oxford.

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