

Algorithmic gymnastics – keeping at least one vault ahead of the rest



BY DAVID WALKER

Little may John Bates have realised, as he studied employee badge-tracking systems at Cambridge University in the late 1980's and early 1990's, that the same principles allowing the university to monitor where employees' little steps were falling in its buildings would one day underpin Bates's own work at Apama, then Progress Software, helping hedge funds take giant leaps ahead of their competitors on global markets.

Before 'cutting the umbilical cord' with the mother ship Academia and founding algorithmic trading software firm Apama in 1999 (which was bought by Nasdaq-listed but Massachusetts-headquartered Progress Software in 2005), Bates's days in Cambridge's halls found him examining distributed computing systems.

"I went to the computer lab and got very interested in database systems, and also in logic engines and rules engines and distributed communications," explains Bates, now vice-president Apama products, Progress Software.

"In the lab alone, there was a huge amount of real-time information flowing around from a whole range of different systems, and nobody had worked out applications to take advantage of this real-time information and respond in a particular system, deriving real-time intelligence and designing patterns to respond to this data."

An early example, in the 1980's and early 1990's of real-time data collection was the employee office-badge system.

"Those applications struggled to cope with the huge amount of data streaming into them about changing employee locations. They also took ages to build using traditional techniques and if you wanted to build another one, it didn't seem to make sense to build it from scratch.

John Bates's product design may be step-by-step improvements at Progress Software, but for his hedge fund clients, it can provide a giant leap ahead of their peers

Traditional programming techniques are sequential, but that doesn't work well with a paradigm involving responding to a stream of updates about people moving between rooms – which are asynchronous. It seemed to require a new paradigm."

As Bates turned his attention to financial markets, he saw the possibilities of applying his expertise of real-time analysis of the markets. Bates found, in his words, that "companies had become successful in shipping data around, but no-one seemed to have an infrastructure that could analyse that data. We looked at things like the correlation between news and financial markets data, not just financial markets data in isolation."

Since Bates's early work, of course, the algorithmic trading that has developed has become extremely popular, with hedge funds leading the charge. Estimates from Tower Group suggest 22% of trading by US hedge funds, and 18% by European hedge funds, is conducted algorithmically. (Worth noting is the quick amalgamation of the term 'algorithmic' to encompass a multitude of activities and programmatic trading 'solutions,' from straight-through-processing (STP) to systematic execution without human hand, to artificial intelligence (AI) systems.)

Bates, for the record, falls mainly into the latter camp when discussing algorithmic trading, arguably setting himself and Progress Software apart from many of the company's competitors. Advanced algorithmic trading in his view is not just STP. Nor is it just hands-free trading, the classic 'one-man-a-computer-and-a-dog' hedge fund analogy – where the computer whirs happily away, the man feeds the dog, and the dog's job is to stop the man, at any cost, from touching the computer.

For Bates, algorithmic trading ideally involves a portion of self-teaching systems, where the program learns from its mistakes. Such 'awareness' on the part of the program may also help it avoid having the pattern of trades it puts into the market from being exploited by other algorithms and – although Bates does not venture to say in as many words – help it exploit other systems.

(In this regard, it is fairly common knowledge there is a gaggle of opportunist

hedge funds who make it their job to pick the trading patterns of, and make money from, juggernaut funds such as Man AHL.)

HAVING FUN IN REVERSE

If managers' trading is spotted, and regular enough – whether or not they use algorithms themselves – they are liable to be 'reverse engineered,' that is, their buy and sell orders pre-empted and used to maximum effect – by their competitors. "Funds say it's happening to me every day and algorithms are acting on other algorithms," Bates says. "You haven't got any choice because you are at the mercy of the order book."

Ever felt you were just such a reverse-engineered patsy in the market?

If so, the solution, says Bates, is simple: "When someone points a gun at you, the best way to avoid being hit is to move, and move quickly. The best way to avoid reverse engineering is not to stand still. The whole principal of trading, in a way, is about reverse engineering, it's about making money and that's at the expense of someone else. But reverse engineering is becoming a bit more explicit now, because there are computer programs waiting to act when something happens.

"The main thing you need to do with a strategy, once you're suspicious someone else knows what you're doing, is to evolve your system. Either get rid of it altogether, or evolve it.

"One client recently, for example, had a Vwap strategy using historical volatility to work out slices in the day, and people could see that every half-hour something happened, so you could randomise the time period, or the parameters around the trading. You see that kind of thing all the time when someone works out the frequencies, then they oscillate them."

Naturally, the more advanced algorithms recognise this, and have themselves evolved to place, then rapidly cancel 'ghost orders' from the order book, monitoring liquidity and trying to trigger other machines to 'show their hand,' and exploit it.

"They're trying to pop up, show their hand, attract people and get people to put things into the market, and, by that, to see what other algorithms are doing."

ADDING YOUR OWN TOUCH

Apart from continually evolving one's systematic program, Bates says, the other recommendation to purchasers of algorithmic packages is to seek those that can be tailored to managers' specific needs. In this regard, again Progress Software may set itself apart from competitors who provide ready-made, unchangeable packages.

"Our approach is always that we're happy to give people some starter algorithms but we believe in the client's intellectual property, that they may want to build their own stuff with our (Progress Apama Algorithmic Trading) platform, all we want is that our platform gives you the capabilities to achieve what you want to.

"Put in a little bit of customisation, and you're differentiated again. If a broker is offering an algorithm where you can 'paramaterise' it like a

Vwap algorithm, where you can alter how many slices, a start- and end-time, you can stay ahead of your competition. You may be able, if you're an important enough customer, to persuade the broker to give you a new algorithm or persuade them to change theirs for you, but how long will that take, how much will it cost?"

Progress Software's platform allows traders to "create, manage and test their own trading strategies against live or canned data," according to the firm, "allowing them to monitor and react against multiple data streams, exchanges and reference data," and change parameters in real time. Firms like Deutsche Bank, which uses Progress Software packages, do this, but other brokers are less willing to allow changes.

It was big investment banks who were the firm's first clients for algorithmic packages, Bates says, and Deutsche Bank has been joined by the likes of JP Morgan Chase and ABN Amro.

Hedge funds, Bates adds, typically engineered their own trading systems. Two things have changed since then, he adds. First, a move to allow managers to alter algorithmic packages for their own designs has allowed smaller hedge funds to enter the arena – Bates says funds with a "few hundred million dollars AuM can now be involved" – and hedge funds have lured some of the brains behind the banks' developing of in-house algorithmic packages to join them.

"In the past,

banks would typically have had the best research, the best quants and the best programmers. Nowadays, if you have the ability to move quickly and a few people with the right strategies in their mind and a good team, or those who know how to use tools to access their markets, you don't need a huge team anymore to be involved.

"With hedge funds, early on they built it all themselves, but now I am seeing a fundamental change with the big players using technology to leverage their intellectual horsepower."

"When someone points a gun at you the best way to avoid being hit is to move, and move quickly. The best way to avoid reverse engineering is not to stand still. Once you're suspicious someone else knows what you're doing...evolve your system."

JOHN BATES, PROGRESS SOFTWARE

As well as the moving of hedge funds increasingly into program-trading Bates witnesses, hedge managers are also moving into niche markets, less transparent, more illiquid, and often OTC, telephone-based to maintain their advantage.

Such markets may pose some challenges for

algorithmic packages, Bates notes, as order flow is split between centralised exchange and phone, with one influencing the other often rapidly and perhaps unexpectedly.

"If the market is predominantly phone-based, it can present challenges to algorithms if the phone is the master method of accessing the market, but markets will move more and more electronic and the more and more effective systems like ours will be." Bates adds here that algorithmic trading has not only been applied to commodity markets and equity exchange trading, but is also seeing accelerated adoption in a largely OTC, and the quite fragmented foreign exchange market.

"In FX, you have so many liquidity pools," he explains, "the banks' own individually, aggregated banks' liquidity like EBS, Hotspot and so forth that are effectively exchanges, so the really smart funds and proprietary trading groups can look at all those pools in parallel. They all have proprietary APIs where you can talk to all of them and see all the prices and respond.

If a fund is predominantly equity, they may do a bit of futures

combining with equity and we have also seen a big rise in automatically hedging systems."

Bates's words on fragmented markets may gain extra importance when Mifid takes effect in the EU from November 2007, adding to the main exchanges that managers or their trading systems monitor for best execution a plethora of investment banks internal-crossing networks (to be known as 'systematic internalisers') and ECNs (to be dubbed in Europe 'multilateral trading facilities'). While the number of each that will appear under Mifid is not known, the EU provision will compel managers to survey many more markets for best price, and justify if they trade in liquidity pools not offering the best price why they did so.

WHERE TO FROM HERE?

For those wondering where AI and algorithms go from here, news is Progress is planning to teach them to read, Bates says.

An as-yet-unnamed news agency has discussed with algorithmic-package providers ways AI systems could more efficiently connect news flow with price patterns, helping managers profit more quickly as stories break.

"At the moment, doing this is a matter of using keywords, but we can foresee a world in which it's much more complicated than that," Bates says. "For example, as the news feeds come in, you could take in all kinds of research and ranking and documents.

"If you have non-farm payrolls, for example, it comes out as a number, so if it comes out with 'NFR' as the subject, and the number as a special field, then algorithms will very easily look for NFRs to be less than a certain number, and trigger trading accordingly. But then you get more subjective news where, at the moment, you need humans in the process.

"If you said if an article was 'good' or 'bad,' how do you determine that? One of the easiest ways is where a kindly news agency marks it up and sends it out. A more advanced way, though, is if an algorithm reads it, and determines whether it's good or bad. It's challenging and we're not saying we're there yet, but we see a level of interest there. You have to train your system to read a document, and look for keywords and phrases." News agencies working in tandem with algorithm producers to make documents more intelligible to AI software could provide a powerful tool to managers.

JOHN BATES

Dr John Bates (right) is vice-president Apama products, Progress Software. Bates has responsibility for leading the team, designing and developing Progress' Apama products for algorithmic trading, risk management, event-processing and business-activity monitoring.

Before joining Progress, Bates was the co-founder, president and CTO of Apama and is co-inventor of Apama's patented technology. After completing his PhD in distributed computing systems at Cambridge University in 1993, he became a Fellow of St Catharine's College and Professor of computer science. Bates led a research group investigating event-based computing systems until 2000.