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Forex Visionaries – *Part Two*

In the second of its serialisation of FXStreet's interviews with "forex visionaries", *Profit & Loss* continues with an interview with Gerd Häußler.

Artificial Intelligence systems will sooner or later beat any human expert - Gerd Häußler

Artificial Intelligence has been used in trading for two decades. The machines haven't replaced humans yet, but A.I. or neural networks trading is a reality which keeps evolving. Gerd Häußler knows about it. He has been involved in this technology for more than 20 years. Besides his industrial projects, he's worked on the prediction of financial markets using neural networks. In this interview, he explains what Artificial Intelligence systems are, how they can be compared to other automated models as expert advisors and what will be their future. "It is only a matter of time until A.I. systems permanently replace the current rule-based systems", he says. We also discuss with him the use of automated systems versus manual ones: even if Häußler predicts that A.I. systems will play a bigger role in the years to come, he believes people will probably continue to trade manually, because they are "interested in markets and they want to apply their own intelligence and knowledge. They want to understand markets and their mechanisms."
High frequency and its impact on volatility, the effectiveness of automated systems in case of crisis situations and in the new economic environment or the interpretation of psychological factors by computers are other topics that Häußler covers with in this interview of the "Visionaries" series.

As a software developer in the industry sector, what was the catalyst that got you into automatic trading?
When I started to work as a software developer more than 20 years ago, I worked with a then-revolutionary parallel computing technology ("transputer"). For that time and in terms of computing power, these systems were superior to conventional microprocessors that existed up to that point. The computing power could be increased almost arbitrarily through parallelisation of several units, achieving the computing power of multi-million dollar mainframe computer systems. These systems were designed for applications that require high computing power. The idea then rose up to implement these systems on financial data.

Do you remember any experience or event that got you involved in finance and trading by then?
At the time I got involved in automatic trading, I was also experiencing my first very memorable negative experience with stock trading. Furthermore, I was immensely inspired by the movie "Wall Street" starring Michael Douglas, which helped me delve further into the world of finance. I think that I am not alone in this regard.

Before going any further, can you briefly define for us Neural networks and how they work?
Neural networks are adaptive systems, which means they don't require explicit know-how. The input data – or "example data" – is added to the system as well as the desired output data, or "training data", without any other explicit rules. The system then automatically determines the hidden relationships in the price data, during the training phase. For this, historical data is used.
When the training phase is completed, you can feed the neural network with new input data (where output data is unknown) and the generated output data will be the prediction. For example, you give the daily returns of the last 20 days to the system and the forecast (ie, output data) will be the daily return for tomorrow. Neural networks such as A.I.-systems are also used for forecasting (alpha-model).

Nowadays private traders use more "Expert Advisors" than neural networks. How would you explain this phenomenon?
"Expert Advisor" and "Trading Robot" are an umbrella term for automated trading systems based on explicit algorithms and the subsequent automatic order execution. Algorithm-based models (or alpha theory-driven models) follow programmed rules that were developed by experts. So, there is explicit knowledge in the form of programs or algorithms in these systems.
Neural networks are at first sight very tempting because they find implicit rules and patterns independently. But they are also more complex and difficult to handle than rule-based systems. Professional traders have more opportunities and qualities for the use of such systems than private traders. That said, it has been shown that adaptive A.I. systems develop strategies that have basically comparable performance in most cases than already known rule-based systems.

Do you think neural networks can be more effective than algorithmic systems?
Neural networks have been used for more than 20 years as a forecasting system for financial markets. They usually reach a similarly high success rate as traditional algorithmic systems that have been programmed by experts. However, their hit rates are not higher. Studies have also shown that self-learning A.I. systems such as neural networks recognise more or less the same patterns as rule-based systems, like trending or reverting strategy. In other words, A.I.-Systems are not "smarter" than expert-programmed systems. Neural networks bring no particular advantage in direct comparison.

Will tomorrow's neural networks be based on completely different algorithms than the ones built in the last decade?
As the computing power will continue to rise, A.I. systems will sooner or later

beat any human expert. This is a similar situation as in chess (IBM's Deep Blue) or in Jeopardy (IBM's Watson).

Are automatic systems generally more effective for speculators seeking absolute returns, for companies with hedging requirements, or both?
It depends on the investment horizon. If your trading horizon is short, then automatic systems are more reasonable than manual analysis. And I would say that for mid-term or long-term horizons, trading automatic systems are less reasonable and manual analysis makes more sense. But there are also subjective criteria to take into account: the choice is also a matter of personal preference, a question of ideology.
We also have to remember that automated systems are typically complex and error-prone and are thus more appropriate for hedge funds. Their response to changing market conditions may also be worse. A programming error can be fatal because automated systems cannot develop a real understanding of financial markets, but only mechanical work according to prescribed rules. That said, adaptive A.I. systems, such as neural networks, are in this case better than rule-based systems because they are at least partially able to adjust to changing market dynamics.

How do you see the evolution of the automated approach versus manual approach in the coming years?
The use of automated systems will certainly grow in the coming years. However, manual systems will still play a role because people are interested in markets and they want to apply their own intelligence and knowledge. They want to understand markets and their mechanisms. This works only by doing their own experiences, even though they usually have poor results at the beginning. However, people learn from mistakes and personal experience, and increased knowledge leads to personal satisfaction.This is often more important than the monetary value for a successful participation in the financial markets.

Financial markets have become highly correlated in stress situations, and we have seen that long-term bubbles or even short-term exuberances tend to form across several markets at the same time. How do neural networks deal with that?
In my opinion, neural networks are not in a position to accurately predict crashes in the financial markets. Since neural networks are self-teaching systems, they require large amounts of data during the training phase. Financial market crashes are rather rare events, thus the training data are more likely to be quite small. In periods following a crash, or generally in periods of very high volatility, such systems, however, are very profitable, based on my own experience. This is mainly because relatively unique patterns are observed in these systems over a long period of time, and can be detected by self-learning systems with relative ease.

What is HFT and what is its impact on market structure?
High-frequency trading (HFT) is a type of program trading platform in which computers make elaborate decisions to initiate orders based on information that is received electronically before human traders are capable of processing the information they observe... so extremely fast. This has provoked dramatic change of the market microstructure, particularly in the way liquidity is provided.

What should the retail public know about it?
Market liquidity means that at any time a large amount of buy and sell orders exist. For small to medium trading volumes, that can immediately result in a trade. Thus the widespread use of HFT systems in the market represents an advantage for retail traders, since it guarantees defined trading conditions. But retail traders should not use HTF, because it is much too complex and the profit margins are relatively low. In other words I'd say that HFT provokes interesting situations for the retail traders, but I don't recommend them to trade with it.

With the large amount of automatic trading systems available out there, banks investing in algorithms to influence the markets, companies shopping for the best price, isn't the whole picture becoming like gaming?
Trading is in fact a kind of game. A game where the best man wins, or the most fortunate. In principle, there is a kind of "arms race". There are always those who are better than others at winning. The rules change through the use of ever more complex and better trading systems. This means that market participants have to adapt and adjust their system continually to the changing conditions. Once again, the strength of adaptive A.I. systems comes into play.

Do you think that automation and technology made markets more fragile?
As market participants react more rapidly and market information is disseminated faster and faster, the market efficiency actually increases. Similarly, the velocity of the flow of rare events such as crashes, or bubbles, also increases. The underlying market forces do not change because of this. In the subjective perception, markets are indeed more vulnerable, but this is caused only by the increase of speed, in my opinion.
People are more aware of global markets and prices than ever before, news coverage provides an immense source of information: will machines be the ones which process all that information in the future?
Automatic systems now deal exclusively with price data, and in the near future that should not change. The interpretation of other information, such as moods and psychological market factors that tend to play a role on the medium to long-term time horizon will continue to be reserved for the human expert.

What changes do you predict to occur in the field of automated trading in the years to come?
In my personal opinion adaptive A.I. systems will begin to play in the future a greater role than before. The computing power will continue to increase and the technologies will continue to evolve, as they are doing now. It is only a matter of time until A.I. systems permanently replace the current rule-based systems.

When do you think it will happen?
I'd say maybe in 10-15 years. This is true only for the prediction of short-term market movements. At the moment, medium and longer-term forecasts are only sensibly executable by human experts... until further development!