Use of Artificial Intelligence in Market Making

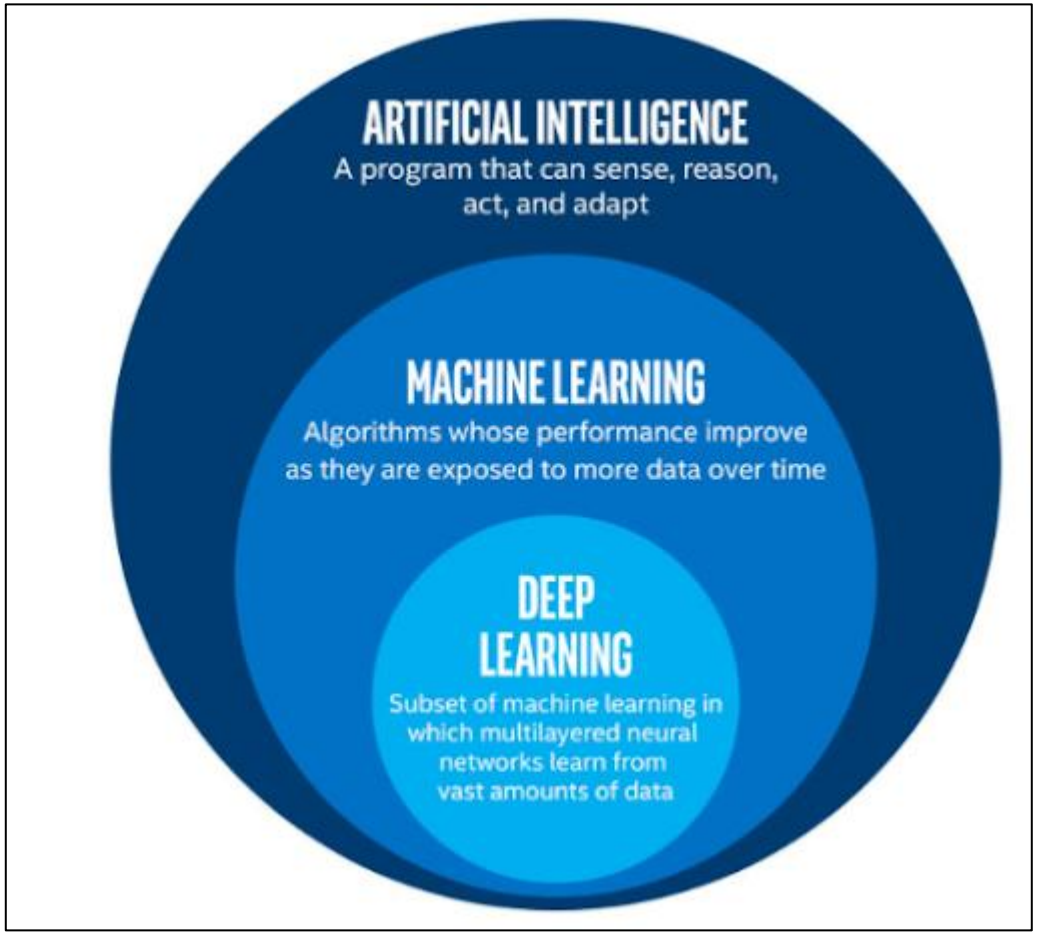
CONTENTS

AI and market making

Use of artificial intelligence and deep learning as it applies to market making and the implications of these techniques for the future of market making

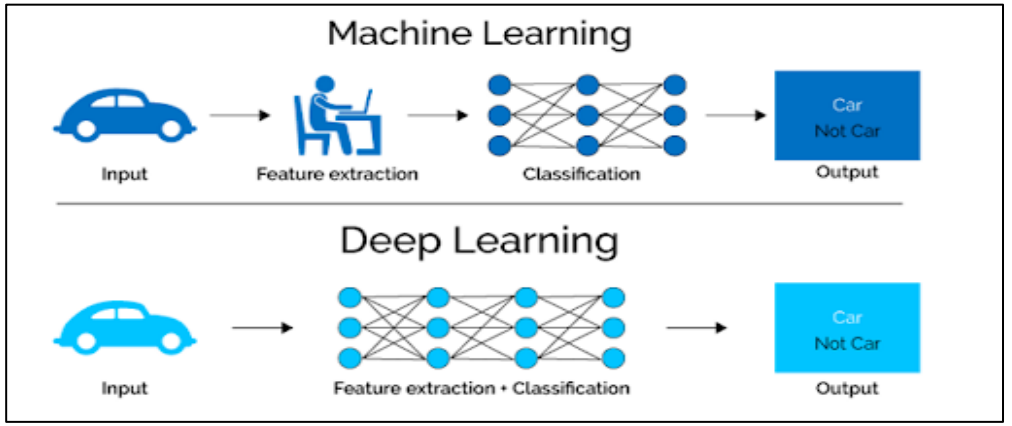
A quick reminder on the terminology

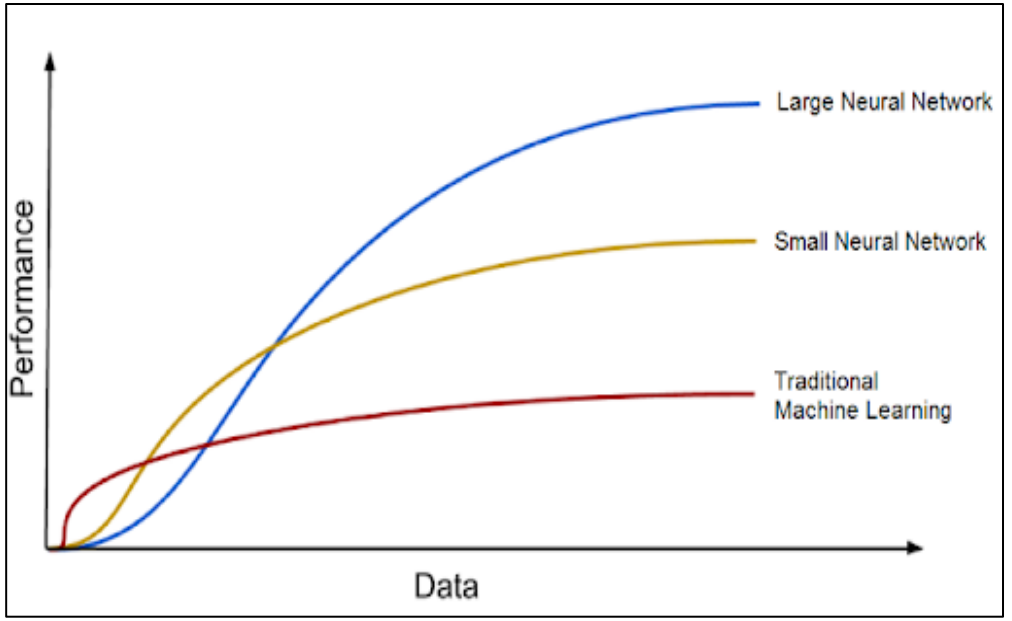
- Artificial Intelligence is the broad concept of machines performing tasks that typically require human intelligence
- Machine Learning - systems learn from large amounts of data to identify patterns and make predictions or decisions without being explicitly programmed for every task
- Deep Learning – a subset of machine learning that uses deep, multi-layered artificial neural networks. These neural networks mimic the human brain. Deep Learning is ideally suited for highly complex tasks involving large amounts of structured and unstructured data and as such is highly suited to the task of market making



Deep Learning v Machine Learning

- Traditional Machine Learning requires "feature extraction", e.g. you have to tell the model what the characteristics of a car are to enable a ML model to identify a car from a set of data
- Deep Learning does not require this "feature extraction" – the model will figure out what a car is all on its own
- Huge amounts of market data from all asset classes (and possibly some non-market data) can be used in Deep Learning and in general, it is reasonable to say that the larger the model and the greater the amount of data, the more performant the engine
- In our world that can be translated into the accuracy of pricing and price predictions
- Of course, at some point the trade-off between the size of the network and the amount of the data begins to tail off – these diminishing returns will further squeeze margins

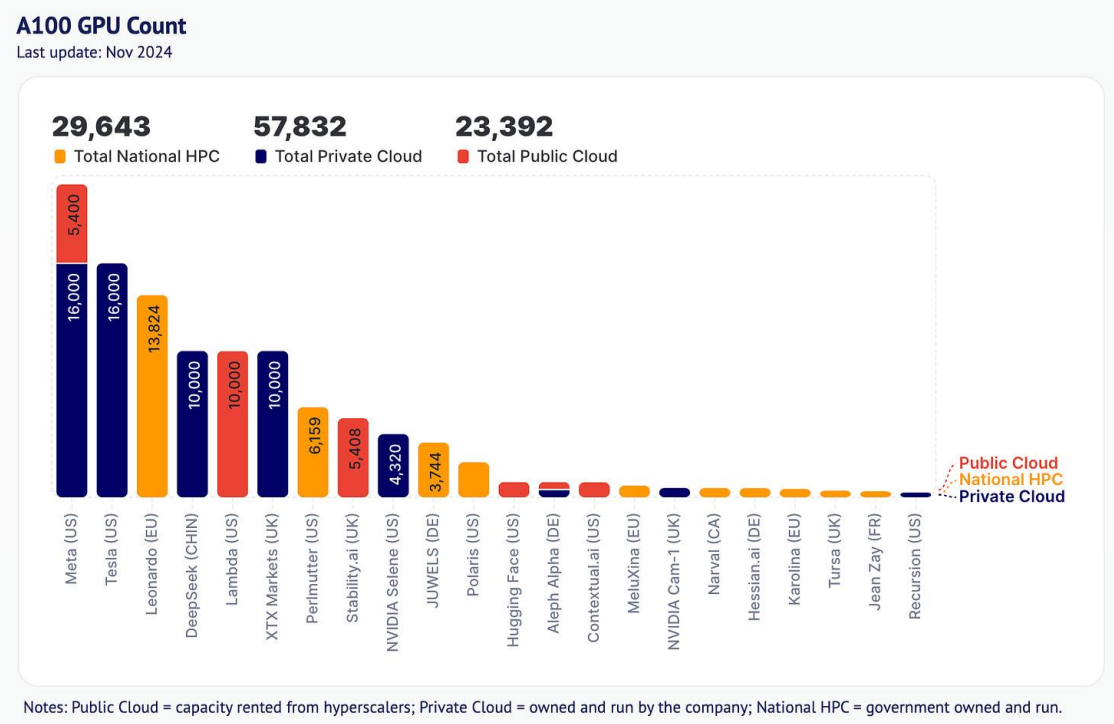




Unrivalled Computational Resources

XTX Markets has a growing research cluster currently containing over tens of thousands of H100/A100 GPUs (growing quickly!) with 650 petabytes of usable storage. All our compute resources are privately owned and maintained.

The firm recently announced plans to invest over €1 billion to develop our newest data centre complex in Finland, which has again made waves across the industry.



https://www.stateof.ai/compute (merely comparing A100s)

Why Large-Scale Deep Learning for Trading is challenging……..SNR

Even with huge resources, applying the model can be difficult……

Signal = the real, meaningful, repeatable part of a price move
Noise = random fluctuations, market chaos, irrelevant variation

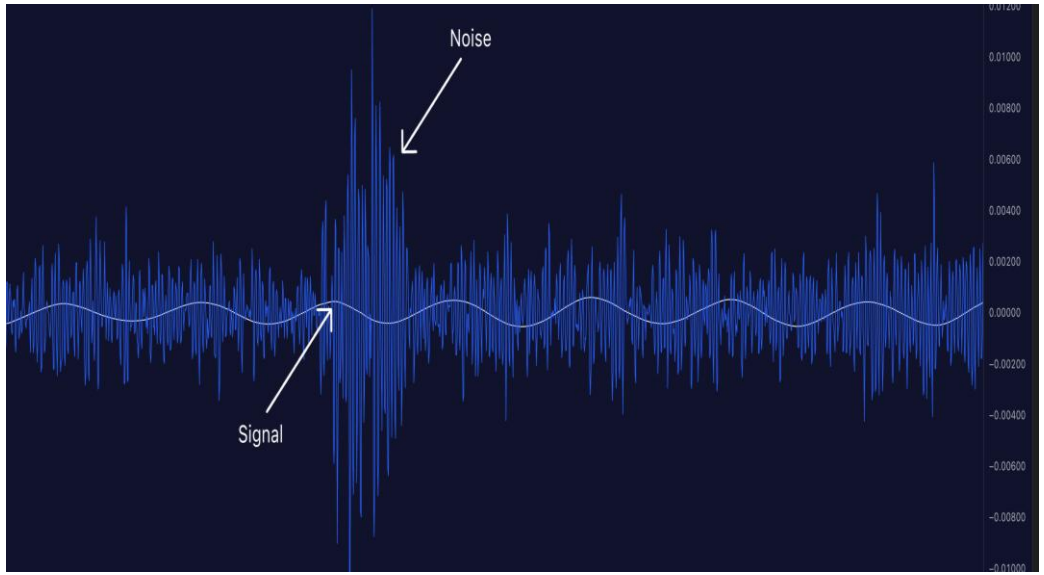
- If your signal is weak and noise is high, your edge gets buried.
- If your signal is strong and noise is low, you can extract alpha with confidence.
- In trading, SNR is like trying to hear a whisper in a hurricane. The whisper is your alpha. The hurricane is the market.

Many strategies fail not because they're logically flawed — but because they're trying to extract signal in a low SNR environment

- Financial markets are dominated by noise
- The real edge (if it exists) is usually tiny and fleeting
- Even strong-looking backtests can be false positives created by fitting noise.

Machine learning struggles in markets because

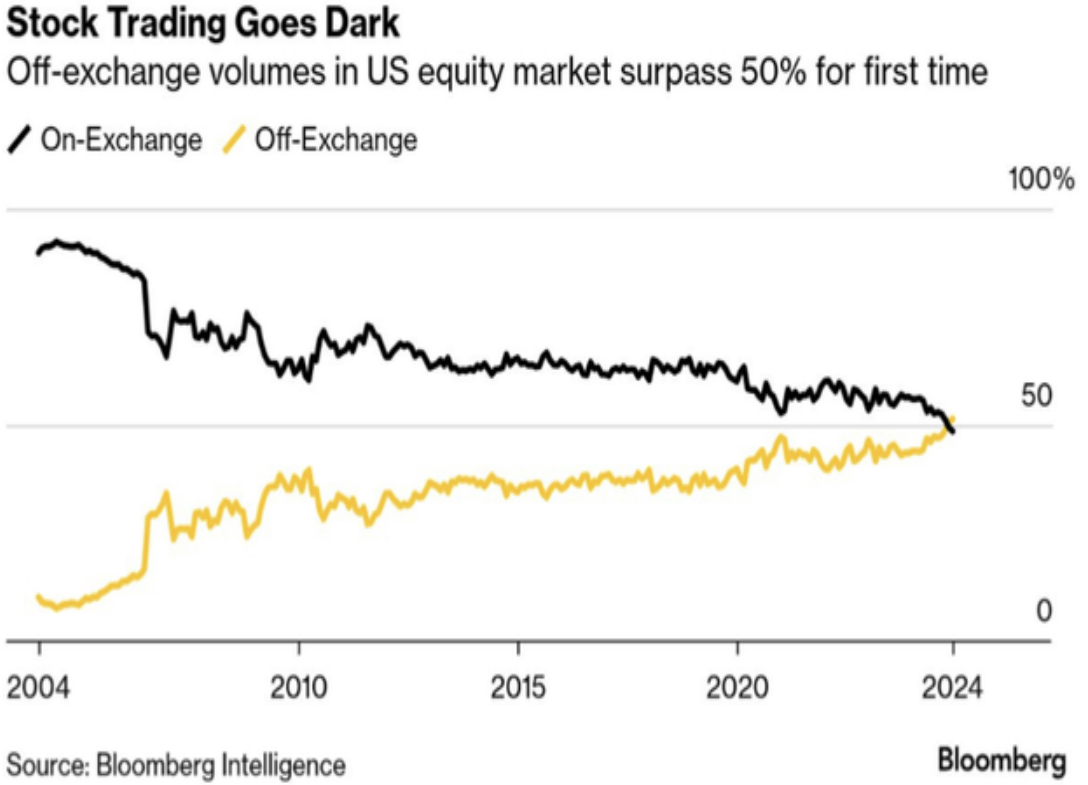
- Most market data has very low SNR
- The signal changes over time (nonstationarity)
- AI is powerful enough to learn anything — including pure noise
- This means unless you're careful, your AI will confidently "discover" patterns that have no predictive value whatsoever



Implications for market making / market makers / clients

Development of Deep Learning models requires huge amounts of compute power at vast expense

- If truly accurate market-making requires a very high level of compute power, it is reasonable to suppose that it becomes a significant barrier to entry for new participants
- It's also potentially questionable how many extant market makers will decide to make the investment to develop DL models and to either build or lease such compute power
- One inference could be that the market continues to bi-furcate between primary market activity (becoming increasingly the domain of those able to employ DL) and the secondary and bilateral market still dominated broadly by bank/brokers and defined by the provision of credit risk, research and balance sheet funding
- Likely that those that employ significant resources in market-making will look increasingly to trade away from primary venues where information leakage is a risk – trading bilaterally with trusted counterparts becomes far more attractive
- Another possible inference would be that there becomes a very small number of participants able to compete at primary market level and this creates market fragility



Conclusions

- AI is driving market evolution by changing the shape of market making
- The compute power required to implement Deep Learning successfully is HUGE and is a massive barrier to entry
- Implementing models can be very challenging
- Likely consolidation of the number of market makers – positives and negatives for liquidity
- More trading moves away from centralised venues to bespoke trading relationships
- The future is uncertain but whatever happens, AI is fundamentally reshaping markets and will change both the nature of liquidity and how it is accessed

This Document is issued by XTX Markets Limited ("**XTX**"), which is authorised and regulated by the Financial Conduct Authority of the United Kingdom (the "**FCA**"), with FCA FRN: 711945. XTX is a private limited company incorporated in England & Wales, with company number 09415174. XTX's registered office and principal place of business is R7, 14-18 Handyside Street, London, N1C 4DN, United Kingdom.

This Document may reference products that are not FCA regulated, which include, but are not limited to, Spot FX. XTX endorses and strongly supports the FX Global Code and its principles for FX market activities.

This Document is issued by XTX only to and/or is directed only at persons who are eligible counterparties for the purposes of the FCA Rules. This Document must not be relied or acted upon by any other persons (including, without limitation, persons who are retail clients or professional clients for the purposes of the FCA Rules).

The distribution of this Document is restricted by XTX and may be further restricted by law. No action has been or will be taken by XTX to permit the possession or distribution of the Document in any jurisdiction where action for that purpose may be required. Accordingly, the Document may not be used in any jurisdiction except under circumstances that will result in compliance with any applicable laws and regulations. Persons to whom the Document is communicated should inform themselves about and observe any such restrictions. This Document may not under any circumstances be copied, distributed, published or reproduced, in whole or in part, without the prior written consent of XTX.
This Document is for information purposes only. Nothing in this Document constitutes investment, financial, tax, legal or other advice, nor does this Document constitute an offer to transact in, or the solicitation of an offer to transact in, securities, derivatives, FX transactions, or other financial instruments, in any jurisdiction.
Although the information in this Document is believed to be materially correct at the date that this Document has been communicated by XTX, no representation or warranty is given as to the accuracy of any of the information provided. Certain information included in this Document is based on information obtained from sources considered to be reliable. However, any projections or analysis provided to assist the recipient of this Document in evaluating the matters described herein may be based on subjective assessments and assumptions and may use one among alternative methodologies that produce different results. Accordingly, any projections or analysis should not be viewed as factual and should not be relied upon as an accurate prediction of future results. Furthermore, to the extent permitted by law, neither XTX nor its employees, directors, officers, shareholders or service providers assumes any liability or responsibility nor owes any duty of care for any consequences of any person acting or refraining to act in reliance on the information contained in this Document or for any decision based on it. Past performance cannot be relied on as a guide to future performance. XTX does not undertake any obligation generally to update or revise any information contained in this Document, except as may be required by law.
Any reference in this Document to a counterparty trading with XTX (or XTX trading with counterparties) is a reference to XTX providing liquidity quotes through certain specific platforms, and all trades will be executed with or through XTX's prime broker(s), and not with XTX directly.