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A.I. instead of Trader Sapiens? It starts ...Now!

Anno 2017 will probably go down in history for the financial industry as truly memorable. This is because in March the first UCITS fund fully managed by Artificial Intelligence was approved in Germany. Can this work? What does it mean for Homo Sapiens among the fund managers?

Deus ex machina? This question is (still) overplayed these days, but we have started to observe how a new form of machine intelligence is beginning to emerge and claiming its place in financial markets. But how is A.I. different from algorithms used in smart beta strategies? "In pretty much everything" says Alessandro Di Soccio, Co-Founder of A.I. Machines.

Artificial intelligence has an image problem. Whether in the guise of the paranoid intelligent computer HAL from the sci-fi classic "2001: A Space Odyssey", or in its extreme incarnation as the Terminator, or in the metaphysical variant of the Matrix trilogy, the end result is still the same: Machine kills Man. And in March 2017, the first retail fund was approved in Germany by BayernInvest and Acatis, which, according to the issuers, is "100% based on artificial intelligence". The Bayerninvest Acatis KI Aktien Global Fund, listed under Isin DE000A2AMP25, invests on individual companies globally. The fund's A.I. architecture, developed by software company Quantenstein, selects 50 stocks every 6 months from an investment universe of approximately 4,000 to outperform the MSCI World Index by at least 3% annually. "In a walk-forward test, the strategy clearly exceeded the investment goal in nine out of eleven years, and its recovery from drawdowns was faster than for the MSCI World Index" as indicated in the product description.

“If you lived the hype of the 1990s, you are inclined to approach the subject with skepticism.”

David Harding, CEO, Winton Capital Management

Homo Sapiens Obsolete?

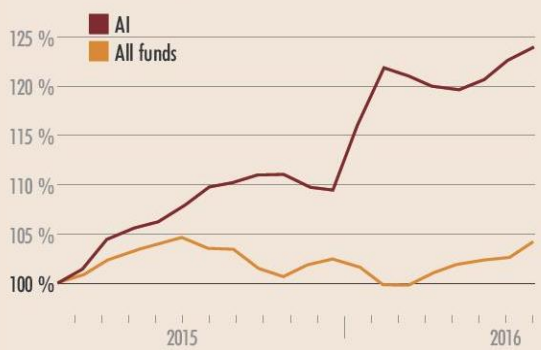
The terminology seems strikingly similar to the magic formulas already known from the "quants" of the smart beta industry – so in the end, is this just ‘old wine in new bottles’? "Definitely not, this is something fundamentally different", explains Alessandro Di Soccio, Co-Founder of A.I. Machines, on the fringes of the "Artificial Intelligence Investor Conference", organized by Swiss-based firm NextGen Alpha in Frankfurt. From his bio, Di Soccio is a seasoned investment banker with a past at Citigroup and a graduate of Bologna. He considers static rule based strategies, such as buy-and-hold modern portfolio theory, smart beta, or multi-asset model portfolios seeking to mimic Harvard's investment model, as obsolete and counts their users among the "Old Quants", who he distinguishes from the "New Quants". So, now those who believe that Di Soccio sees himself as a "new Quant" are mistaken: he is himself a Homo Sapiens after all. And this is where the demarcation between the well-known algorithmic trading and artificial intelligence begins. All previous automated models had a common base: the human. In these models knowledge was encoded by ‘human experts’ based on human a-priori views of how markets work with the goal to isolate causal relationships. "Traditional quantitative strategies are based on a top-down approach, where expectations and drivers are coded as set of rules and simplified with “if-then” ramifications. In other words, static rule-based systems that are failure-prone to be viable for most complex phenomena” points out Di Soccio.

Self-Creating Intelligence

So far, so good, but how does artificial intelligence work? The first answer is relatively simple: without people. "A.I. algorithms follow a bottom-up approach to learning, deriving knowledge directly from data and then developing their own models. They learn from past and present, make connections, map evolving relationships, and then recalibrate the models accordingly as things change" explains Di Soccio.

Artificial Masters of the Universe

AI Benchmark beats all other investors



When compared to Smart beta or Active Human Stock Picking Strategies - according to Bloomberg data - A.I. funds of the youngest generation beat clearly the competition on a global level. **Source**: Bloomberg

"This is something fundamentally different from smart beta. The machines learn autonomously and take their own decisions."

Alessandro Di Soccio, Co-Founder, A.I. Machines

The machines learn autonomously from large volumes of data, continuously evaluate what happens and re-process data as needed. It is impossible for a human programmer, or a human team, to manually encode a quasi-infinite number of "if-then" links and re-program these again and again. This is the same type of learning technology that has made face recognition possible, something impossible to do for computers until recently. A normal algorithm can't accomplish this: too many moving parts, too many features, too many interactions to be evaluated. Human beings are intuitively good at recognizing faces and A.I algorithms seek to mimic the human brain cognitive processes. Technically, this has enabled the concept of Deep Learning (see box "Deep Learning: the End and Beginning of Everything."), a type of machine learning method which has been theoretically known for decades, however, it was not until recently that technological progress and a number of algorithmic breakthroughs made it technically feasible.

Brave New Intelligence

For an investor who wants to embrace the brave new World of A.I. – probably not least because of the cost of active investing – then the question arises: does this technology outperform? Early indications point to a Yes answer – as far as human competition is concerned. According to Bloomberg data, during the 2 year period 2015-2016 (see graphic "Artificial Masters of the Universe"), funds managed by artificial intelligence globally have outperformed human fund managers by 20%.

The Gross Difference

How to Differentiate Conventional Systematic Strategies from A.I.

"OLD QUANT"	"NEW QUANT"
Model Creation done by Humans, based on A-Priori views of how Markets Work	Model Creation done by A.I. software, with No A-Priori views of how Markets Work
✓Top down approach	✓Bottom up approach
✓Human comes up with an idea / thesis	✓AI model generation system
✓Convictions / Drivers are codified	✓Extract features from data
✓Run what "if" scenarios	✓Build model from data
✓Calibrate model based on feedback	✓Map evolving relationships
✓Fix model and go live with it	✓Model continuously learn and adapt
Static Rule-Based Strategies	Adaptive Self-Learning Strategies

Source: A.I. Machines

Skepticism From The Past

Whilst the considered observation period is manageable and correspondingly significant, this is still a young technology and the short track records simply do not allow for an adequate assessment. And in the financial sector it is also

important to be prudent. Together with the pioneers of Acatis and Bayerninvest, large quantitative firms like Man Group, WorldQuant and Winton are also active in the space, and the latter is also still a bit wary: "When you witnessed the hype surrounding artificial intelligence in the 1990s and the subsequent disenchantment, you tend to be skeptical" explains David Harding, CEO of Winton Capital, which manages about $30 billion of assets.

Physics vs Statistics

What may add to the doubts is the feeling of investing in a black box. Whilst it is good that deep learning algorithms can accurately mimic the activity of the human brain with many more layers of virtual neurons than ever before, is this information sufficient to allow clients money to be managed by an intelligent machine? If you ask technical people about the exact functioning of their A.I. algorithms, they tend to be buttoned up – either because they have the feeling of wasting valuable programming time through useless lay enlightenment, or because they are reluctant to show their cards. Stefan Ruile, Co-Founder of Autonomous capital, does not belong to one or the other species. “Physics instead of statistics", he points out. The questioning facial

“Artificial Intelligence takes better decisions at times of market stress than people who are in panic mode.”

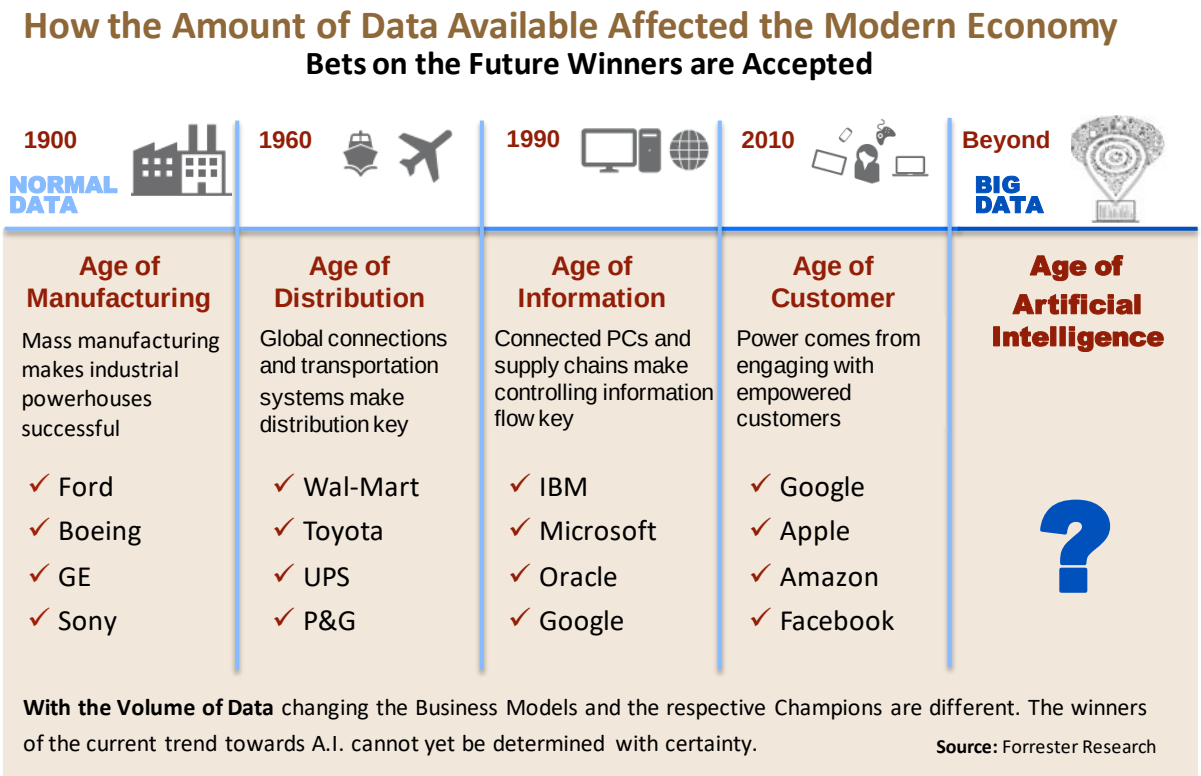
Stefan Ruile, Co-Founder, Autonomous Capital

expression is followed by a clarification: "We are completely out of the statistics and do not make any assumptions. Instead, we are guided by physical laws. Think of quantum mechanics, think of electric field theory." Ruile is now in his element: “Imagine for example the Fresenius share price. It follows a certain path, has a certain mass, and therefore exerts a kind of gravity. As there may be interactions, the path of the stock can be distracted. The artificial intelligence learns how to move through this map.” He then pauses for a moment, “Do you know what is also important?” We don’t know, so Ruile gives us the answer: “To allow the machine to forget. The danger is that the artificial intelligence will be too strongly influenced by obsolete data. Dramatic events, for which the general conditions have changed in the meantime, would be distorted in the case of an eternal, equally weighted memory.”

600 A.I. Analysts, 600 Reviews

Also significant is the approach developed by Di Soccio. His A.I. investment engine replicates no less than the entire trading team of an investment bank. The A.I. engine is made of multiple types of machine learning technologies and methods integrated into a functioning network of interlinked layers.

For example, in a first layer, 600 self-learning A.I. Analysts process the data supplied and then make predictions about the future price behaviour of an instrument/asset. In a second layer, a Head-A.I. Analyst monitors the behaviour of the analysts, summarizes their opinions and then provides a single recommendation for each instrument, such as buy, hold, or sell. These assessments then land with an A.I. Portfolio Risk Manager who “attributes weights dynamically across assets, as a function of changes in asset relationships and market behaviour, to explicitly minimize expected portfolio capital loss risk, whilst meeting the return objectives", explains Di Soccio. Now you could be a critical investor and wonder if there is a risk that 600 different algorithms/analysts, which rely on the same set of datasets, could ultimately share the same opinion with no dispersion of estimation results. Di Soccio adds further: “Each A.I. Analyst processes and transforms data in different ways, develops its own knowledge and hypothesis, and self-adjusts its modus operandi based on experience, in essence it’s like having analysts with different backgrounds who value the data from different angles using different techniques, therefore, providing 600 diverse, complementary assessments”.



The “Red Button”...

As part of the above-mentioned picture gallery, we have summarised the most important findings on the subject. The complete article, which deals among other things, with the question of the “Red Button", the "coolness of A.I." but also with the genesis of the phenomenon, can be found in the print-issued 2/2017 of Institutional Money, or via this link in the form of the e-paper of Institutional Money (Hans Weitmayr).

https://www.institutionalmoney.com/fileadmin/emagazin/2017_2_IM/index.html#180