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The Impact of Deep Learning on Investments: Exploring the implications one at a time

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Until recently, the artificial intelligence portion of data science was looked upon cautiously due to its history of booms and flops.[1] However, major improvements have been made in this field and now deep learning, the new leading front for AI, presents a promising prospect for overcoming big data problems.

A method of machine learning that undertakes calculations in a layered fashion, deep learning starts with high level abstractions (vision, language and other artificial intelligence-related tasks), moving to more and more specific features.[2] The machine is able to progressively learn as it digests more and more data, and its ability to transform abstract concepts into concrete realities has opened up a plethora of areas where it can be utilized. Deep learning has various architectures, such as deep neural networks, deep belief networks, deep Boltzmann machines, and so on, that are able to handle and decode complex structures with multiple nonlinear features.[3]

Deep learning offers us considerable insight into the relatively unknown, unstructured data, which is 80 percent of the data we generate, according to IBM.[4] Data analysis before 2005 focused on just the tip of the iceberg; the recent big data revolution and deep learning now offer us a better glimpse into the segment of data we know exists but are constrained in accessing. Deep learning helps us in both exploring the data and identifying connections in descriptive analytics, but these connections also help us in forecasting what the result will likely be, given the particular combination as the machine learns from the data.

Deep learning, in collaboration with other machine learning tools, is making headway in possible applications. All major giants like Google, IBM and Baidu are aggressively expanding in this direction but startups are providing the most vivid applications so far. Kensho[5] is a startup that aims to use software to perform tasks in minutes that would take analysts weeks or months. Just like searching via Google, the analysts can write their questions in the Kensho's search engine. The cloud-based software can find targeted answers to more than 65 million combinations in seconds by scanning more than 90,000 actions, which are as myriad as political events, new laws, economic reports, approval of drugs, etc., and their impact on nearly any financial instrument in the world.[6] Another startup, Ufora[7] is set to automate a large part of quantitative finance work undertaken by quants, especially on the stochastic modeling front. Even some hedge funds like Renaissance Technologies[8] are proactively working on machine learning and deep learning algorithms to better see patterns in the financial data to exploit opportunities (which stocks are overrated or underrated, when the market is going strong on fundamentals or approaching the bubble stage and so on) to guide their investment strategies.[9]

On the other hand, firms like Narrative Science[10] and Automated Insights,[11] working on text analytics, utilize deep learning to create lively and interactive narrative reports out of data and numbers. The reports—generated by a machine—read almost like they were written by a human. To elaborate, Narrative Science's Quill platform undertakes statistical analysis by applying time series, regression, etc., then the semantic engine evaluates the important data signal from the unimportant noise, per the needs of the audience in question, such as different reasoning if it is related for a quant or an investment trader. The patterns are spotted and made sense of in a holistic manner. Particular fuzzy attention is given to anomalies and elements of results that deviate from the main body of the results to ascertain their impact and proper interpretation. Quill remembers previous reports so it doesn't become repetitive. Natural language generation is applied with a surgeon's precision and expertise in forming such a dynamic semantic engine.

Deep learning allows us not just to better explore and understand the data, but also to improve forecast performance. For

predictive analytics, the startup MetaMind[12] is working to help financial firms assess the chances of selling stocks by going through corporate financial disclosures, according to its website. It identifies from previous experiences when a particular combination of actions led to a particular result to assess the chances of the same result happening in the future.

Extrapolating this trend into the future, it is my opinion that such analytics might soon find their way into mergers and acquisitions (M&A) and will be able to come up with the probability of some key event happening and the consequences of it when involved in a high stakes M&A. Another application can be to apply deep learning to help with one of the most vexing problems—financial crises. Economists, financial experts and social scientists have elaborated on a lot of key issues that lead to financial crises in general, as well as specifically for a particular meltdown. These can form the modeling methodology for the deep learning machine to analyze the cosmic scale of data available on any and every platform that it can garner. Such evaluation can perhaps help us to see patterns we may have missed otherwise as well as to allow us to understand more accurately the sequential movements and mechanisms involved in a particular financial contagion and crisis. There is no guarantee this will work. But perhaps it can shed some light inside the "quantum black box" of financial crises. This seems to be the need of the hour with recurring financial hemorrhages such as the EU crisis on Greek debt as well as the recent massive and escalating falls in Chinese stock exchanges—reminding us of the bitter past we faced in the Wall Street crisis of 2008-09.

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Given all these developments, there are still a myriad of issues that need clarification with not just deep learning specifically, but also with big data generally. Automation of such unprecedented scale and intensity raises the possibility of mass redundancies in the labor force across the economy. Are we comfortable with giving up our controls to such applications without knowing the full implications of such a move? Not every innovation brings positive results or sustains in the long run. Technology is progressing at an unstoppable pace, but can we manage the social consequences and make it sustainable in the long term? Human efforts are seemingly being diverted from other fields into information technology, which consequently can imply a concentration of power in one overlord field to the potential detriment of others. Are we ready for this? From a consumer point of view, how ethical is it that marketing personnel know you so well that it makes rational optimization very difficult on the part of the consumer?

These are all good questions and should be adequately and mutually tackled and addressed by all the stakeholders involved such as the data scientists, governments, professions and consumers so a mutual policy that can better alleviate such concerns can be reached. The core aim of the policy has to be to sustain technology for the benefit of our societies, to lead to value creation, to reduce scarcity and reduce fragility of our systems, as well as to generate more resources for our prosperity instead of creating the monster of Frankenstein, as "Terminator" and other doomsday movies will have us believe. ■

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ENDNOTES

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10 *https://www.narrativescience.com/.*

11 *https://automatedinsights.com/.*

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