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We recently sat down with Fritz Folts, Chief Investment Strategist at 3EDGE Asset Management and spoke with him about Artificial Intelligence and machine learning in the investment management industry. The interview is provided in 5 installments with below being Part 4

ETF Strategy Summit: Why are quantitative investment approaches sometimes referred to as *Black Boxes*.

3EDGE: It may be entirely appropriate to refer to many quantitative approaches to capital market analysis as *black boxes*, since oftentimes once the algorithmic model has reached a certain conclusion, it cannot express the reasoning behind its decision. Therefore, it could be referred to as a black box, since the programmer cannot see inside it. Paraphrasing Eric Beinhocker, in his book, *The Origins of Wealth*, (Harvard Business School Press, 2006) "*…all models are attempting to predict the future in some manner, the question is, would one prefer a model that seeks to predict the future by way of a black box or by way of a model where it is possible to observe all the moving parts within*." At 3EDGE we believe that to utilize AI and machine learning when analyzing the global capital markets, it is helpful to understand the how and the why behind the results. To do this, the model should be transparent so that there is some element of *explain-ability*. To our way of thinking, insisting on some level of *explain-ability* is the best way to know whether the model results stand up to the logic inherent in global capital market behavior. We believe that the most effective quantitative models contain the best of both worlds, i.e. human-plus-machine.

ETF Strategy Summit: *Deep Learning* programs don't necessarily care what computations are being performed or even why they may work. Does this matter?

3EDGE: The most recent advances in AI, have come through advances in *deep learning*, through methods such as neural networks, and there is currently a lively debate around the efficacy of being able to understand the how and the why behind the results of one's model. In the words of Judea Pearl in his book, **The Book of Why**, ***The New Science of Cause and Effect***, "When finished training a new (neural) network, the programmer has no idea what computations it is performing, or why they work. If the network fails, (the programmer) has no idea how to fix it." One example of this is found in the famous program *AlphaGo,* developed by Google *DeepMind.* A few years ago this program defeated the individuals who were considered to be the best human players in the world of the board game *GO*. This was seen as quite a feat since training a computer to play the board game *GO* is actually more difficult than teaching it to play chess. Before the program was retired *AlphaGo* played sixty games against the best human players in the world without losing a single game. Prior to that competition, experts declared that the one game that AlphaGo lost in 2017, would be the last time it would ever lose to a human *GO* player again! Interestingly, in the end, the programmers of *AlphaGo* are not actually able to explain why the program is so good at playing the game. There isn't a level of *explain-ability*, and perhaps it simply doesn't matter, since the program accomplished the objective of creating a computer that would ultimately become the ultimate *GO* master.