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Artificial Intelligence and Stock Selection

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John Hunter | Managing Director, Agilis Capitis

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The Rise of the Machines

There is a significant amount of discussion and research dedicated to utilising artificial intelligence to predict the movement in stock prices.

Technical research has been focused on specifically considering historical stock price movements to predict future prices, concluding that due to the significant amount of "noise" and uncertainty in public information, that it is difficult to consistently predict price movements.

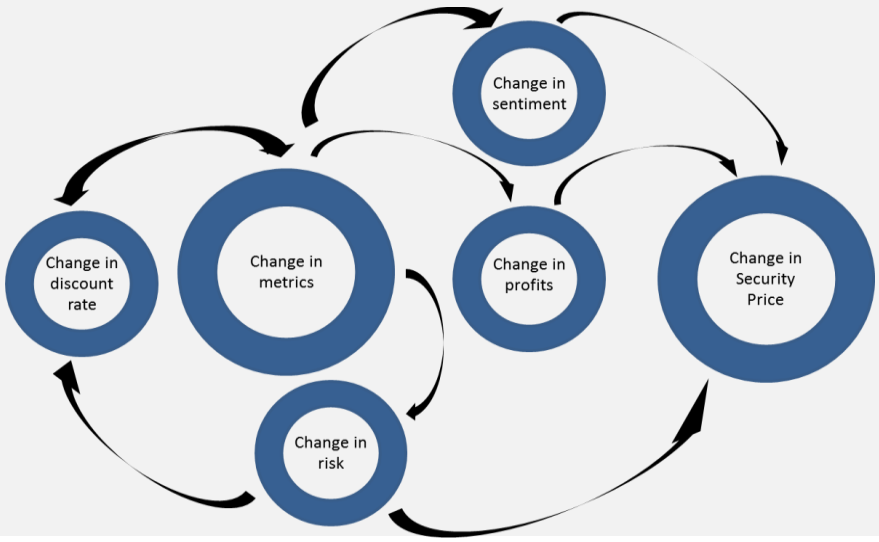
Simply put, artificial intelligence takes algorithmic trading strategies to the next level. It relies on analysing historical information to train the system to then predict future prices. It uses the historical information, or training data, to continually update the trading algorithm.

The more detailed the trading algorithm used, the more that algorithmic trading moves from the realm of technical analysis to fundamental analysis. However, there is a long way to go to get there.

Trading Strategies Revisited

Fundamental Analysis

Fundamental analysis is the method of measuring a security's intrinsic value by examining related economic and financial factors to determine the fair value of a security. This includes analysing qualitative and quantitative information that can affect the security's value, from macroeconomic factors such as the state of the economy and industry conditions to microeconomic factors like the effectiveness of the company's management.

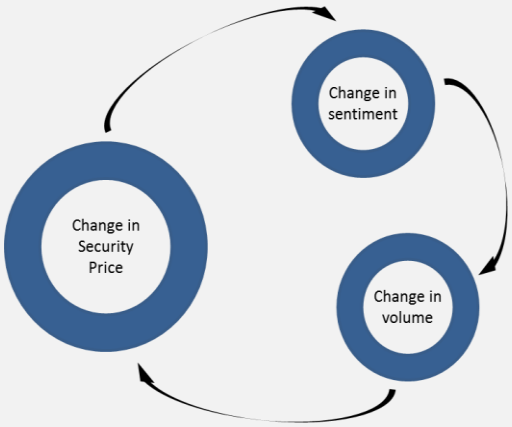


Trading Strategies Revisited

Technical Analysis

Technical analysis studies the behaviour of the market and the market participants. It is focused on analysing the historical prices and volume to forecast the direction of prices to predict future price movements.

It navigates the gap between intrinsic value (the assessment of the security value) and the market price by leveraging on techniques such as statistical analysis and behavioural economics.



Artificial Intelligence and Stock Selection

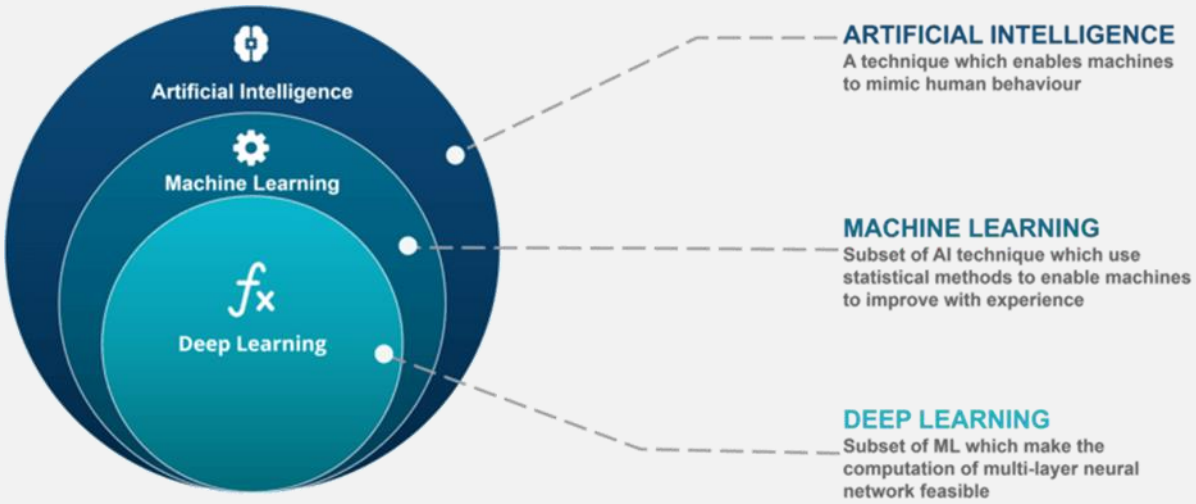
The objective of using artificial intelligence is to improve on, or surpass the performance of humans. In the case of stock selection, no investment manager achieves 100% accuracy at selecting stocks.

The objective of utilising artificial intelligence for stock selection is to outperform the market and achieve alpha returns in excess of traditional investment managers.

To understand if artificial intelligence is able to improve the stock selection process, it is first important to understand its background and what methods are used. Artificial intelligence is a general term that actually covers a vast number of different things.

Artificial intelligence is used as a general term that covers areas of artificial intelligence, machine learning and deep learning. This has created a significant amount of confusion and to be clear these are three different things.

AGILIS CAPITIS – ARTIFICIAL INTELLIGENCE



Artificial Intelligence

Artificial intelligence is a science like mathematics or biology. It studies ways to build intelligent programs and machines that can creatively solve problems, imparting cognitive ability to a machine. This ranges from the performance of a particular task, but does not pass for a human in any field outside of its defined capacities to the point where machines become human-like, being able to solve logical tasks and having emotions.

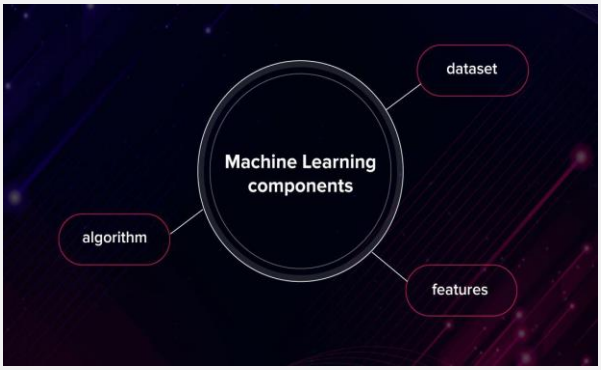
Artificial intelligence is currently at the level of ANI, focused on the development of Machine Reasoning (for example Google assistant, Alexa, Cortana, chatbots on websites), Robotics and Machine Learning (algorithm and computer models).

The different levels of artificial intelligence comprise:

- Artificial Narrow Intelligence (ANI)
  Focused on one single, narrow specific task.
- Artificial General Intelligence (AGI)
  As capable as a human, performing intellectual tasks.
- Artificial Super Intelligence (ASI)
  Surpass humans at everything, being able to undertake many tasks, including logical, decision making and having emotions.

Machine Learning

Machine learning is all about learning from data (examples), building the logic and predicting the output for a given input. Machine learning is a subset of artificial intelligence that provides systems the ability to automatically learn and improve from experience without being explicitly programmed for specific tasks.



Three components required are:

Datasets

Machine learning systems are trained on samples called datasets, such as historical stock prices.

Features

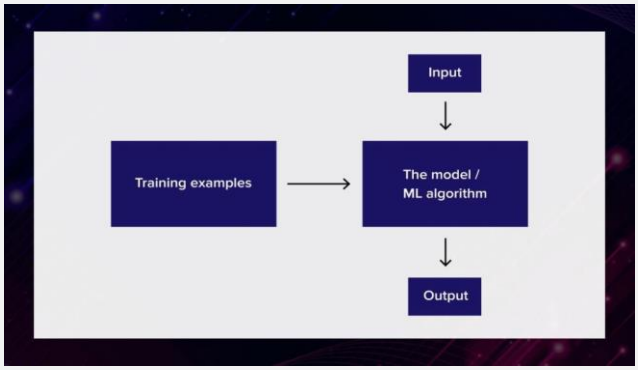
Features are important pieces of data that work as the key to the solution of the task. They demonstrate to the machine what to pay attention to that effects the forecast. This may include stock announcements, the impact of micro and macro-economic influences that have an impact on the operations of the company. All of which may impact the stock price.

Algorithm

An algorithm is used to analyse both the datasets and the features of the data in order to assess the results, or in the case of stock price prediction, what the forecast stock price will be.

With machine learning, there are different algorithms that analyse, understand and identify patterns in data, learn, help to solve problems and make predictions with minimal human intervention.

Machine learning is more independent than manually encoded instructions for performing specific tasks. Machine learning uses data to feed an algorithm to assess the relationship between the input and the output. When the machine is finished learning, it can recognise patterns and make predictions.

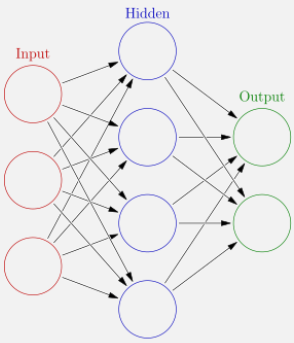


Machine learning is grouped as either Supervised, Semi-supervised, Reinforcement and Unsupervised Learning.

Supervised learning is more applicable for stock selection, using regression models to determine if it can replicate the same output on the sample training dataset.

Deep Learning

Deep learning is a subset of machine learning and relies on algorithms inspired by the structure of a human brain. Deep learning algorithms use complex multi-layered neural networks, where the level of abstraction increases gradually by non-linear transformations of input data.



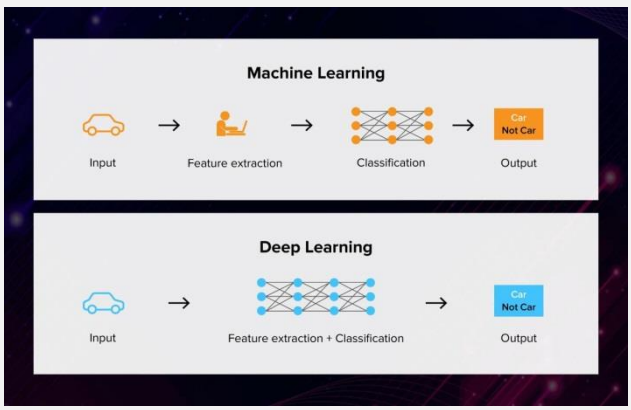
Each input goes into a neuron and is multiplied by a weight. The result of the multiplication flows to the next layer, which itself becomes another input. This process is repeated for each layer of the network. The final layer is named the output layer; it provides an actual value. The neural network uses a mathematical algorithm to update the weights of all the neurons. The neural network is fully trained when the value of the weights provides a forecast price that is close to the actual price.

Deep learning comes really close to what many people imagine when hearing the words “artificial intelligence”.

Difference Between Machine Learning and Deep Learning

The differences between machine learning and deep learning are as follows:

- Machine learning requires a smaller dataset to train the algorithm compared to deep learning.
- Deep learning requires an extensive and diverse set of data to identify the underlying structure.
- Machine learning provides a faster-trained model whereas Deep learning can take days to a week to train.
- Deep learning generates more accurate price predictions compared to machine learning as more input variables are used.
- Deep learning calculates the best features of the training data to calculate the forecast stock price; the neural network learns how to select critical features. Whereas, machine learning requires a manual selection of the features to include in the model.



What is Missing?

Fundamentally speaking, the value of a stock price is dependent on future earnings. To value the price of a stock based on historical information is equivalent to driving a car forward by looking in the rear vision mirror.

What is missing from machine and deep learning models is the information that will have an impact on future earnings. Which is pretty much everything.

Deep and machine learning models could be used to asses the impact of historical events, and how it affected stock prices, and use that information to attempt to calculate the stock price movements for current events. The issue is that the impact of past events will not have the same impact on future events even if they were the same.

For example, comparing the impact of Covid-19 to the Spanish Flu pandemic in 1918 is not possible as the fiscal and monetary economic response of governments have been different.

It is very difficult to model and assign variables and weights to subjective events that will result in different outcomes. Investment managers attempt to factor this into their fundamental analysis models via a highly technical process of guessing.

Application to Stock Selection

The use of machine learning for stock selection is mainly focused on technical analysis techniques. It utilises historical price movements to predict future prices.

Whereas, deep learning, uses input variables and calculated weights to determine the forecast stock price. The input variables represents anything that affects the stock price.

The algorithm of a deep learning model is closer to that of a fundamental analysis valuation model. However, what is missing is the ability for a deep learning model to factor in subjective, qualitative information, that may affect the future performance of the stock.

An investment manager manually compensates for the impact of this information in the model, and being subjective in nature, will depend on the individual impact assessment.

In the absence of being able to assess and adjust the deep learning model's variables, or to over engineer the algorithm, it will be a long time before deep learning will replace fundamental analysis to value stock prices.

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AGILIS CAPITIS – ABOUT US

"Just because we have identified a mispriced security does not mean that the market has."

Agilis Capitis is a specialist Australian equities manager that is focused on active management to generate alpha returns for its investors.

It uses a combination of technical algorithmic and fundamental analysis to:

- Identify mispriced securities; and
- Confirm the mispricing by analysing shifting market sentiment.

Using algorithmic strategies allows for the coverage of a greater number of securities, providing a faster reaction time while removing the emotion from decision making. It improves the timing and reduces the error rate.

"The market can remain irrational longer than you can remain solvent."

John Maynard Keynes

John Hunter
Managing Director

M. 0478 694 788

E. jhunter@agiliscapitis.com

W. agiliscapitis.com

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