Artificial intelligence for the financial market: Machine learning can enhance stock return prediction

February 6 2024, by Melanie Löw

Professor Dr Vitor Azevedo is researching how artificial intelligence methods can help to better predict share returns. Credit: RPTU/Voss

In the complex world of financial markets, accurately forecasting stock

prices is a significant challenge. One approach relies on enhancing the information from stock market anomalies, factors influencing a stock's return. Traditional methods that combine information from these anomalies often reach their limits, especially in global stock investments.

However, Machine Learning (ML) methods, a branch of Artificial Intelligence (AI), offer a promising solution. These methods can aggregate various factors to improve stock return predictions, as shown in a study titled "Stock market anomalies and machine learning across the globe" by researchers from Kaiserslautern and Munich, published in the *Journal of Asset Management*.

Predicting stock returns is similar to forecasting the weather, requiring a multitude of data points. These include, for instance, high-altitude temperatures and humidity, as well as air currents, cloud cover, and sunlight duration. Just as detailed meteorological data is crucial for accurate weather predictions, extensive financial data, and intelligent methods to combine this information are essential to determine if an investment is likely to be profitable.

Such data includes so-called capital market anomalies. "Over 400 of these, identified in recent years by leading financial journals, are considered predictive for stock returns," explains Professor Dr. Vitor Azevedo from the University Kaiserslautern-Landau, a co-author of the study.

One example is the well-known "Price-Earnings Ratio" (PER) of a stock. So-called Value Strategies can use this metric to invest in (seemingly) affordable stocks with low PERs. Another example is the "Short-Term Reversal" effect, where stocks with the lowest returns in the previous month tend to outperform those with the highest returns in the following month.

However, which of these anomalies are relevant? How do they interrelate, and what is their impact when combined? In the study, Azevedo, Professor Dr. Sebastian Müller from the Technical University of Munich, and Sebastian Kaiser from Roland Berger aimed to determine if Artificial Intelligence could answer these questions.

"Traditional methods like regression analyses have their limits in this context," notes Azevedo. "That is why we used Machine Learning methods capable of uncovering complex relationships within large datasets." This approach is often referred to as a nonlinear combination in expert circles.

For their analysis, the economists examined various ML approaches. They analyzed nearly 1.9 billion stock-month-anomaly observations from 1980 to 2019 across 68 countries.

"We found that these AI models significantly outperform traditional methods. The machine learning models can predict stock returns with remarkable accuracy, achieving an average monthly return of up to 2.71% compared to about 1% for traditional methods," adds Professor Azevedo.

The study's findings highlight the potential of such technology for the financial market. Financial managers could use it in the future to develop new stock price models. The researchers from Kaiserslautern and Munich advise, among other things, careful data preparation to correctly incorporate outliers and missing values, especially when working with international data, as they write in their study. Additionally, they recommend reviewing ethical and regulatory concerns before deploying these AI techniques.

More information: Vitor Azevedo et al, Stock market anomalies and machine learning across the globe, *Journal of Asset Management* (2023).

DOI: 10.1057/s41260-023-00318-z