The Rise of Artificial Intelligence in the Stock Market in the 21st Century

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I. Abstract

Forecasting the movement of the stock market plays an essential role in ensuring yields from the stocks. However, this area is often unexplored by the common people. Analysing stocks can be deemed tedious and intimidating leading to less people who are interested in it. The analysis of stocks is done principally through either technical or fundamental analysis by humans. Since humans are involved in this stock analysis, emotions can hinder the person from conducting an objective and accurate analysis. Aside from that, the traditional stock analysis is slower compared to automated analysis. Henceforth, an inclusive automated stock analysis powered by machine learning algorithms should be echoed to ease the process of trading, produce accurate results and grow a community ranging from different levels of expertise.

II. Targeted Problem's Summary

The lack of diversity in a community of people in the stock market could potentially lead to less innovative solutions and ideas. Maintaining an inclusive workplace environment is necessary to promote advancements through welcoming fresh ideas on the table. Especially in the trading industry, there is an alarming lack of diversity in the male-dominated field. According to CNBC, there is only one full-time woman trader at the New York Stock Exchange named Lauren Simmons (Connley). In fact, only 17 percent of females are part of the Toronto Stock Exchange's board members (The Canadian Press). The truth is these are just some of the securities markets that shortfalls in terms of diversity.

In addition, stock analysis powered by humans tends to be affected by biases such as personal beliefs, emotions and impulses that could impact the accuracy of forecasting the stock price. These cognitive and emotional biases could potentially limit the perspective of the person forecasting the movement of the stocks. The Gerstein Fisher Researcher Center examines the results between the "returns in various asset classes versus the average performance of the asset class itself over the past 15 years." It proves that human emotions are the investors' foe (Fisher). Letting these biases could prohibit the trader to produce a more accurate result in comparison to an automated analysis.

III. Descriptions of all current solutions and their insufficiencies

Direct investing to stocks and banks is another option that some investors are taking. However, it is a high-risk game. Since this method is done without the guidance of a broker, the investor needs to evaluate and research for the value of the business wisely. As a result, this procedure leads to a higher chance of earning or losing money. According to Stingy Investor, "almost 80% of day traders lose money" (Stingy Investors). This specific quotation reveals the alarming losses of traders due to the lack of proper guidance of an expert. The method of direct investing's lack of directions puts investors into higher risks of gains and losses. With these probabilities, a person could be discouraged to pursue investing due to this factor. The fear of losing money diverts people away from investing to the stock market despite the explicit potential gains. Therefore, the stock market should be designed to be more intuitive to increase the number of investors and to diversify the community.

Mutual funds continue to soar to one of the most common investment options. In Canada alone, the Investment Funds Institute of Canada (IFIC) reveals the $10.8 billion sales of mutual funds in February 2015. Like the direct investing stock option, mutual funds' disadvantages are also spotted (Spiering). Although mutual funds is a quick way to diversify your portfolio, it has higher expense ratios and sales charges. In this case, it lessens the rate of the investment's return (Palmer). In comparison to other investment options, mutual funds are safe but have low investment return. Investors who are seeking short-term gains should minimize purchasing mutual funds due to its weak execution strategy. Despite this investment option's ability to attract the common people, its safe strategy provides lower profits in comparison to direct investing.

In the 21st century, automated analysis is powered by machine learning algorithms to forecast the movement of the stock market. Indeed, automated analysis prevents any uses of cognitive and emotional biases that could limit the calculation of the probable movement. Although this type of program produces accurate results depending on the data used to train the model, it lacks user mobility to engage different people from walks of life towards stock market analysis. User friendliness is a vital role in growing a community of people who use the product. In addition to the previous point, the system requires monitoring as it is susceptible to mechanical failures like connectivity issues, computer crashes, and system quirks (Admiral Markets). Since human intervention is still needed to accomplish the desired tasks, an automated analysis system is prone to over-optimisation. It is the excessive curve-fitting that produces an unreliable trading plan in live trading caused by employing backtesting techniques that are great on paper

but terrible on the live market (Admiral Markets). Therefore, the current automated analysis system is still to be enhanced to produce more accurate results and combat the lack of diversity in the financial stock market.

IV. Description about the solution and the way it overcomes the problem

The solution for this given problem is defined in three ways such as safe goal, stretch goal and bold goal. Firstly, the safe goal is the tolerable comfort zone in which the solution is done by replicating an existing model from a Youtube video by Computer Science and evaluating the model's efficiency. Then, the stretch goal requires running more complex work compared to mimicking an existing model. For this one, the idea is to automate an existing dataset using IBM's Watson Studio. Ultimately, the bold and crazy idea is the most complicated among the three. It is a mobile application that enables people from different walks of life to forecast the movement of the stock market called Aspen. It calculates the probability of the stock value's movement through machine learning. Therefore, these are the three hypothetical solutions to the stock market's lack of diversity and accuracy.

The current automated stock analysis can still be improved. Although the first solution which is automated analysis is more accurate in comparison to stock analysis done by a human, this program could be challenging for people who are unfamiliar with python libraries or data science. Since the manipulation of the data requires knowledge of concepts in certain python libraries, common people could be discouraged to use it to forecast the movement of the stock market. Aside from that, this type of solution is difficult to replicate by common people. However, the available automated stock analysis

uses more objective measures in comparison to the traditional stock analysis performed by humans leading to more accurate results. Henceforth, this model replicates the current solution available to the public.

For the stretch goal, creating an automated existing dataset using IBM's Watson Studio has advantages and disadvantages. This solution is easier to use in comparison to letting the user replicate an existing model since the minimum requirements to fulfill the task to automate the model are to choose a dataset and create the model without typing a single line of code. Although these advancements in machine learning pave ways to tackling more complex tasks, some parts of the machine learning model could be overlooked or oversimplified by the user. Since the software is not the most intuitive, tweaking the settings to fit the particular requirements could be difficult to implement as well (Penn). In addition, IBM's Watson Studio's documentation is not as strong in comparison to present documentations. Most of the available resources that elaborate the functionality and provide a reasonable walkthrough of the software are mainly available on YouTube instead of the documentation of itself. Ultimately, the tight integrations with IBM's API lead to the lack of high quality integrations to third party daty resources and APIs (Penn). Notably, the absence of support for MySQL needs to be worked on (Penn). Indeed, automating a dataset's insufficiencies hinder the software to completely solve the problem.

The bold and crazy idea is the ideal solution which is a mobile application that forecasts the movement of the stock market using machine learning. In addition, it enables the people from different backgrounds to forecast the stock market by using a

beginner-friendly product. According to Statista, around 4.57 billion people have access to the internet as of April 2020 that scopes around 59 percent of the global population. With this growing number of people, Stck.ly is an accessible and convenient financial application that could provide accurate stock analysis easily. Ideally this project solves the lack of diversity in the stock market while providing accurate forecasts of the stock market's movement.

V. Anticipation of any obstacles that stand in the way of the success of the research

Firstly, finding test users to calculate and measure the efficiency of the model is a challenge as it would require other people's input. Quantifying the results of the research would be a challenge as it requires the input from other people. Next, creating a fully functional mobile application within the span of one month is another obstacle. Due to the time constraint, Stck.ly's success metric would be based on building a working prototype modelled from an existing project. In this research, there are no expected world breaking discoveries. Instead, this research is intended to contribute to the positive improvements on figuring out the strategies that work and that does not work.

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