IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 10, Issue 1, October 2021
Impact Factor: 5.731

Artificial Intelligence in Stock Market

Sumer Patil
Student MSc, Department of Information Technology
Sir Sitaram and Lady Shantabai Patkar College of Arts and Science, Mumbai, India
sumerpatil4599@gmail.com

Abstract: *Nowadays, the most significant challenges in the stock market is to predict the stock prices. The stock price data represents a financial time series data which becomes more difficult to predict due to its characteristics and dynamic nature. As the technology is increasing, stock traders are moving towards to use Intelligent Trading Systems rather than fundamental analysis for predicting prices of stocks, which helps them to take immediate investment decisions. One of the main aims of a trader is to predict the stock price such that he can sell it before its value decline, or buy the stock before the price rises.*

Keywords: Artificial Intelligence, Stock Market, ETF's, AI Stock Market Prediction

I. INTRODUCTION

Predicting the Stock Market has been the goal of investors since its existence. Everyday billions of dollars are traded on the exchange, and behind each dollar is an investor hoping to profit in one way or another. Should an investor be able to accurately predict market movements, it offers tantalizing promises of wealth and influence. It is no wonder that the Stock Market and its associated challenges find their way into the public imagination every time it misbehaves.

The share market is a compilation of different people buying and selling the shares. Mostly known as stock (stake) which generally refers to claims of ownerships over a business by an individual or group of individuals. The way of finding the future valuation of the stock market prices is called the stock market estimate, expected to be Strong, accurate and effective.

Beginning in the 1990s with introduction of computational methods in finance, much research has focused on applying Artificial Intelligence to financial investments in the stock market. The main advantages of using computational approaches to automate the financial investment process include the elimination of ''momentary irrationality'' or decisions made based on emotions, ability to recognize and explore patterns that are looked over by humans, and immediate consumption of information in real-time. This area of knowledge has become known as Computational Finance. More recently, within computational finance, there is increasing use of and research on AI techniques applied in financial investments. Although a computer conducts the vast majority of hedge fund trades in an automated way, 90% of these operations are still performed by a hardcoded procedure. Thus, the ever-increasing application of artificial intelligence still has great potential for development.

Generally, AI is applied to finance in three different areas: the optimization of financial portfolios, prediction of future prices or trends in financial assets, and sentiment analysis of news or social media comments about the assets or companies. Despite the differences and peculiarities of each area, some works have proposed combinations of techniques from the different areas.

Some other studies in the area of computational finance include the control of dynamic systems applied to the financial market, investor behavioral analysis, network analysis, and clustering of financial assets. Reference relates the calibrated volatility of options to the movements in futures prices in the Taiwan stock market. It calculates a correlation of approximately -0.9 and concludes that the volatility of options can be used for the prediction of futures prices.

II. STOCK MARKET PREDICTION

Stock market prediction or forecasting using historical time series has become a technique widely used by researchers and investors to obtain financial profits in stock trading. These predictions, initially carried out by statistical methods,

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have been increasingly performed by Artificial Intelligence algorithms. Therefore, AI applied to investments constitutes a recent research area that has already achieved a large amount of publications.

The advent of the internet and its consequent technological innovations over time have significantly transfigured the way stock markets function and thus have impacted the way securities are actively traded. According to an article in *The Journal of Finance*, the two most consequential technological innovations are:

- Financial investors are maneuvering computer systems to mechanize their stock trading processes, and
- The financial markets have restructured themselves, so virtually all markets right now are limited to order books.

The majority of financial transactions at the present time have become electronic and the total period it takes to execute a stock trade has been significantly reduced to nanoseconds.

2.1 Algo –Trading

Algorithmic trading is the practice of purchasing or trading security according to some prescribed set of rules tested on past or historical data. These sets of rules are based on charts, indicators, technical analysis or stock essentials. For instance, suppose you have a proposition to purchase a particular stock assuming that the stock will end up in losses for three consecutive days before it rises in price. In this case, one can write and design an algorithm in such a way that the buy order for the particular stock is met when price is at a prespecified low and sold when the price is at a prespecified high.

Algorithmic trading has increased significantly over the past 10 years. In the U.S. stock market, about 70% of the comprehensive trading volume is initiated through algorithmic trading. A recent report by *Forbes* evaluated that the total world market for algorithmic trading is going to expand by 10.3% by the year 2020**.**

2.2 High – Frequency Trading

A popular form of algorithmic trading is high-frequency trading (HFT). Currently, most of the regulators and regular stock market investors have moved in the direction of HFT and algo-trading. HFT is a category of algorithmic trading where vast volumes of stocks and shares are sold and bought mechanically at very high speeds. HFT tends to develop continuously and will become the most authoritative form of algorithmic trading in the future.

Algorithmic trading has transformed the way trading is done. Stock traders are using algorithms to bring higher speed and efficiency to trading in securities. The algorithms that are developed will tend to become more complicated as it will be able to accommodate itself to diverse trading patterns using Artificial Intelligence. We can also anticipate Algo Trading to move into more pragmatic Machine Learning dexterity that can manage real-time deciphering of large volumes of data from many different sources.

2.3 AI – Powered ETF's and AI Stock Pickers

The advent of exchange-traded funds (ETFs) has rocked the world of portfolio investment. In fact, most ETFs are index funds, they incur a low expense ratio because they are not actively managed (just passively managed). An index fund is much simpler to run since it does not require security selection and can be done largely by computer.A current example of an ETF fueled by AI, is the AI-powered equity exchange-traded fund AIEQ. According to Sam Masucci, founder and CEO of ETF Managers Group, powered by IBM's artificial intelligence Watson, this actively managed portfolio is the first of its kind, which operates the fund. The AI-powered equity ETF, or AIEQ, consistently outperforms the S&P 500.

Another application of AI in managing portfolios is the introduction of AI Advisors as stock pickers to replace human advisors in actively managed equity funds. For example, Black Rock, the largest U.S. investment management firm, has started to replace human stock-pickers with the full automated investment program based on self-learning artificial intelligence algorithms.

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III. System Architecture

The system is divided into the following modules:

- **Data Collection:** Data is collected from various sources, such as yahoo finance and google finance, which are in the form of .csv format. For news data gathering system uses Google News API.
- **Analysis Manipulation and Visualization of Data:** Data collected is cleaned and pre-processed to make it ready to use formal algorithms and models. And along with this data visualization is also performed.
- **Build a Model:** The cleaned and pre-processed data is used to create, build and train various machine learning algorithms which can be used in predictions.
- **Predict Outcomes:** After the model has been built successfully, the next thing to do is predict an outcome pattern for a particular stock and check the accuracy of the predictions.
- **Predict Combining Results of all Algorithms:** After models are built system combines their results for better prediction and high accuracy and predicts the output based on real time data provided to it.

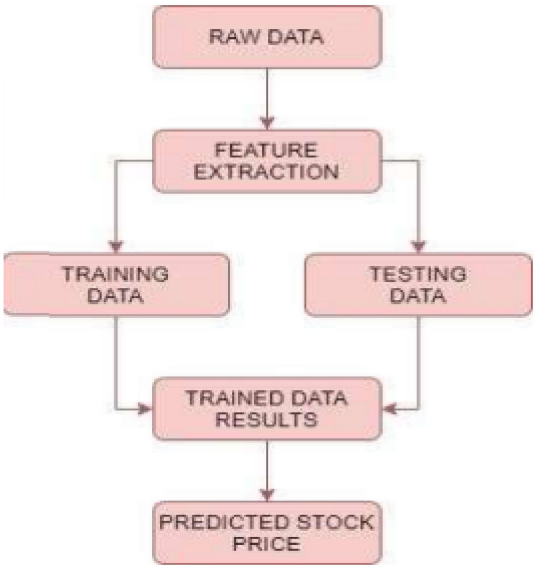

Figure 1: System Architecture

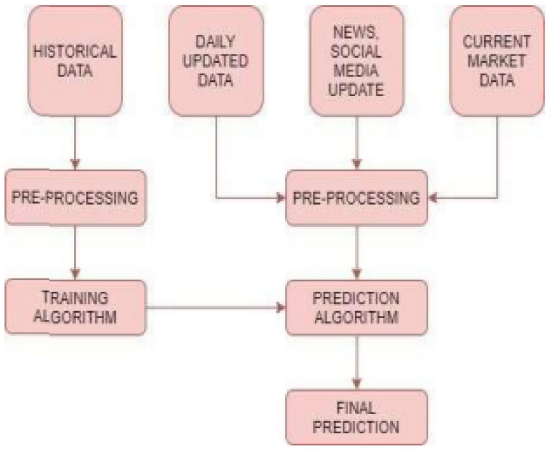

Figure 2: Stock Price Prediction

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IV. AI Stock Trading

While humans remain a big part of the trading equation, AI plays an increasingly significant role. According to a recent study by U.K. research firm Coalition, electronic trades account for almost 45 percent of revenues in cash equities trading. And while hedge funds are more reluctant when it comes to automation, many of them use AI-powered analysis to get investment ideas and build portfolios.

Artificial Intelligence is shaping the future of stock trading. Using Artificial Intelligence, Robo-advisers analyze millions of data points and execute trades at the optimal price, analysts forecast markets with greater accuracy and trading firms efficiently mitigate risk to provide for higher returns.

When Wall Street statisticians realized they could apply AI to many aspects of finance, including investment trading applications, he explained, "they could effectively crunch millions upon millions of data points in real time and capture information that current statistical models couldn't." Here are some ways companies around the world use AI for smarter trading.

4.1 Trading Technologies

How it's using AI in trading: Through its acquisition of Neurensic, Trading Technologies now has an AI platform that identifies complex trading patterns on a massive scale across multiple markets in real time. Combining machine learning technology with high-speed, big data processing power, the company provides clients with an ongoing assessment of compliance risk.

4.2 Green-Key Technologies

How it's using AI in trading: Green-Key Technologies' AI for trading uses speech recognition and natural language processing technology to save traders time searching through conversions, financial data and notes. With the company's platform, financial professionals are using AI to sift through, and access, notes, market insights and trending companies in real-time.

4.3 Auquan

How it's using AI in trading: Auquan's data science competition platform democratizes trading by allowing data scientists from all backgrounds to produce algorithmic trading strategies that help solve investment challenges. As a result, investment clients can reap the benefits of data science without the need for pricey in-house expertise.

4.4 Epoque

How it's using AI in trading: Epoque's fully automated AI trading has three "engines": a strategy engine that observes and analyses potential trades; an order engine that creates orders and performs operational actions; and a logical engine that handles active orders and uses machine learning to improve its performance.

4.5 Trade Ideas

How it's using AI in trading: Overnight, Trade Ideas' AI-powered self-learning robo-trading platform "Holly" subjects dozens of investment algorithms to more than a million different trading scenarios to increase the alpha probability in future sessions. Only those strategies with a success rate of 60% and above and a 2:1 profit factor are shared with traders the next day.

Industry impact: The Company's actionable intelligence considerably outperformed market benchmarks in the first quarter of 2018, returning 16% to the S&P's -1.0%.

V. Why Artificial Intelligence Will Never Beat The Stock Market

Over the past decade, the belief that artificial intelligence could solve the complexities of the stock market has spread like a wildfire. The notion that humans lack the capacity and capability compared to machines, who will, without fail, consistently beat the market over time. By simply programming a machine, it will produce the ultimate formula making

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you filthy rich in the process. A radical change in society where anyone can make money, but not just a stable income: a modest fortune. Unfortunately, though, this is a mere fantasy.

There's a major flaw in algorithms built solely to predict future market moves: they don't. They only respect the technical aspects of an asset by taking into account past price movements, avoiding any consideration for future fundamentals. Any veteran trader will tell you the market isn't there to give away free money. Instead, it's a competitive environment punishing anyone — or anything — who tries to make a quick buck by trading on reactionary information already priced in.

Technical analysis alone will not make you money. In fact, the myth that it does has fueled an entire industry which preys on the vulnerable: As the homepage of many online brokerage websites illustrates, up to 96% of foreign exchange traders have fallen for the trickery. The truth about the brokerage industry is it makes money when its clients lose. So when your broker offers you a plethora of trading algorithms to choose from, the alarm bells should be ringing. Still, you may fall for the con, because the trickery itself is seductive: Let the algorithms do everything for you, sit back and relax until you can retire. All the algorithm has to do is choose the right direction: either buy or sell, right?

Wrong. In reality, feeding an algorithm with data based purely on technical is the equivalent to putting on a blindfold and aiming at a dartboard. You hit the board 1 out of 10 times, but the rest hit the wall.

VI. Conclusion

Considering other factors affecting the stock price improves accuracy of prediction. Trying to predict the stock market only when its more predictable and avoiding when market is more uncertain gives greater profits,such as prediction only when standard deviation was within the threshold values improved accuracy of our algorithm by 10 or more percentage. The algorithms are an extraordinary resource for investors and financial institutions or investment in share market as they are trained on a huge collection of past data and have been picked subsequently to be tested on sample data. And thus to conclude I'll say that this paper tried to cover mostly all aspects.

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