Stock Market Prediction

USING
MACHINE LEARNING

Mahir Modi   RA2111027010080
Ritesh Ranka   RA2111027010097
Aniket Saxena   RA2111027010085

Abstract

► Time series forecasting has been widely used to determine the future prices of stock, and the analysis and modelling of finance time series importantly guide investors' decisions and trades

► This work proposes an intelligent time series prediction system that uses sliding-window optimization for the purpose of predicting the stock prices

► The system has a graphical user interface and functions as a stand-alone application.

► The proposed model is a promising predictive technique for highly non-linear time series, whose patterns are difficult to capture by traditional models.

Introduction

► Financial markets are highly volatile and generate huge amounts of data daily

► It is the most popular financial market instrument and its value changes quickly

► Stock prices are predicted to determine the future value of companies' stock or other financial instruments that are marketed on financial exchanges

► However, the stock market is influenced by many factors such as political events, economic conditions and traders' expectation

Machine Learning in Stock Prediction

- ► The field of Machine Learning is vast and plays a key role in a wide range of critical applications.

- ► The concept of **Support Vector Machines (SVM) / Long Short-Term Memory(LSTM)** have advanced features that are reflected in their good generalization capacity and fast computation.

- ► Predicting the stock market involves predicting the closing prices of a company's stock for any given number of days ahead.

- ► SVMs can be used to perform Linear Regression on previous stock data to predict the closing prices using Time series forecasting and other optimization algorithms

Existing Methods

▶ Time series forecasting consists of a research area designed to solve various problems, mainly in the financial area

▶ Support vector regression (SVR), a variant of the SVM, is typically used to solve nonlinear regression problems by constructing the input-output mapping function.

▶ The least squares support vector regression (LSSVR) algorithm is a further development of SVR and its use considerably reduces computational complexity and increases efficiency compared to standard SVR.

▶ The Firefly Algorithm (FA), which is a nature-inspired metaheuristic method, has recently performed extremely well in solving various optimization problems.

Disadvantages

► The existing system focuses on the stock price market in Taiwan, but does not generalize for other markets worldwide.

► The system does not allow the import of raw data directly

► The existing system cannot be used to analyze multi-variate time series

► Lastly, the system does not have a user-interface which can be distributed as a web app to users for personal use

Proposed System

► To generalize the application of the existing system, our work uses the system to estimate other stocks in similar emerging markets and mature markets

► The system can be extended to analyze multivariate time series data and import raw dataset directly

► Profit can be maximized even when the corporate stock market is has lower value

► The development of a web-based application has been considered to improve the user-friendliness and usability of the expert system.

Future Enhancement

- The limitation of the proposed system is its computational speed, especially with respect to sliding-window validation as the computational cost increases with the number of forward day predictions.

- The proposed model does not predict well for sudden changes in the trend of stock data.

- This occurs due to external factors and real-world changes affecting the stock market.

- We can overcome this by implementing Sentiment Analysis and Neural Networks to enhance the proposed model.

- We can modify the same system to an online-learning system that adapts in real-time.

Conclusion

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Thus, as we can see above in our proposed method, we train the data using existing stock dataset that is available. We use this data to predict and forecast the stock price of n-days into the future.

The average performance of the model decreases with increase in number of days, due to unpredictable changes in trend.

The current system can update its training set as each day passes so as to detect newer trends and behave like an online-learning system that predicts stock in real-time.

Literature Review

- It has been supported by several empirical studies such as those of Atje and Jovanvich (1993), Levine and Zervos (1993, 1998), Roussean and Wachtel (2000) and Beck and Levine (2004).
- These studies suggest a strong positive relationship between stock market development and growth rates of real GDP per capital although they have failed to discuss the important of stock market development, banking sector.
- Amihud etal ai. (2006) analyzed the studies that have evaluated the effect of liquidity and liquidity risk on stock returns.
- Benson et ai(2015) analyzed the literature available on liquidity in financial markets.
- Kumar and misra (2015) evaluated 95 articles and presented a review of literature on various Of stock market liquidity, intraday movements, and liquidity effects on firm value.

Thank You