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Generative Adversarial Network for Sentiment-based Stock Prediction

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Abstract

Financial markets received more attention due to technological advancements, such as Artificial Intelligence (AI). In addition to the price index, traders and investors constantly monitor stock news on social media. Therefore, predicting the market by analyzing public opinions is an important issue. In this research, we propose three models based on Generative Adversarial Network (GAN), namely Price-GAN, Price-Sentiment-GAN, and Price-Sentiment-WGAN. The first model uses only optimized price features, and the two other models use sentiment features collected from social media as well as optimized price features. All the proposed GAN models include Long Short-Term Memory (LSTM) as generators and Convolution Neural Networks (CNN) as discriminators. To evaluate the proposed models, two different social media datasets in English and Persian are used. Our proposed models predict the close stock price for 15 English and 5 Persian stocks. All of the proposed GAN models outperform the state-of-the-art models by enhancing the performance of the English dataset by 2.44% and the Persian dataset by 12.11%.

KEYWORDS:
stock prediction, sentiment analysis, generative adversarial network, deep learning

1 | INTRODUCTION

From the past to the present, trade markets have been noticed by people. Although the form of exchanges in these markets has changed over time, buying and selling at the right time is always interesting for people. Stock markets seem to play an essential role in the worlds economic area, and the evolution and development of stock markets will continue. In todays world, the stock market and financial assets, such as stocks, bonds, and similar cases, are easily accessible; Hence, the number of trades each day increases. Over the past years, stock market prediction has been an exciting and challenging topic. Investors and financial market analyzers always use their strategies to predict the future trend of stock markets. This will result in supply and demand in financial markets. Due to the advancement of AI methods in recent years, financial markets have also been affected. Hence, the financial markets are predictable with the use of AI algorithms. Since there are more funds in financial markets compared to the past, predicting the future of the market will help investors gain more profits.

There are principally two strategies for predicting these markets, technical analysis and fundamental analysis. The former one mainly uses past prices and technical indicators. By focusing on charts, while the latter one focuses on analyzing financial data from companies. However, due to financial markets' uncertainty and complexity, it is difficult to predict the stock markets future with high accuracy [32]. In the area of time series data, especially in stock markets, various research studies use AI to predict the future price or trend of stock markets [23,31,3]. Nowadays, more than 70-80 percent of overall trading volume in the US stock