

COMP4560 - Literature Review

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For project:

Trade For Me

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Abstract

In this literature review, we aim to provide an overview of the existing research related to our proposed project, which aims to analyse the sentiment of tweets related to specific companies in the financial sector and use this information to inform investment decisions. The project will involve collecting tweets related to the companies of interest, training sentiment analysis models using a financial news dataset, identifying the most reliable twitter users for each company, and analysing their recent tweets to provide buy or sell recommendations. If there are no recent tweets from the most reliable users, the project will use time series analysis models to predict future stock prices for the company.

Previous research has shown that sentiments expressed on social media platforms such as Twitter can provide valuable information for predicting stock market movements (Bollen et al., 2011). Additionally, research has demonstrated that incorporating sentiment analysis with time series analysis can improve the accuracy of stock price predictions (Zhang et al., 2018). This literature review highlights the importance of combining sentiment analysis with time series analysis in order to improve the accuracy of stock price predictions and inform investment decisions.

Keywords

Sentiment Analysis; Twitter; CNN; LSTM; BiLSTM; RNN; Arima; Time Series Analysis

Introduction

The use of social media platforms, particularly Twitter, as a source of information for financial decision making has received increasing attention in recent years. Sentiment analysis, the process of determining the emotional tone of text, has been applied to tweets as a way to gauge public opinion and predict stock market movements. The relationship between tweets and stock prices has been widely studied, with many researchers finding a positive correlation between the sentiment of tweets and stock prices (Bollen et al., 2011; Liang et al., 2016).

In addition to sentiment analysis, time series analysis has also been used to predict stock prices. Time series analysis is a method of analyzing a series of data points collected over time and can be used to forecast future values based on past trends. A number of studies have demonstrated that incorporating sentiment analysis with time series analysis can improve the accuracy of stock price predictions (Zhang et al., 2018; Li et al., 2016).

Given the potential usefulness of sentiment analysis and time series analysis in financial decision making, the aim of this project is to develop a system that can analyze tweets related to specific companies in the financial sector and use this information to inform investment decisions. The project will involve collecting tweets related to the companies of interest, training sentiment analysis models using a financial news dataset, identifying the most reliable twitter users for each company, and analyzing their recent tweets to provide buy or sell recommendations. If there are no recent tweets from the most reliable users, the project will use time series analysis models to predict future stock prices for the company.

In order to train the sentiment analysis models, various architectures have been proposed such as LSTM, CNN+BiLSTM, and BiLSTM. Long Short-Term Memory (LSTM) networks are a type of recurrent neural network (RNN) that are able to capture long-term dependencies in sequential data, making them well suited for sentiment analysis tasks (Hochreiter and Schmidhuber, 1997). A combination of CNN and BiLSTM also been proposed in literature for sentiment analysis tasks, where CNN is used for feature extraction and BiLSTM for capturing the temporal dependencies (Kim, 2014).

For the identification of the most reliable twitter user, various methods have been proposed in literature such as using the user's followers, tweets and engagement rate, and even an end-to-end deep

learning model that can predict the reliability of the users based on their tweets and profile (Wu et al., 2018).

For time series analysis, various models have been proposed such as LSTM, RNN, CNN, and BiLSTM, as well as traditional models such as ARIMA (AutoRegressive Integrated Moving Average) (Bollerslev et al., 2016). LSTM and RNN have been proven to be effective in modeling time series data by capturing the temporal dependencies (Hochreiter and Schmidhuber, 1997). CNN and BiLSTM have also been applied to time series data and have been shown to be effective in capturing local and global patterns in the data (Wang et al., 2017).

In summary, this project aims to contribute to the existing literature by combining sentiment analysis with time series analysis in a novel way to inform investment decisions. By training sentiment analysis models on a financial news dataset, identifying the most reliable twitter users, and analyzing their recent tweets, the proposed system has the potential to provide valuable information for stock market predictions. Additionally, by incorporating time series analysis as a fallback in case of lack of tweets, the proposed system can provide a more robust and reliable method for stock market predictions.

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