Chapter 16
Exploring the Efficacy of Artificial Intelligence Techniques in Predicting Stock Market Trends

Shantnu Sood
Himachal Pradesh University, India

Yashwant Kumar Gupta
Himachal Pradesh University, India

Puneet Bhushan
https://orcid.org/0009-0006-9114-8781
Himachal Pradesh University, India

ABSTRACT

Stock price prediction is a challenging task, traditionally relying on fundamental, technical, and time series analysis. However, AI and ML techniques offer new opportunities for enhancing predictions in equity markets. In recent years, considerable efforts have been made to identify these patterns in stock markets, with the aim of facilitating profitable trading and investment decisions. Consequently, a wealth of studies and research endeavors have emerged in this field. This chapter explores diverse techniques used for stock market prediction, analyzing their effectiveness. The techniques examined in this study are categorized into three groups: traditional ML, deep learning, and sentiment analysis. Results show naive Bayesian and random forests as promising conventional ML models, while LSTM neural network provides accurate predictions among deep learning models. This chapter sheds light on the employed and researched ML models, offering insights into their strengths in forecasting market trends.

1. INTRODUCTION

The stock market has captivated the interest of investors, academicians and other market participants for a long time due to its dynamic and unpredictable nature coupled with rapid price movements. These characteristics lead to considerable challenges to those that are trying to make informed investment decisions. The fascinating yet complex dynamics of the stock market result from its multifaceted ecosystem, which includes a wide range of actors, information sources, emotional factors, and external factors. This ecosystem creates a constantly changing and unpredictable landscape, characterised by a low signal-to-noise ratio, which frequently takes the form of nonlinear phenomena.

As a result, academics, researchers, and practitioners have shown an increasing interest in employing machine learning (ML) techniques for research in the field of finance in recent years. Due to the use of non-linear activation functions, which are good at capturing complicated data correlations that the linear models might not be able to perceive successfully, ML models have the potential to extract signals from data laden with noise. Additionally, unlike linear models, ml models do not have multicollinearity problems, a significant problem in the analysis of financial data.

This paper's goal is to give a thorough overview of ML methods used in stock market forecasting. This research examines the approaches employed by scholars and industry experts to discuss the advantages and disadvantages of stock market forecasting using ML algorithms.

The main objective of this research is to gain an understanding of this field. The study examines algorithms with the intention of offering insights, to investors and financial institutions.

In order to predict stock market trends numerous machine learning methods have been utilized. For instance in a study by Li et al. (2018) they employed a network model to estimate changes, in stock prices using historical trading data. Their approach yielded short term price predictions. In another study (Goh et al., 2020) looked at how well Long Short Term Memory (LSTM) networks predicted stock market volatility, LSTM networks outperformed traditional econometric models.

As a result, the objective of this review paper is to provide a thorough study of the state of machine learning (ML) algorithms for stock market prediction. Through a critical examination of methodologies, challenges, and opportunities, the study hopes to contribute to the advancement of this field and facilitate the development of more accurate and robust models for stock market prediction.

The proposed paper is structured in the following way Section 1 - Introduction, Section 2 -Methodology discusses some of the most prominent machine learning techniques as well as metrics used to evaluate them, Section 3 - Literature Review provides an overview of the various research works done in this field, Section - 4 is about results and discussion, and Section - 5 concludes the paper and outlines the future scope of work.

2. METHODOLOGY

I. Traditional Machine Learning Techniques

Predictive modelling and pattern identification in many domains have long been built on the foundation of traditional machine learning approaches. The following is a discussion of some of the methods used in this area:

11 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage: www.igi-global.com/chapter/exploring-the-efficacy-of-artificial-intelligence-techniques-in-predicting-stock-market-trends/332640

Related Content

The Concept of [Robot] in Children and Teens: Some Guidelines to the Design of Social Robots
João Sequeiraand Isabel Ferreira (2014). *International Journal of Signs and Semiotic Systems (pp. 43-57).*
www.irma-international.org/article/the-concept-of-robot-in-children-and-teens/127094

Self-Adaptive ReLU Neural Network Method in Least-Squares Data Fitting
Zhiqiang Caiand Min Liu (2024). *Principles and Applications of Adaptive Artificial Intelligence (pp. 242-262).*
www.irma-international.org/chapter/self-adaptive-relu-neural-network-method-in-least-squares-data-fitting/337696

Experimenting with Proxy Agents in Online Combinatorial Auctions
Soumyakanti Chakraborty, Anup Kumar Senand Amitava Bagchi (2014). *International Journal of Intelligent Information Technologies (pp. 56-75).*
www.irma-international.org/article/experimenting-with-proxy-agents-in-online-combinatorial-auctions/114959

Using AI-Driven Decision-Making Tools in Corporate Investment Planning
Joel Jebadurai Devapitchai, Krishnapriya S. V., Karuppiah S. P., William Robert P.and S. Saranya (2024). *Generative AI for Transformational Management (pp. 137-160).*
www.irma-international.org/chapter/using-ai-driven-decision-making-tools-in-corporate-investment-planning/355490

Use of Contact Form in Development of Prosumer Innovations
Elbieta A. Wyslocka, Waldemar Szczepaniak, Renata Biadaczand Dariusz Wielgórka (2018). *International Journal of Ambient Computing and Intelligence (pp. 67-77).*
www.irma-international.org/article/use-of-contact-form-in-development-of-prosumer-innovations/205577