Chapter 10
Novel Applications of Data Analytics in Financial Markets:
A Review and Exploration of Predictive Power

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ABSTRACT

The world of stocks is ever-changing and implementing predictive analytics is a cornerstone for making astute investment decisions. This paper delves into the effectiveness of advanced machine learning algorithms, notably Long Short-Term Memory, Artificial Neural Networks, and Linear Regression, in analyzing historical data to possibly project future trends while documenting existing papers and providing a breakdown of the most popular and sought-after machine learning algorithms.

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The objective is to find intricate, underlying patterns that offer invaluable insights for analysis and gauging risk for analysts and potential investors. By looking into such topics, this paper contributes novel ideas to the ongoing research surrounding utilizing machine learning algorithms in the dynamic world of financial markets. The paper consists of two segments: one provides a detailed review of recent methodologies used for market prediction on a region-wise basis, while the other focuses on using Long Short-Term Memory, Artificial Neural Networks, and Linear Regression.

INTRODUCTION

In the volatile world of stocks, predictive analytics has become a mainstay for making smart investment decisions, and the advancements in machine learning offer great aid in not only analyzing current date trades but also predicting future trends in stock prices. This paper explores the efficacy of advanced ML algorithms like Long Short-Term Memory, Artificial Neural Networks, and Linear Regression. By systematically utilizing these algorithms and models on historical stock data, we hope to identify patterns and predict stock market trends, thus providing analysts and potential investors insights that could lead them to make more informed decisions. LSTM is a type of neural network that deals with the vanishing gradient problem many traditional neural networks face. ANNs are computing systems mimicking the human brain's and neurons' design and can transmit signals to one another. Linear Regression is a model used to represent the linear bonding between a dependent and independent variable. Each study is examined for its dataset, geographic focus, employed machine learning model, financial metrics, and identified shortcomings.

REVIEW OF LITERATURE

Research from the year 2020 indicates a growing trend of employing machine learning algorithms for statistical analysis within the global financial markets. While applying these algorithms has shown promise, it is evident that certain models outperform others in specific tasks. This review delves into pertinent research to categorize machine learning methods based on their efficacy and limitations in financial market analysis. Each literature review discusses the dataset or the region of the study, the machine model they have used, financial risk/ performance metrics, and the limitations of the work.

Ejder et al. (2023) employ the Distance-Based Exponential moving average (DBEMA) technique to forecast Borsa Istanbul stock exchange stock prices using daily end-of-day data from 1998 to 2021. DBEMA is proposed as an improvement