



Abstract

Title: Integrating Wavelet Neural Networks to Enhance Stock Market Forecasting in Emerging Markets.

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Amidst the globalization of financial markets, the imperative precision of stock market trend forecasting in emerging economies remains paramount for both investors and policymakers. This study delves into the application of a hybrid Neural Network, amalgamating Wavelet transform with Multilayer Perceptron (MLP), Long Short-Term Memory (LSTM), and Convolutional Neural Network (CNN) to attain refined predictions of the daily returns of the composite index on the Ghana Stock Exchange. Leveraging data from the Ghana Stock Exchange, the models underwent comprehensive training and evaluation, focusing on the augmentation of prediction accuracy.

Employing a discrete wavelet transform, the time series data was decomposed into distinctive frequency components, fostering an exhaustive analysis of high and low-frequency patterns while accommodating inherent complexities. The Wavelet variants were subsequently integrated inputs for the neural network models.

The study observed the superiority of the hybrid LSTM model over the individual models and the hybrid models featuring MLP and CNN. The Wavelet-LSTM's adeptness in capturing temporal dependencies and its resilience to the prevalent noise within financial data significantly contributed to its superior forecasting performance. Particularly noteworthy was the facilitation by the wavelet transform, empowering the LSTM model to encapsulate intricate temporal structures and enduring dependencies within the data, consequently culminating in more precise and resilient predictions.

This study emphasizes the vital fusion of sophisticated deep learning models and advanced data processing techniques, like the wavelet transform, for precise stock market forecasting in dynamic emerging economies. The successful Wavelet-Enhanced LSTM hybrid model serves as a crucial decision-making tool for stakeholders, fostering informed choices in Ghana's evolving financial landscape. Furthermore, it highlights the significance of customizing predictive models to the unique nuances of specific emerging markets, enhancing investment strategies and risk management practices.

Keywords: Wavelet Transform, Long Short-Term Memory, Convolutional Neural Network, Multilayer Perceptron, Wavelet Variants