

# Forecasting Stock Index Movement Using Stationary Wavelet Transform and Long Short- Term Memory network

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## Abstract

Forecasting the stock prices with a satisfying accuracy can be considered a highly challenging task due to non-linearity and non-stationarity of the stock market data [1]. Therefore, movements of financial markets behave, according to previous studies, in a dynamic and non-linear manner [2]. In order to help investors, analyst and traders, movement and future direction of the stock market can be predicted with the help of AI-based system. Such system can provide valuable and supportive information about the future situation of the market, which is important for successful investment and maximizing profits. In this research, authors investigate the predictability of NASDAQ Composite movement direction by integrating the Stationary Wavelet Transform (SWT) with Long Short-Term Memory (LSTM) networks. First, the Unit Root Test is performed in order to examine data stationarity. Afterwards, the time-series data is decomposed by utilizing SWT to obtain low and high frequency components which are then used as input variables for the LSTM network. The performance of the trained model is evaluated using Root Mean Square Error (RMSE) measure. Satisfactory results for intraday stock price forecasting are achieved with a combination of four-level SWT using Haar wavelet and LSTM network.

## Keywords

*Intraday Stock Data, Stock Market Movement, Unit Root Test, Wavelet transform, Long Short-Term Memory*

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