Enhancing Patch Time Series Transformer with Wavelet Transform for Improved Stock Prediction

Authors : Cheng-yu Hsieh, Bo Zhang, Ahmed Hambaba

Abstract : Stock market prediction has long been an area of interest for both expert analysts and investors, driven by its complexity and the noisy, volatile conditions it operates under. This research examines the efficacy of combining the Patch Time Series Transformer (PatchTST) with wavelet transforms, specifically focusing on Haar and Daubechies wavelets, in forecasting the adjusted closing price of the S&P 500 index for the following day. By comparing the performance of the augmented PatchTST models with traditional predictive models such as Recurrent Neural Networks (RNNs), Convolutional Neural Networks (CNNs), Long Short-Term Memory (LSTM) networks, and Transformers, this study highlights significant enhancements in prediction accuracy. The integration of the Daubechies wavelet with PatchTST notably excels, surpassing other configurations and conventional models in terms of Mean Absolute Error (MAE) and Mean Squared Error (MSE). The success of the PatchTST model paired with Daubechies wavelet is attributed to its superior capability in extracting detailed signal information and eliminating irrelevant noise, thus proving to be an effective approach for financial time series forecasting.

Keywords : deep learning, financial forecasting, stock market prediction, patch time series transformer, wavelet transform
Conference Title : ICABEM 2024 : International Conference on Accounting, Business, Economics and Marketing
Conference Location : San Francisco, United States
Conference Dates : September 26-27, 2024