PAPER ID: 17-03-0148

Time Series Forecasting Based On Wavelet Decomposition and Correlation Feature Subset Selection

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Due to the possibility of extracting the features of data through wavelet transformation, its use in time series forecasting model has become popular. The appropriate wavelet function selection and the level of decomposition are very necessary for a successful use of the wavelet coupled with the artificial neural network (ANN) models. This is because it can enhance the performance of the model. A drawback of the wavelet-coupled models is their used a large output number to the ANN, thereby making it more difficult to calibrate the neural structure and need a long time to train the model. This study aims to develop a wavelet-coupled ANN for the detection of the dominant input data from the wavelet decomposition sub-series for use as ANN input to increase the model accuracy with minimum input number. The result showed that the Wavelet Transformation and Correlation Feature Subset Selection (CFS) with ANN can significantly improve the efficiency of the ANN models.

Keywords: ANN, MLPNN, Correlation Feature Subset Selection, Wavelet Decomposition

PAPER ID: 17-03-0189

Anomaly Detection in Time Series Data using Spiking Neural Network

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One of the crucial issues in anomaly detection problems is identifying abnormal patterns in time series data that contains noise and in unstructured form. In order to deal with this problem, a good detector is needed with a capability to learn the complex features in the datasets and extract useful information to distinguish normal and abnormal patterns in the datasets. This study exploits the features of Spiking Neural Network (SNN) to generate potential neurons through its learning. These neurons will spike whenever it detects abnormal pattern in the data. The proposed method is consisting of three stages: 1) initializing the weight values using rank order method; 2) representing the real input data into spike values using Gaussian Receptive Fields; and 3) identifying the firing nodes that indicate the abnormal data. We applied the proposed technique to selected data with anomalies from time series datasets. Experimental results show that the proposed technique is capable of detecting the anomalies in the datasets with reasonable False Alarm Rate.

Keywords: Computational Intelligence, Anomaly Detection, Spiking Neural Network.