

[This paper](#) got favorable results from running a Wavelet Transform + ANFIS (Adaptive neuro-fuzzy inference system) predictive model on stock market time series data. In fact, it found that the Wavelet + ANFIS method outperformed Wavelet + ANN and pure ANN methods implemented in recent papers. As such, I feel that ANFIS models may warrant further study in general.

The paper splits, scales, and uses a level-3 discrete wavelet transform to separate each X series (open, high, low, and volume) into approximation/smooth series and detail series. It then uses these approximation and detail series as input for an ANFIS model in order to generate one-day-ahead predictions about closing price.

ANFIS is a type of artificial neural network that integrates ANN and fuzzy logic principles, and has been viewed as a “best-of-both-worlds” approach that combines the advantages of both types of models. It consists of a "fuzzification layer" to convert numeric values into fuzzy values, then generates a series of fuzzy if-then rules with the fuzzified inputs in order to generate predictions. ANFIS models can learn much more quickly, adapt to changes in model distributions, and capture more nonlinear structures of a time series. Combined with a wavelet transform to break the data into smooth and detailed components, this feels like a very promising model.

August 7, 2020 update - running an R implementation of this model on Apple data yielded mixed but promising results. While the model was only successfully able to handle the initial ~150 terms in the test dataset, it was able to predict them with reasonable accuracy. More

experimentation with hyperparameters would be needed, but the model ultimately achieved an RMSE of 0.0085 on the selected portion of the test data and 0.0805 on the overall test data.

