Related work:

Computationally Efficient FLANN-based Intelligent Stock Price Prediction System: the paper conducted an experiment to predict the next-day’s closing price of Exxon Mobil (energy sector), Citigroup (banking sector) and IBM (technology sector) by a supervised learning method using functional link artificial neural network (FLANN). The data was collected on daily basis from Yahoo Finance between Jan 1998 and Apr 2008. It contained 2478 samples in total. The model predicted next-day’s closing price based on 14 different features which consisted of not only open and closing prices but also industrial indices and technical indicators for higher accuracy. The structure of the FLANN network had two parts. The first part was a trigonometric functional expansion component to map the input data from low dimensional space to a higher dimensional space. The second part was a single neuron with tanh activation function. The experiment yielded a reasonably low average percentage error (APE) 1.4% to 4.5% with relatively acceptable hit rate of 0.62.

The Use of Artificial Neural Networks in the Analysis and Prediction of Stock Prices: the paper conducted an experiment using supervised neural network to predict the next-day’s closing price and possible future behavior of stock PETR4 which belong to Petrobras (energy sector) traded on the Sao Paulo Stock Exchange (BM&FBOVESPA). The data set consisted of 2384 samples during 04/01/2000 and 18/08/2009. It contained 22 features such as opening, closing price and 5, 22, 200-day exponential moving average. The structure of the neural network consisted of three layers which were 1 input layer, 1 hidden layer and 1 output layer. The number of neurons in the input layer was the window size multiplied by the number of sample set series. The hidden layer had 22 neurons which was the number of features. The number of neurons in the output layer varied by the size of the expected prediction window. The best performance of the model was obtained with 5-day window and a prediction range of 1 day with root mean square (RMS) error of 0.00129.

Deep Learning with Stock Indicators and Two Dimensional Principal Component Analysis for Closing Price Prediction System: the paper proposed a stock closing price prediction model based on deep belief networks (DBNs) with stock daily information and stock technical indicators input preprocessed by principal component analysis (PCA). The input data was S&P500 stocks collected from Yahoo Finance from Jan 2004 to Apr 2016 which equaled to 3093 trading days. Each sample in the data set consisted of 16 features which were daily information such as open and closing price and technical indicators such as Chaikin volatility and Williams. The DBNs network had 5 layers in total which were 1 input layer, 3 hidden layers in which hidden units within each layer were not connected with each other and 1 output layer with a softmax activation function. The PCA reduced input dimension to 2. The paper compared results acquired from the proposed model with two other approaches which were basic neural network with stock daily information input and deep belief networks (DBNs) with stock daily information and stock technical indicators input to show its superior performance.

Application of artificial neural network for the prediction of stock market returns: The case of the Japanese stock market: the paper introduced a new set of input features and applied Global search techniques, a genetic algorithm (GA) and simulated annealing to improve prediction ability of the ANN models to forecast the return of the Nikkei 225 index. The data covered the period from Nov 1993 to Jul 2013. In total, 71 features which contained financial indicators and macroeconomic data were employed to predict the return of the Nikkei 225 index. The neural network consisted of three layers which were 1 input layer, 1 hidden layer and 1 output layer. To improve the performance of the model, genetic algorithm (GA) and simulated annealing was employed to optimize the weights and bias of the ANN.