

COMPARISON OF SUPPORT VECTOR REGRESSION AND ARTIFICIAL NEURAL NETWORK MODELS TO FORECAST DAILY COLOMBO STOCK EXCHANGE

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ABSTRACT

Stock market prediction is one of the fascinating issues of stock market research. Accurate stock prediction is a big challenge in the investment industry. This study aims to identify better approach for predicting stocks of different sectors which were listed under the Colombo Stock Exchange (CSE). In literature a number of different methods have been employed to predict stock market returns such as technical analysis methods, fundamental analysis methods, traditional time series methods and machine learning method. Most of traditional statistical models are less satisfactory in financial forecasting since most of the financial time series usually very noisy or behave nearly like a random-walk process or they are subject to sudden shifting. To minimize this crucial problem mentioned in the traditional statistical models nowadays most researchers tend to use machine learning techniques. Various prediction techniques have been studied in this field and researchers still focus on implementing new techniques in order to improve the stock market prediction model. In this research Artificial Neural Network (ANN) trained with Levenberg-Marquardt (LM) algorithm and new data mining technique called Support Vector Regression (SVR) with linear and polynomial kernels were used as forecasting techniques. Closing share prices of Development Finance Corporation of Ceylon Bank (DFCC) and John Keels Group (JKH) from 4th January 1999 to 26th July 2010 were considered as data for the study. The forecasting performance of the neural network models and support vector models were evaluated using a number of widely used statistical metric namely Normalized Mean Square Error (NMSE), Mean Absolute Error (MAE), Directional Symmetry (DS), Correct Up trend (CU) and Correct Down trend (CD). According to the performance of these two companies under different market conditions, it can be concluded that performances of NN and SVR models depend on the period considered and variables used in that period. Moreover it was found that in value prediction SVR models with polynomial kernel perform better than SVR with linear kernel and NN with Levenberg-Marquardt algorithm for any size of data set. When consider about the directional prediction NN models show high performance for large data set and SVR models show high performance for small data sets. When considering the most recent period of the DFCC and JKH, SVR model with polynomial kernel forecast the daily closing price indices with directional prediction accuracy of 78% and 75% and mean absolute error with 2.3 and 2.1 respectively.

Keywords: Support Vector Regression, Neural Network, Levenberg-Marquardt (LM) algorithm, Kernel Function