ABSTRACT

Forecasting of financial data plays an important role for proper financial planning. The review of literature reveals that the existing statistical methods are being replaced by soft and evolutionary computing techniques. The efficiency of the recent adaptive nonlinear methods depends on the appropriate selection of features from the raw data, model architecture and the learning algorithms used. Close examination of the literature also indicates that very little work has been reported on

(i) prediction when outliers are present in the data
(ii) long range prediction of the financial data
(iii) multi-objective optimization based prediction and
(iv) development of recursive prediction model

These four issues have been addressed in the thesis and some satisfactory solutions have been provided to these problems. The contributions made in the thesis are listed below:

Two new robust forecasting models, wilcoxon functional artificial neural network (WFANN) and wilcoxon artificial neural network (WANN) have been developed to efficiently forecast various exchange rates in presence of outliers in the data. A new hybrid differential evolution (DE) based auto regressive moving average (ARMA) forecasting model is proposed and demonstrated to offer superior prediction performance of various exchange rates compared to those provided by other three competitive models. A recurrent radial basis function (RRBF) based neural network is employed to develop a promising forecasting model for long range prediction of net asset values. Finally, a non-dominated sorting genetic algorithm-II (NSGA-II) based optimization RBF prediction model is proposed for predicting stock indices. It is shown that new model offers improved prediction performance compared to other conventional multi-objective optimization based prediction models.

In essence the thesis has made few contributions in developing new forecasting models for improving accuracy of prediction, reducing computational complexity and enhancing the speed of prediction.