

Abstract

The presented rigorous thesis is focused on the stock markets returns analysis using a new type of neural network. First chapter of the thesis describes the underlying theory of the financial time series prediction, Efficient Market Hypothesis and conventional forecasting models. Following part illustrates biological framework, basic principles, functioning of neural networks, their architecture and several well-known learning algorithms such as Gradient descent, Levenberg-Marquardt algorithm or Conjugate gradient. It also mentions certain disadvantages which influence the performance and effectiveness of neural networks. Third chapter is devoted to two applied metaheuristic techniques, *i.e.* genetic algorithms and simulated annealing that were integrated into neural networks framework to eliminate above mentioned drawbacks. Next chapter describes details of presented hybrid network, whereas the last section is aimed at evaluation of overall results of all models. It shows that on the examined sample hybrid network clearly outperformed standard techniques as well as ordinary neural networks and in most cases achieved the least mean squared error among all explored methods.

Keywords: stock returns analysis, neural networks, genetic algorithms, simulated annealing, hybrid networks

JEL classification: C32, C45, C53, E44, G14, G15