

Abstract

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Improving the Quality of Egyptian Stock Price Predictions using Case-based Reasoning and Control Charts

Stock Market Predictions have always been the focus of many investors and researchers from numerous fields such as economics, psychology, statistics and more recently artificial intelligence. The high dimensionality, noisiness, and non-stationary characteristics of the stock price have made the problem of predicting future stock prices of extreme complexity. The Egyptian Stock Exchange is a highly volatile market causing more deterioration to the quality of investing. This research establish a novel stock price prediction model that combines the concepts of quality control and artificial intelligence aiming to improve the quality of investing within the Egyptian Stock Exchange to support the decision of stock investors. The predicting model implements the Case-based Reasoning (CBR) artificial intelligent and statistical quality control methodologies. CBR imitates the human problem-solving and reasoning behavior. The concepts of quality control were implemented within the suggested model to control and ensure the quality and stability of the stock predicting process. Control charts were used to monitor the process and detect out of control behavior. Out of control conditions act like a warning for the stock investors for the reduced predictability and quality of the prediction process. A web based client-server prototype system was built to implement the predication model to provide stock price predictions for the Egyptian stock exchange over the Internet. The data used in this research were the historical daily stock records of the Egyptian Stock Exchange (ESE) from the 1st of January 1998 to the 30th of April 2012 for 218 distinct Egyptian stocks. Daily stock records included the following variable: open price, low price, high price, close price, volume of trade, close value for the Egyptian stock exchange index (EGX30), and the close value for the United States S&P500 market index. The suggested quality controlled stock case-based prediction model generated acceptable results for the highly volatile Egyptian Stock Exchange (ESE). The mean absolute prediction error and thus the quality of stock price predictions were further improved after using the control chart to monitor and control the prediction process.