

Oninion

Open Access

The Evolution of Grey Forecasting and its Application on Stock Price Prediction

Pei-Han Hsin and Chun-I Chen*

Department of Industrial Management, I-Shou University 1, Section 1, Syuecheng Rd., Dashu Township, Kaohsiung County, Taiwan

Introduction

Since Grey theory proposed by Prof. Deng [1], it has been widely applied in many fields. The traditional grey forecasting model, which is termed GM (1, 1), starts from accumulation of raw data to form a simple monotonic series. Based on this new series, the coefficients of discretilization of first order ordinary differential equation (ODE) could be solved by least square method. Then, these coefficients could be substituted into the particular solution of ODE to serve as a predictor. The solution procedure could be found in textbook [2].

Development of Grey Forecasting

The forecasting precision of GM (1, 1) is satisfactory in many cases. In order to improve its application in various situations, like drastic change data, cyclic data and seasonal change data. Recent publications concentrated on:

A) Topic (1): Different selection of initial condition

Traditional GM (1, 1) used the first raw data to serve as initial condition. Some studies found that second or third data could also be served as initial condition to enhance the forecasting precision.

B) Topic (2): The discussion of background value. [3]

The background value was set to 0.5 by Prof. Deng. Generally speaking, it is within the range $0\sim1$. Proper selection of background value by soft computing method or computer program could increase the forecasting precision.

C) Topic (3): The improvement of original differential equation. [4]

The GM (1, 1) is linear equation which fits smooth change data. Nonlinear equation is adopted to fit drastic change raw data. The Bernoulli equation is proposed to modify the traditional model which is termed NGBM. Therefore, GM (1, 1) and Grey-Verhulst become the special cases of NGBM. Furthermore, NGBM together with changing background value which is termed as NNGBM [5] increase the forecasting precision by combination of topic (2) and (3).

D) Topic (4): The hybrid of methods.

Combination of soft computing methods, like Fuzzy [6], neural computing [7], and wavelet transformation [8] could further decrease the forecasting error.

Consideration of Grey Theory on Stock Market

The evolution and development of grey theory are still going on to achieve better results. The application of grey forecasting on the stock market was popular [5,9-13]. The following points were proposed to attract the attention when apply grey theory on stock price forecasting.

(1) The unchanged price

The closing price could be unchanged and this will make singular phenomenon happen. Chen and Huang [14] proposed solution and it should be noticed when treat the raw data.

(2) The up or bottom price limit of day trade.

In order to avoid uncontrollable price fluctuation, the stock exchange of developing country usually regulates the up or bottom price limit of day trade. But this will affect the forecasting result when forecasted price exceed this limit.

(3) The increment of stock price is discontinuous.

The minimum changing unit is called tick. When stock price falls within different price range, the unit for tick is also different. Therefore, it should be considered.

Conclusion

Grey theory has widely applied in management and engineering and achieve satisfactory results. We all believe grey theory could apply successfully in the field of stock market forecasting. But the proposed three points above should be considered to achieve higher and better forecasting performance.

References

- Deng JL (1982) Control problems of grey systems. Systems & Control Letters 1: 288-294.
- 2. Wen KL (2004) Grey Systems: Modeling and Prediction. 2004, Arizona: Yang's.
- Chang SC, Lai HC, Yu HC (2005) A variable P value rolling Grey forecasting model for Taiwan semiconductor industry production. Technological Forecasting and Social Change 72: 623-640.
- Chen CI, Chen HL and Chen SP (2008) Forecasting of foreign exchange rates of Taiwan's major trading partners by novel nonlinear Grey Bernoulli model NGBM (1, 1). Communications in Nonlinear Science and Numerical Simulation 13: 1194-1204.
- Chen CI, Hsin PH, Wu CS (2010) Forecasting Taiwan's major stock indices by the Nash nonlinear grey Bernoulli model. Expert Systems with Applications 37: 7557-7562.
- Yang YW, Chen WH, Lu HP (2012) A Fuzzy-Grey Model for Non-stationary Time Series Prediction. Applied Mathematics & Information Sciences 6: 445S-451S.
- Pai T (2007) Grey and neural network prediction of suspended solids and chemical oxygen demand in hospital wastewater treatment plant effluent. Computers & Chemical Engineering 31: 1272-1281.
- Bahrami S, Hooshmand RA, Parastegari M (2014) Short term electric load forecasting by wavelet transform and grey model improved by PSO (particle swarm optimization) algorithm. Energy 72: 434-442.
- 9. Sun YQ (2014) A Hybrid Approach by Integrating Brain Storm Optimization Algorithm with Grey Neural Network for Stock Index Forecasting. Abstract and Applied Analysis 10.

*Corresponding author: Chun-I Chen, Department of Industrial Management, I-Shou University 1, Section 1, Syuecheng Rd., Dashu Township, Kaohsiung County, Taiwan, Tel: +886-7-6577711; E-mail: EddyChen@isu.edu.tw

Received November 10, 2014; Accepted November 10, 2014; Published November 17, 2014

Citation: Hsin PH, Chen CI (2014) The Evolution of Grey Forecasting and its Application on Stock Price Prediction. J Stock Forex Trad 3: 124. doi:10.4172/2168-9458.1000124

Copyright: © 2014 Hsin PH, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Citation: Hsin PH, Chen CI (2014) The Evolution of Grey Forecasting and its Application on Stock Price Prediction. J Stock Forex Trad 3: 124. doi:10.4172/2168-9458.1000124

Page 2 of 2

- Huang KY, Jane CJ (2009) A hybrid model for stock market forecasting and portfolio selection based on ARX, grey system and RS theories. Expert Systems with Applications 36: 5387-5392.
- 11. Wang YF (2002) Predicting stock price using fuzzy grey prediction system. Expert Systems with Applications 22: 33-38.
- Wang YH (2009) Nonlinear neural network forecasting model for stock index option price: Hybrid GJR-GARCH approach. Expert Systems with Applications 36: 564-570.
- Liu JNK, Hu YX (2013) Application of feature-weighted Support Vector regression using grey correlation degree to stock price forecasting. Neural Computing & Applications 22: S143-S152.
- Chen CI, Huang SJ (2013) The necessary and sufficient condition for GM(1,1) grey prediction model. Applied Mathematics and Computation 219: 6152-6162.