Utilization of NNs for Improving the Traditional Technical Analysis in the Financial Markets

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Abstract. In this paper, we propose a new decision support system (DSS) for dealing stocks which improves the traditional technical analysis by using neural networks. In the proposed system, neural networks are utilized in order to predict the “Golden Cross” and the “Dead Cross” several weeks before they occur. Computer simulation results concerning the dealings in the “TOPIX” and the “Nikkei-225” confirm the effectiveness of the proposed system.

Keywords: neural networks, traditional technical analysis, golden cross, dead cross, TOPIX, Nikkei-225.

1 Introduction

The widespread popularity of neural networks (NNs) in many different fields is mainly due to their ability to build complex nonlinear relationships between input variables and output variables directly from the training data [1]. NNs can provide models for a large class of real systems which are difficult to handle using traditional approaches. Recently, because of NNs’ characteristic property, a large number of people have paid particular attention to apply NNs to the financial market [2]-[5].

In this paper, we shall utilize NNs in order to predict the “Golden Cross (GC)” and the “Dead Cross (DC)” several weeks before they occur. The structure of this paper is as follows. In Section 2, we briefly touch upon the traditional technical analysis which utilizes the measure “long term moving average” versus “short term moving average” for finding the current tendency of the stock market. In Section 3, we suggest that predicting GC & DC several weeks before they occur by NNs could contribute a lot in dealing stocks. Further, we show how the prediction of GC & DC can be done by NNs. In Section 4, we give computer simulation results concerning dealings in the TOPIX and the Nikkei-225 which confirm that prediction of GC & DC by NNs can contribute a lot in dealing stocks. Finally, the paper concludes with a brief summary.

2 Traditional Technical Analysis Utilizing the Measure “Long Term Moving Average (LTMA)” Versus “Short Term Moving Average (STMA)”

In order to detect the current tendency of the stock market, many stock traders have often used the traditional technical analysis which utilizes the measure “Long Term
Moving Average (LTMA) versus Short Term Moving Average (STMA). Particularly, they have often fixed their eyes upon the “Golden Cross (GC)” and the “Dead Cross (DC)” which are the crossings of LTMA & STMA. (Fig.1 illustrates a typical example of GC and DC which appeared in the two moving averages of the stock price of “Nissan Motors” listed in the Tokyo Stock Market. In Fig.1, the point B (A) denotes GC (DC) where STMA cuts LTMA upwards (downwards).) They have believed that GC (DC) is a clear indicator that predicts the upward (downward) moving of the stock price.

![Fig. 1. Golden Cross and Dead Cross of the LTMA & STMA (Nissan Motors)](image)

### 3 Utilization of NNs for Improving the Traditional Technical Analysis

#### 3.1 Prediction of GC & DC by NNs Could Contribute a Lot in Dealing Stocks

Many stock traders have often relied upon the traditional technical analysis which utilizes the measure LTMA versus STMA in dealing stocks. However, we consider that the traditional technical analysis could further be improved by the use of NNs. The prototype DSS utilizing the traditional technical analysis executes dealings after golden cross or dead cross has been observed. However, such a way of dealings often loses an important chance to execute dealings in a reasonable price in the stock market. If one could deal stocks several weeks before real crossing occurs, one could save considerable amount of money. We shall explain this by using the real data which illustrates the changes of the price of “Nissan Motors” during the period January 2001-May 2002. In Fig.1, the solid line and the broken line indicate the STMA(13MA) and the LTMA(26MA), respectively. If we utilize the traditional technical analysis, we have to sell the stock at the price around 750 yen and buy it at the price around 730 yen. On the other hand, we can sell the stock at the price higher than 800 yen and buy it at the price around 700 yen if we could predict the dead cross and the golden cross several weeks before those crossings occur.