Currency Exchange Rate Forecasting Using Artificial Neural Networks Backpropagation Method

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ABSTRACT

Since 1997, the rupiah currency has a tendency to change at any time since the economic crisis that hit Indonesia. One of the most widely traded currencies in the international exchange market is the U.S. dollar. This paper forecasts the exchange rate by using back propagation neural networks. Variables that affecting currency exchange rates is inflation, gross national product and interest rates. After performing data processing with the help of software VB.net forecasting results and forecasting program, it is displayed online by using PHP to construct the webpage.

Keywords: Back Propagation, Currency Exchange Rates Forecasting, Fluctuating Currency Rates, International Exchange Market, Rupaih, Webpage Design

INTRODUCTION

Currency exchange rate is the ratio of a country’s currency with another country’s currency. Currency is also a macro-economic variables that is very important, because exchange rates can maintain economic stability in a region or country (Muhammad, 2010). One of the currencies of the most widely traded in the international exchange market is the U.S. dollar. In Indonesia, Dollar was used as one indicator in designing the State Budget. Since 1997, the rupiah currency has a tendency to change at any time since the economic crisis that hit Indonesia.

According Defitra, Head of Export Affairs, Cooperatives, Industry and Trade (DISKOPERINDAG) (2011), the exchange rate is never shown in DISKOPERINDAG site, whereas the exchange rate is also influential in the trade between countries. During this time, exchange rate forecasting is only done by the Jakarta Stock Exchange, but not shown on the Jakarta Stock Exchange website. In order to know the value of forecasting, it should come directly to that agency. So do not close the opportunity for DISKOPERINDAG to display the currency rates in their sites, because who

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visit this site are overseas businesses which of course needed information about changes in currency exchange rates so they can determine the best time to do business.

The problems that arise then is how to make predictions based on the exchange rate stochastic processes (probabilistic) with high accuracy. In this case, the necessary phenomenon of the dependence on time are realized in a stochastic model (Box & Jenkins, 1994). Artificial neural networks can identify the pattern of the forecasting system data exchange rate of rupiah against the U.S. dollar. It can be done by the method of approach to training. Based on learning skill, it has the neural network which can be trained to study and analyze the patterns of past data and trying to find a formula or function that will link the pattern of past data with the desired output. These network functions describe the dependence of the current data the previous data values. Back propagation is one of the methods of artificial neural networks that can be applied well in the field of forecasting (Siang, 2005).

**ARTIFICIAL NEURAL NETWORK**

Artificial neural networks are information processing systems that have characteristics similar to biological neural networks (Siang, 2005). Artificial neural networks are computing systems that are based on modeling of biological system (neurons) via the approach of computational properties of biological (Sekarwati, 2005). Artificial neural networks are computational systems model that can simulate the workings of biological neural networks (Subiyanto, 2002).

**BACK PROPAGATION**

Back propagation is an artificial neural network model with multiple layers. As with other artificial neural network model, back propagation trained network to obtain a balance between the network’s ability to recognize patterns used during training and networking capabilities to provide the correct response to the input pattern.

It is similar (but not equal) to the patterns used during training.

**BACK PROPAGATION TRAINING**

As with other neural networks, the network feed forward training is done in order to calculate the weights so that at the end of the training will be obtained good weights. During the training process, the weights iteratively adjusted to minimize error that occurs.

Error is calculated based on the mean squared error (MSE). The mean squared error is also used as the basis for calculating the performance of the activation function. Most of the training for feed forward network using a gradient of activation function to determine how to adjust the weights in order to minimize the performance. This gradient is determined by using a technique called back propagation.

Basically, the standard back propagation training algorithm will move the weight with a negative gradient direction. The basic principle of back propagation algorithm is to improve the network weights with the direction that makes the activation function to be falling rapidly.

Back propagation training includes three phases as follows.

1. Phase 1, the forward propagation.
   
   Input pattern is calculated forward from the input screen to display output using the specified activation function.

2. Phase 2, the backward propagation.
   
   The difference between the network output with the desired target is the error that occurred. Errors occur dipropagasi retreat. Starting from the line that relates directly to units in the output layer.

3. Phase 3, the weight changes.
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