A hybrid intelligent system of ANFIS and CAPM for stock portfolio optimization

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Abstract. This paper addresses about an approach that suggests for stock portfolio optimization using the combination of Adaptive Neuro-Fuzzy Inference System (ANFIS) and Capital Asset Pricing Model (CAPM). Stock portfolio optimization aims to determine which of the stocks to be added to a portfolio based on the investor’s needs, changing economic and market conditions. In order to construct an efficient prediction model, ANFIS is used to take decisions for forecasting the stock price using historical data of BSE SENSEX and well-known technical indicators. CAPM have been incorporated for portfolio optimization that can find the combination of stocks to offer an investor trade-off between expected return and risk of a portfolio. ANFIS-CAPM plays a decisive role in discovering portfolio strategies for investors and creates the optimal portfolio from a combination of stocks. Experimental results show that the proposed hybrid intelligent system ANFIS-CAPM yields better performance than existing portfolio models.

Keywords: Stock market forecasting, fuzzy logic, artificial neural network, portfolio optimization, Capital Asset Pricing Model (CAPM)

1. Introduction

The emerging stock market is being looked for the expectation of higher returns by investors, as they much feel more immediate profitable growth as calculated by Gross Domestic Product (GDP) [29]. Investments in emerging stock markets fall with some heavier risk due to Governmental instability, national infrastructure problems, natural disasters, currency volatility, tax rates, and bank interest rates [1, 25].

In this study, BSE (Bombay Stock Exchange) SENSEX (SENSitive IndEx) of India has been considered in the experiment that plays an important role in the stock market. Bombay Stock Exchange (India) was created the index named SENSEX in the year 1986.

The BSE SENSEX is a weighted average of 30 shares market value of the Bombay Stock Exchange. In this experiment, BSE SENSEX has been considered as a benchmark portfolio.

A novel portfolio optimization approach combining an Adaptive Neuro-Fuzzy Inference System (ANFIS) and Capital Asset Pricing Model (CAPM) has been proposed in this paper for stock forecasting and portfolio management in an emerging stock market like India. This system consists of two main modules: the ANFIS module, to predict the expected return of each stock, and CAPM module, to determine the optimal investment weight allocation for all stocks in the portfolio.

Stock market forecasting has been a field of great interest due to the possibility of getting a high return on the investment in a very short period. Trusted and undeviating data will assist investors in forecasting which stocks will get good returns and smaller risks and allot the properly investment amount on the available stocks.

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