ABSTRACT

UNIVERSAL PORTFOLIOS GENERATED BY PROBABILITY DISTRIBUTIONS

Lim Choon Seng

The idea of using a probability distribution to generate a universal portfolio is due to Cover(1991) and Cover and Ordentlich(1996). We generalize this idea to generate a wider class of universal portfolios different from the Dirichlet universal portfolios due to Cover and Ordentlich(1996). The well-known Dirichlet joint distribution can be derived from a transformation of a \( m \) random variables, each of which has the gamma(\( \alpha_i, 1 \)) distribution for \( i = 1, 2, \ldots, m \). The non-Dirichlet Cover-Ordentlich universal portfolio can be generated using any set of \( m \) independent distributions different from the gamma distribution. For this purpose, we need to use the Monte Carlo method to simulate the \( m \) random variables to generate the universal portfolio. The portfolio is run on some real stock data sets selected from the Kuala Lumpur Stock Exchange to evaluate its empirical performance.

The restriction of the variates lying in the simplex of the vectors in the Cover-Ordentlich universal portfolio can be removed to generate a general class of finite order and moving-order universal portfolios. The low-order universal portfolios contribute to the saving of computer memory and computational time in their implementation. The comparative performance of the universal portfolios of order 1, 2, 3 generated by some common probability distributions is studied. These portfolios can outperform the Dirichlet Cover-Ordentlich universal portfolio for some data sets, thereby demonstrating the practical significance of the memory and time saving implementation of the such portfolios.

An algorithm to generate the moving-order universal portfolio is proposed for efficient implementation of the portfolio. The moving-order universal portfolios are generated for a few probability distributions and run on some selected three-stock
data sets. The ratio of the capitals achieved by the best-constant-rebalanced portfolio to the universal portfolio as a function of the number of trading days is computed for the moving-order universal portfolio to evaluate its performance.