STOCHASTIC OPTIMIZATION ALGORITHMS FOR MANY-DIMENSIONAL TASKS OF PORTFOLIO THEORY

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Modern Portfolio Theory (MPT) was created more than 60 years ago by Harry Markowitz and at present time is the foundation of stock investments. Unfortunately, the system of equation for stocks weight factors determination is linear system only in the case of Markowitz risk - risk, which is calculated as standard deviation of the price time series. In the case on non-Markowitz risks the system of equation for stocks weights determination is non-linear.

Using Matlab Financial Instruments Toolbox library functions it is possible to receive from finance.yahoo.com, finance.google.com and other financial data sources time series for more than 7000 financial instruments, some of which are more than 25 years long. In the case of Markowitz risk the system of linear equation for optimal portfolio creation can be solved relatively easy, but in the case on non-Markowitz risks the system of equation is non-linear and problem of portfolio optimization becomes very complicated. There are no universal methods for non-linear system of 7000 equations solution.

This report is devoted to the description of new non-gradient robust algorithm for large scale optimal portfolio creation. Method is based on the transformation of n-dimensional tetrahedron. Using this method portfolios based on Morning Star Rating 100 stocks, index S&P500 450 stocks, index Russel1000 850 stocks, index Russel2000 1500 stocks, index Russel3000 2500 stocks and complete set of www.yahoo.com 4500 stocks were created and tested.

The development of methods of such kind is very important for practical applications in portfolio theory.