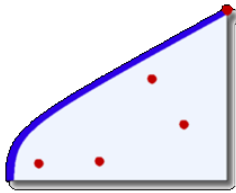


Introduction to PORTimizer™ and MPF OpAI

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PORTimizer™ provides powerful portfolio optimization. The users can choose from different ways to input/loading the historical data to PORTimizer, perform descriptive analysis of the assets, create new portfolios, track the changes of the assets in portfolios, customize the optimization constraints, perform portfolio optimization by using different basic/advanced statistical models, backtest the performance of optimized portfolios and generate stochastic projection of their future performance.

Motivation of developing PORTimizer™

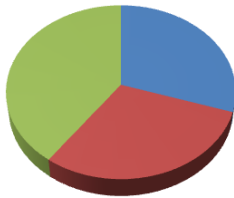
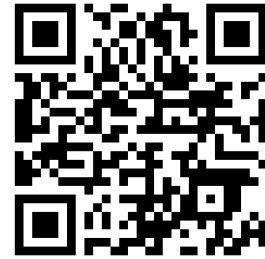
In order to inspire students to apply the theories to determine the optimal financial portfolio, Dr Philip Yu Leung-ho has developed a portfolio optimization software package called **PORTimizer™**, which was supported by a teaching development grant in 2003. Since the PORTimizer was first used in Dr Yu's course **Statistics of Investment Risk** in early 2005, it has been using in teaching and learning for over ten years. Since September 2012, the PORTimizer™ has been using in the master course **Financial Data Analysis**. Students commented that the software could greatly help them put the complex theories into real practice. Over the years, the software has been upgraded by including more advanced features and one of **Dr Yu's new portfolio selection method – GPQ method** which are summarized below.

Traditionally, applying the Markowitz mean-variance model for portfolio optimization requires using historical asset return data to estimate the expected returns and the covariance matrix of the assets. However, this method ignores the sampling variation of the estimated input parameters during the optimization.

In 2017, Dr Yu's research team proposed a direct estimation method for the optimal portfolio weights based on the concept of generalized pivotal quantity (GPQ). The GPQ method can derive both the point and interval estimates for the optimal portfolio weights. The detailed methodology is explained in the article entitled "A generalized pivotal quantity approach to portfolio selection" published last year in the well-known publication - *Journal of Applied Statistics* (<http://dx.doi.org/10.1080/02664763.2016.1214241>).

The simulation results in the article show that for interval estimation, the GPQ method can perform better than the resampled and resampled shrinkage methods. In general, the GPQ method can guarantee good coverage rate with smaller average interval width than the resampled methods. For point estimator, the GPQ method achieves the smaller mean squared error than the Markowitz mean-variance model and the resampled methods for at most 43% and 29% reduction respectively in most cases. We also applied our methodology on a portfolio rebalancing problem. We proposed a portfolio rebalancing strategy by making use of both point and interval estimates of the optimal weights, and illustrated that this dynamic rebalancing strategy can help the investor achieve higher returns.

The trial version of the software with limitation in the number of assets and amount of financial data to be studied has been available for free download. For the details of the installation, please visit http://www.riskscientist.com/portimizer_v3/ or scan the QR code:



MPF Optimal Allocation (MPF OpAI) is a new mobile app which aimed to provide statistical suggestion on how to re-allocate the investments on MPF so that the users can well manage their own MPF for retirement. The users can view the monthly market price information of each MPF fund, record their own portfolios, track the changes of the portfolios, perform optimization based on their preferences on equity contribution based on the **newly developed GPQ method**, and project the future performance of the optimized portfolios. It is hoped that this new mobile app can provide optimal allocation guidance to MPF holders.

Here are some screenshots of the app.

