

Classification Methods on Portfolio Optimization

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1 Introduction

1.1 Mean-Variance Optimization

We begin with Mean-Variance Optimization(MVO) proposed by Markowitz (1952)...

Unfortunately, MVO relies on an accurate estimate of expected return μ and the covariance matrix Σ .

In real world, its performance is very sensitive to the estimation error and often requires large dataset.

Typically, the sample covariance is defined by

$$\Sigma = \frac{1}{N-1} \mathbf{X} \mathbf{X}'$$

where

$$\mathbf{X} = \begin{bmatrix} R_{11} & \dots & R_{1T} \\ \vdots & \ddots & \vdots \\ R_{N1} & \dots & R_{NT} \end{bmatrix} - \begin{bmatrix} \bar{R}_1 & \dots & \bar{R}_1 \\ \vdots & \ddots & \vdots \\ \bar{R}_N & \dots & \bar{R}_N \end{bmatrix}$$

References

Markowitz, H. (1952, March). Portfolio Selection. *The Journal of Finance* 7(1), 77.