DDS Algorithm

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Portfolio Theory

The Expected return of a portfolio with k assets is simply the weighted sum of expected returns for each asset and is given by:

$$E[R_p] = \sum_{i=1}^{k} w_i r_i = \mathbf{w}^T \mathbf{r}$$

where $\mathbf{w}$ is a vector of stock weights and $\mathbf{r}$ is a vector of the expected returns for each stock. Defining these functions in matrix algebra notation emphasizes the use of vectorization within the DDS Algorithm. The variance of the expected return is then:

$$\begin{aligned} Var[E[R_p]] &= Var[\mathbf{w}^T \mathbf{r}] \\ &= \mathbf{w}^T Var[\mathbf{r}] \mathbf{w} \\ &= \mathbf{w}^T \Sigma \mathbf{w} \end{aligned}$$

Generally use simple returns

Bibliography

- Harry Markowitz Portfolio Theory