**Analysis Write-up**

Write one to two paragraphs explaining your results. What do you learn from the analysis? Do you believe if there were more data (a longer time series of returns), the weights would change? What is the point of portfolio optimization strategy? Focus on whether you can improve (higher return/lower variance) an equally weighted portfolio.

Specifically, when you find the portfolio for the minimum variance, does the portfolio earn a greater return than the asset whose variance is that minimum?

When you find the portfolio for the maximum return, does the portfolio have a lower variance than the asset with that return?

Even if you can improve, what are the pitfalls if any?

**Answer:**

From this analysis, I learned the following

* Calculation of variance -covariance matrix
* Calculation of ideal combination of each stock using variance-covariance matrix in each portfolio

As I followed the optimization steps, I observed that weights are leaning towards majority of one stock that is either giving maximum return or minimum variance. In a scenario where there were more stocks, probably the weights would have changed.

In the overall portfolio, for some stocks with similar returns and different variance, there would be different weights. Similarly, if there were more stocks with similar variance but different returns, it would prefer those with smaller variance.

Let’s say there were around 30 stocks in the portfolio, then the optimization strategy would have been tedious, but very helpful in focusing on selected few stocks which can help objective of returns maximization or variance minimization.

For a scenario of an equal weighted portfolio, the mean and variance are already decided and there is no tuning possible to improve that. In such cases the only way is selecting the stocks which complement each other to offset the overall variance.