**Final Capstone Project Overview**

[00:00:00.00] [MUSIC PLAYING]

[00:00:08.00] RYAN AHMED: Hello, everyone, and welcome to this lesson. In this lesson, I'm going to provide you with an overview of the final capstone project, and then I'm going to walk you through the series of steps that we are going to do, and then I'm going to quickly go over the code and all the various steps and practice opportunities as well. OK. So let's start with our first topic, which is just a quick overview of the project.

[00:00:35.82] So in this capstone project we will perform portfolio analysis, visualization, and optimization. So the first question is, what do you mean by portfolio? Well, a portfolio is a collection of financial assets such as stocks, bonds, cash, or real estate. The purpose of a portfolio is to diversify the investment and manage risk. And what we're going to do afterwards is we are going to perform portfolio optimization.

[00:01:05.15] So portfolio optimization is the process of selecting the optimal portfolio out of a set of available portfolios with the objective of maximizing returns and reducing risks. So let me show you three different portfolios. So in portfolio one, we would like to have equal allocation between stocks, bonds, gold, and real estate. So you will see 25% allocated to each of these different investment categories.

[00:01:36.23] In portfolio two someone might say, well, I would like to bet more on stocks, so you would see that 65% have been allocated to stocks, 15% to bonds, and then 10% to gold and 10% in real estate. Someone might say, well, I'm a different investor. I'm mainly interested in investing, for example, in gold and bonds as an example. So you will see that here there is 40% invested in bonds, 40% invested in gold, then 10% real estate and 10% stocks as an example.

[00:02:11.97] So in this project we are going to perform portfolio optimization by focusing primarily on stocks. So we are going to select a basket of stocks, and then we'll try to see the optimal portfolio weights that is going to maximize returns and reduce risks. So let me show you from a very high level what we're going to do in this project. First, we are going to visualize individual stock data, calculate percentage daily returns, and analyze market trends.

[00:02:43.91] So essentially over the next couple of lessons I'm going to focus on a single stock just for simplicity's sake. We'll learn how to analyze these stocks, how to visualize them using various libraries in Python. We'll learn how to calculate the percentage daily returns and calculate trends as well. Next, we are going to move on from single or individual stocks to multiple stocks. So we're going to select a group of companies in a portfolio and then we'll learn how to perform portfolio analysis and visualization.

[00:03:20.00] Next we will learn how to run Monte Carlo simulations using random portfolio weights, and please don't worry about Monte Carlo simulations. We're going to cover them in great details coming up over the next couple of lessons. But essentially the objective here is to try to perform portfolio optimization, so I'm going to run multiple simulations to try to find the optimal stocks that is going to maximize returns and reduce risk for me. Next, I'm going to plot the risk versus return for each simulation run, and then finally, I'm going to select the optimal portfolio weights that maximize returns and reduce risks.

[00:04:01.25] All right. So let me quickly walk you through the various steps in this project. So first we'll learn how to import libraries and data sets, and of course, we're going to have a quick slide that covers the theory from a very high level or the definitions. And then I'm going to show you the code afterwards. And then after each individual lesson, we're going to have a practice opportunity, so I'm going to ask you to please go ahead, give it a shot, and write your code in here, and then you can compare your answer to the practice opportunity solution lecture. And also I included the solution at the end of the notebook as well.

[00:04:38.55] Next, we are going to calculate percentage daily returns for individual stocks, so we're going to cover how to do that and how to do that as well here in code. And of course, we'll have our practice opportunity. Over the next series of lessons, we will learn how to perform data visualization for a single stock. So essentially here we'll leverage multiple data visualization libraries. It's going to be really fun.

[00:05:03.80] We're going to learn about different libraries such as Matplotlib, Seaborn, and Plotly. These are really famous libraries in Python. And that is going to be part one here. So we'll learn how to generate these interactive charts. Going to be really powerful. You can even zoom in as well on the charts as well.

[00:05:22.69] And then we are going to continue with part number two, and then I'm going to show you how to plot pie charts that looks like that. Then in part number three I'm going to show you an additional library which is known as cufflinks, and we'll learn how to plot these candlestick charts. And that is going to simply conclude the analysis on a single individual stock.

[00:05:49.86] Afterwards, we will learn how to perform data visualization for multiple stocks. So here we're going to move on from a single stock to multiple ones. And then here, if you scroll down, you will see multiple powerful data visualization using Plotly express library. Again, we're going to cover that in great details. And we'll learn how to do histograms. We'll learn how to generate heat maps and generate these pear plots.

[00:06:15.78] And then afterwards, in the next lesson, we'll learn how to define a function to generate random portfolio weights, and then afterwards we will learn how to perform asset allocation. We'll cover the math behind it, and then I'm going to show you the code that performs that. And of course, we're going to have a practice opportunity as well at the end of each lesson.

[00:06:37.53] And then we'll learn about Sharpe ratio and how we can create or develop a simulation engine function, and that would be essentially the core of our simulation. So that is going to be my simulation engine function. And then we're going to have our practice opportunity, and then we'll learn how to run Monte Carlo simulations. We're going to run the simulations. We're going to do the analysis. And then finally, we'll learn about Markowitz efficient frontier and how to perform portfolio optimization.

[00:07:06.87] And at the end here, I've included for you all the practice opportunity solution. But of course, I highly, strongly recommend that you do not check the solution, and you can simply attempt to solve it first on your own and then you can compare your answer to the answer that I've included at the end. And that's it. That's simply all I have for this lesson. I hope you enjoyed it. Please get ready. We're going to have a lot of exciting content to cover coming up next. Please stay tuned. Best of luck, and I will see you in the next lesson.

[00:07:34.47] [MUSIC PLAYING]