Project 1

You have the following two options for your project:

- Develop a financial application.
- Analyze a financial problem.

The first option will take the form of a fully-fledged application that real users could use. The second option is more analytical, with the goal of better understanding data and/or patterns. This may take the form of an elaborate Jupyter notebook, or a set of them. You may also include elements of both options in your project.

Here are just a few examples:

- A portfolio analyzer: Build an app that compares the performance of portfolios that are composed of different assets. Include calculations, tables, financial models, and Monte Carlo simulations. Also include information about past and future performance of the portfolios, as well as suggestions for improving that performance.
- A fintech funding platform: Define the metrics, measures, and models that can be used to evaluate the viability of a fintech startup seeking venture capital (VC) funding. Demonstrate how the proposed location (city, state, or country/region) of the business affects its valuation and viability.
- Currency calculator: Create an application with a CLI interface that allows an investor to calculate real-time conversions to and from a variety of currencies. Incorporate interactive maps that allow the investor to view and compare the exchange markets for different locations. Also incorporate a feature that detects arbitrage opportunities for conversions involving three different currencies.

Working with Your Group

Meeting with your group and communicating regularly is imperative for successfully executing an online group project. Plan for significant collaboration time outside of classtime. Here are some tips to help you make the best use of your time:

- Decide how you're going to communicate with your group members when you begin. Create a Slack channel, exchange phone numbers, and ensure that the group knows each group member's working hours (that is, the hours of the day that they are available to collaborate).
- Set up an agile project by using GitHub Projects (https://docs.github.com/en/free-pro-team@latest/github/managing-your-work-on-github/managing-project-boards) so that your group can track tasks.
- Create internal milestones to ensure that your group is on track. Set due dates for these milestones so that you have a timeline for completing the project. Some of these milestones might include:

- ~~Project ideation~~
- ~~Data fetching/API integration~~
- ~~Data analysis~~
- ~~Testing~~
- ~~Creating documentation~~
- ~~Creating presentation~~

~~Because this is a two-week project, you'll want to make sure that you have done at least half of the ideated project by the end of the first week to stay on track.~~

~~Though you will divide the work among the group members, it's essential to collaborate and communicate while working on different parts of the project. Be sure to check in with your teammates regularly and offer support.~~

Support and Resources

~~Your instructional team will provide support during classes and office hours. You also have access to learning assistants and tutors to help you with topics for which you need additional help. Be sure to take advantage of these resources as you collaborate with your group on this first project.~~

Technical Requirements for Project 1

The following sections outline the technical requirements for Project 1.

Software Version Control (10 points)

- ~~Repository is created on GitHub. (2 points)~~
- Files are frequently committed to the repository. (3 points)
- Commit messages include an appropriate level of detail. (2 points)
- Repository is organized and includes relevant information and project files. (3 points)

Data Collection and Preparation (10 points)

- Data is collected from CSV files, APIs, or databases by using Python or a Python library. (5 points)
- Data is cleaned and prepared for the application or analysis by using Python or a Python library. (5 points)

Financial Programming (40 points)

- Code runs without errors and produces the assigned results. (25 points)
- Code uses good systems design with appropriate use of functions and modules for code organization. (5 points)
- Code uses DRY (don't repeat yourself) principles and is as concise as possible. Variable names are short but specific. (5 points)
- Code incorporates a new Python library not previously covered in the course. (5 points)

Documentation (15 points)

- Code is well commented with concise, relevant notes. (5 points)
- GitHub README file includes a concise project overview. (2 points)
- GitHub README file includes detailed usage and installation instructions. (3 points)
- GitHub README includes either examples of the application, or the results and a summary of the analysis. (5 points)

Presentation Requirements (25 points)

Your presentation should cover the following:

- An executive summary or overview of the project and project goals. (5 points)
- An overview of the data collection, cleanup, and exploration processes. (5 points)
- The approach that your group took in achieving the project goals. (5 points)
- The results and conclusions of the financial application or analysis. (5 points)
- Any additional questions that surfaced, what your group might research next if more time was available, or share a plan for future development. (5 points)

Project Guidelines

The following project guidelines focus on teamwork, your project proposal, data sources, and data cleanup and analysis.

Collaborating with Your Team

Remember that projects are a group effort. Working closely with your teammates will benefit the outcome of your project AND help you in your future careers. You'll learn collaborative workflows that will enable you to approach and solve complex problems. In other words, working in groups allows you to work smart and dream big. Take advantage!

Project Proposal

Before you start writing any code, your group should outline the scope and purpose of your project. This will help provide direction and safeguard against scope creep.

The proposal is essentially a brief summary of your interests and intent. Be sure to include the following details:

- The kind of data you'd like to work with and the field you're interested in (e.g., trading, quantitative analysis)
- The questions you'll ask of the data
- Possible source for the data

Here's an example:

- The aim of our project is to uncover patterns in credit card fraud. We'll examine relationships between transaction types and location, purchase prices and times of day, purchase trends over the course of a year, and other related relationships that will derive from the data.

Remember, you have the following two options for your project:

- Develop a financial application.
- Analyze a financial problem.

You may also include elements of both options in your project. Just make sure that your group agrees on the approach. Your instructor and TAs can also help you figure out how to best format to answer your group's research questions.

Finding Data

Once your group has written its proposal, it's time to start searching for data. We recommend the following curated sources of high-quality data:

- **data.world (https://www.data.world)**
- **Kaggle (https://www.kaggle.com)**
- **Data.gov (https://www.data.gov)**
- **Awesome Public Datasets (https://github.com/awesomedata/awesome-public-datasets)**
- **Public-APIs (https://github.com/n0shake/Public-APIs)**
- **Awesome API (https://github.com/Kikobeats/awesome-api)**
- **Medium API List (https://benjamin-libor.medium.com/a-curated-collection-of-over-150-apis-to-build-great-products-fdcfa0f361bc)**

IMPORTANT

Whenever you use a dataset or create a new dataset based on other sources (such as existing datasets or information scraped from websites), be sure to follow these guidelines:

1. Check for copyright protections and make sure that the way you plan to use this dataset is within the bounds of fair use.
2. Document how you intend to use this dataset, now and in the future. Find any licenses or terms of use associated with the dataset, and review them to confirm that your intended use is in compliance.
3. Investigate how the dataset was collected. Identify any indicators that the data was obtained from a source that the compilers were not authorized to access.

You'll likely have to adjust your project plan as you explore the available data. That's okay! This is all part of the process. Just make sure that everyone in the group is aligned on the project's goals as you make changes.

Make sure that your datasets are not too large for your personal computer. Big data datasets are difficult to manage locally, so consider using data subsets or different datasets altogether.

Data Cleanup and Analysis

With your data now in hand, it's time to tackle development and analysis. This is where the fun starts!

The analysis process can be broken into two broad phases: (1) exploration and cleanup, and (2) analysis.

As you've learned, you'll need to explore, clean, and reformat your data before you can begin answering your research questions. We recommend keeping track of these exploration and cleanup steps in a dedicated Jupyter notebook to keep you organized and make it easier to present your work later.

After you've clean your data and are ready to start crunching numbers, you should track your work in a Jupyter notebook dedicated specifically to analysis. We recommend focusing your analysis on techniques such as aggregation, comparison, and summary statistics, as well as on financial analysis concepts like Sharpe ratios, beta, and Monte Carlo simulations. Don't forget to include plots during both the exploration and analysis phases. Creating plots along the way can reveal insights and interesting trends in the data that you might not notice if you wait until you're preparing for your presentation. Presentation requirements will be further explained in the next module.

Presentation Day

It's crucial that you find time to rehearse before presentation day.

On the day of your presentation, each member of your group is required to submit the URL of your GitHub repository for grading.

NOTE

Projects are requirements for graduation. While you are allowed to miss up to two Challenge assignments and still earn your certificate, projects cannot be skipped.

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