Deciphering Decisions
Assignment 1

Problem Statement

In this assignment, you are required to analyze the performance of selected financial instruments over a given time period. Specifically, you will:

1. Select **5 international equities** from the Yahoo Finance database (`yfinance`).

2. Load the daily data for these instruments from **January 1, 2022** to **January 1, 2024**.

3. Compute the following metrics for each instrument:

   - **Daily Returns**: The percentage change in the price from one day to the next.
   - **Cumulative Returns**: The total return of the instrument over the entire period.
   - **Maximum Drawdown**: The largest peak-to-trough decline during the investment period.
   - **Sharpe Ratio**: A measure of risk-adjusted return, calculated as the average return earned in excess of the risk-free rate per unit of volatility.
   - **Sortino Ratio**: A modification of the Sharpe Ratio, which differentiates harmful volatility from total overall volatility by using the standard deviation of negative asset returns (downside deviation) instead of the total standard deviation of asset returns.

Guidelines

- Use the `yfinance` Python library to download the historical data for the selected indices and equities.

- Calculate the daily returns using the formula:

$$\text{Daily Return}_t = \frac{P_t - P_{t-1}}{P_{t-1}}$$

  where P_t is the price at time t and P_{t-1} is the price at time $t-1$.

- Compute the cumulative return as:

$$\text{Cumulative Return} = \frac{P_{end} - P_{start}}{P_{start}}$$

  where P_{start} is the price at the beginning of the period and P_{end} is the price at the end of the period.

- Determine the maximum drawdown using the formula:

$$\text{Max Drawdown} = \min\left(\frac{P_t - \max(P)}{\max(P)}\right)$$

  where P_t is the price at time t and $\max(P)$ is the maximum price observed up to time t.

- Calculate the Sharpe Ratio as:

$$\text{Sharpe Ratio} = \frac{E[R - R_f]}{\sigma_R}$$

  where R is the return of the instrument, R_f is the risk-free rate, and σ_R is the standard deviation of the excess return.

- Compute the Sortino Ratio using:

$$\text{Sortino Ratio} = \frac{E[R - R_f]}{\sigma_D}$$

  where σ_D is the downside deviation of the returns.

- Present your findings in a clear and concise manner, using appropriate visualizations such as graphs and tables to support your analysis.

Submission

- Submit your code as a Jupyter notebook or Python script.

- Include comments on your methodology, analysis, and conclusions.