StockMarket.et

Cohort 3 Internship Program

Week 3: Crypto Asset Management Platform

Task2: Risk assessment and portfolio construction

1. Project overview

This project aims for inters to be able to see what an operating exchange looks like, how to connect to an exchange API, how to select different assets to invest, and understand how technical indicators work and how to back test the effectiveness of different trading strategies. So that you can make the best decision while investing.

1. Project Planning

- Tasks
  - Connection with crypto exchange
  - Portfolio construction and optimization (This week's task)
  - Exploratory Data Analysis (EDA): for technical indicators
  - Back testing strategies
  - Dashboard development

2. Deliverables and Tasks to be done

- Merge the necessary branches from task-1 into the main branch
- Create at least one new branch called "task-2" for the performing portfolio construction.
- Commit your work with a descriptive commit message.
- Perform the following tasks:
- In task 1, you have selected at least 30 symbols. Now it is time to understand the data and create optimized portfolio
- **Explore the Data**
  - Visualize the closing price over time to identify trends and patterns.
  - Calculate and plot the daily percentage change to observe volatility.
  - Analyze volatility by calculating rolling means and standard deviations to understand short-term trends and fluctuations. Plot rolling means and standard deviations to understand them better.
  - Analyze days with unusually high or low returns.
  - **Note:** You are not required to do the above analysis for all 30 symbols. But if you can, it would be great, as it will give you a better understanding of your data.
- **Portfolio construction using PyPfOptimizer**
  - From PyPfOptimizer try using different risk and return models. Calculate the mean absolute error to see which risk and return model is appropriate for the crypto market.
  - Construct your portfolio using the risk and return model you have chosen and report the following:
    - Expected annual return
    - Annual volatility
    - Sharpe Ratio
  - Identify the importance of short selling while building a portfolio in respect to return and volatility.
  - Calculate VaR and CVaR to see the risk exposure of your portfolio

Resources:

- Readings Portfolio Optimization
- Concepts Portfolio Optimization
- Documentation PyPortfolioOpt
- Github PyPortfolioOpt
- VaR
- CVaR

Deliverables:

- Writing an article on your findings, consider structuring it similarly to an article you've been working on.
- Imagine you are employed at **PI-Finance** a leading investment fund, tasked with assisting two investors in crafting optimized portfolios: one seeking to maximize returns and the other aiming to minimize volatility. In a single report, detail your discoveries on portfolio optimization and risk-return analysis for crypto assets and offer tailored recommendations for each investor.
  - The article should cover the following topics:
    - **Introduction**:
      - Introduce the context of the report, focusing on optimizing portfolios for two distinct investor profiles within an investment fund.
    - **Key Metrics Summary**:
      - Summarize essential metrics such as expected return, volatility, and Sharpe ratio for crypto assets.
    - **Asset allocation adjustments**:
      - Explain adjustments made to crypto asset allocation and provide the rationale behind these changes.
    - **Risk-Return Analysis**:
      - Explore the risk-return relationship in the context of the portfolio optimization process.
      - Discuss how alterations in asset allocation impact both risk and return.
      - Examine and write the results of how shorting specific crypto assets impacts the expected return.
    - **Portfolio optimization and recommendations**:
      - Present your findings on portfolio optimization strategies tailored to each investor's goals.
      - Provide personalized recommendations for each investor based on the analysis conducted.
    - Feel free to incorporate any other types of analysis you have conducted.
    - **Conclusion**:
      - Summarize the key takeaways from the report and emphasize the importance of tailored portfolio strategies.
    - **GitHub Code Link**:
      - Include a link to your GitHub repository containing relevant code for portfolio optimization and analysis.
- **Submission**: Submit the article inside the folders on the drive.