Fyde Treasury Protocol

Algothon Challenge Instructions

Introduction

In the ever-evolving world of finance, the emergence of new asset classes and the volatility associated with them presents both challenges and opportunities for portfolio managers. Imagine a market environment reminiscent of the cryptocurrency space, where assets are highly volatile, non-normally distributed, and some even plummet to zero without warning. In such a scenario, how can one design a Smart Beta ETF that captures downward momentum while optimizing for returns and minimizing risks? Furthermore, how can we maintain a diversified portfolio while avoiding a scenario where the algorithm rebalances into a black swan event?

Challenge Objective

Your job will be to build a mechanism to capture downward momentum for the portfolio. You can update any of the provided code or create new functions to accomplish your task. Consider a generalized approach to your code so that it remains useful across any benchmark or market environment. The goal of smart beta is to obtain alpha, lower risk or increase diversification at a cost lower than traditional active management and marginally higher than straight index investing. It seeks the best construction of an optimally diversified portfolio.

Submission Instructions

There will be two items needed to be submitted upon the end of the challenge:

- Submit a csv with the format "TeamName.csv". Ensure your CSV follows the format metrics as columns.
- Separately, a zipped folder with the format "TeamName" that contains your updated code. Inside this folder include a short report that includes clear documentation explaining your submission.

Grading Methodology

Your submission will be evaluated through a multi-step process designed to fairly assess each team's strategy:

Step 1: Quantitative Filter

Your CSV submission will be part of a matrix M, where each row is a team's data, and columns are performance metrics.

Score Normalization

We'll standardize scores to account for variance among teams:

$$z_{i,m} = \frac{M_{i,m} - \mu_m}{\sigma_m}$$

Here, $z_{i,m}$ is your z-score for metric m, $M_{i,m}$ is your raw score, μ_m is the average score for metric m, and σ_m is the standard deviation.

Weighted Scores

Your overall score S_i is a weighted sum of z-scores:

$$S_i = \sum_m W_m \cdot z_{i,m}$$

W_m are the predefined weights for each metric.

- Cumulative Returns Z-score ($W_{CumulativeReturnsZ}$): 0.2
- Sharpe Ratio Z-score ($W_{SharpeRatioZ}$): 0.3
- Tracking Error Z-score ($W_{TrackingErrorZ}$): 0.3 - Higher weight for lower tracking error
- Sortino Ratio Z-score ($W_{SortinoRatioZ}$): 0.2
- Portfolio Turnover Z-score ($W_{PortfolioTurnoverZ}$): 0.1 - Higher weight for lower turnover

These weights are applied to the corresponding z-scores of each metric to calculate the overall 'Effectiveness' score.

Top Tier Selection

Teams scoring 1 standard deviation above the mean μ_S in overall score S will be shortlisted:

$$TopTeams = \{i \mid S_i \geq \mu_S + \sigma_S\}$$

Step 2: In-Depth Review

If shortlisted, your strategy will undergo a qualitative review focusing on innovation, clarity, and efficiency. The following criteria will be used to evaluate the submissions:

- **Innovation (50 points)**: Novelty and creativity in approach and solutions.
- **Robustness (30 points)**: How consistently does the algorithm handle extreme market scenarios and data anomalies across market cycles? This section will compare strategy against real data and new synthetic data to calculate consistency of results.

- **Effectiveness (25 points)**: How well does the algorithm capture downward momentum and optimize results. This section will re-calculate the weighted score using the Z-score portfolio evaluation metrics (returns, sharpe, tracking error, sortino ratio, portfolio turnover) to identify true outliers in strategy performance.
- **Clarity (15 points)**: Clear documentation of the methodology, assumptions, and results.

Any ties will be decided by the most unique team name.

Good luck!