Week 10 Assignment

April 7, 2023 at 10am

Exercise 1 Simulating an AB-Test

Consider three alpha signals with correlations $\rho_0 = 0$, $\rho_1 = 0.05$, and $\rho_2 = 0.3$.

1. For each correlation, create a synthetic alpha. The result should be in long format (duplicate each table row for each alpha).
2. For each synthetic alpha, backtest the optimal trading strategy. The result should be in long format (duplicate each table row for each strategy).

The next step is to simulate an A-B testing engine. The engine is a function with signature


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abTest:{[tbl; strat1; strat2; prob1]}
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where tbl is a table with separate rows for each strategy. Strat1 and strat2 are the strategy names and prob1 is the probability assigned to strat1 (the rest being assigned to strat2). The function returns a table randomly selecting a strategy.

3. Implement an abTest that randomly assigns each (stock, day) pair to one of two strategies.
4. For each day, bucket all stocks into three equal-size groups: low, medium, and high volatility. Implement an abTest that randomizes within each volatility bucket.

Exercise 2 Analyzing an AB-Test

The baseline scenario is strat1 follows the ρ_1 alpha signal and strat2 does not trade.

1. Simulate an AB-test with prob1 at 80%. What is the average daily P&L of this randomized strategy? What is the average daily P&L for each strategy?

2. For [illegible]e daily t-stat (mean/sdev) of each strategy's P& [illegible]se suitably normalized units.
3. For [illegible]te the t-stat (mean/sdev) of each strategy's P& [illegible]ys). Use suitably normalized units.
4. Re[illegible] prob1 $= 0.1, 0.2, ..., 0.9$. Comment on the P& [illegible]de-off across A-B allocations.
5. Re[illegible] every strategy pair. Comment on the amount of A-B testing needed based on an alpha's strength and the trader's waiting time.