

INTER IIT TECH CAMP



Pairs Trading and Cointegration Strategy

Team Size - 2 to 4

Submission deadline: October 15th, 12:00 PM.

Presentations: October 15th, 5:00 PM.



PROBLEM STATEMENT

Pairs trading is a market-neutral trading strategy enabling traders to profit from virtually any market conditions: uptrend, downtrend, or sideways movement. This strategy is categorised as statistical arbitrage. It involves matching a long position with a short position in two assets with a high degree of cointegration.

Your Task:

Design and implement a low-frequency pairs trading strategy that leverages the concept of cointegration to profit from the relative price movements of two assets. Your task is to create a trading algorithm that identifies, trades, and manages pairs of assets exhibiting cointegration.

Key Objectives:

1. Pair Identification and Selection

Develop a method to select pairs of assets from a given dataset that demonstrate a statistically significant cointegration relationship. Explain the criteria and rationale behind your pair selection.

2. Strategy Development

Create a robust trading strategy for the selected asset pairs. This strategy should include clear entry and exit rules, risk management measures, and position sizing guidelines.

3. Backtesting

Implement your pairs trading strategy using historical price data to evaluate its performance over a specified time period. Assess the strategy's profitability, risk-adjusted returns, and overall effectiveness.



4. Visualisation

Present the results of your pairs trading strategy visually using charts and graphs. Highlight key performance metrics and illustrate the strategy's behavior over time.

5. Documentation

Provide comprehensive documentation of your approach, including the mathematical and statistical methods used, code implementation, and data sources. Ensure that your documentation is clear and detailed enough for others to understand and replicate your strategy.

Guidelines:

- You can use the **Yahoo Finance API** to get the historical price data.
- Pair Identification and Selection Period - **June 2017 to June 2020**
- Strategy Backtesting Period - **July 2020 to July 2023**
- Assume an initial invested portfolio of **INR 1,00,000**. You can choose how to divide this capital initially amongst the assets of your pair.
- The performance of your strategy will be judged on the following metrics:
 1. Cumulative Returns
 2. Annualised Sharpe Ratio
 3. Maximum Drawdown
 4. Frequency of trades placed
- Your documentation should be in line with the following template:
 - A. Pair Identification and Selection
 - B. Trading Strategy and Signal Generation Method
 - C. Risk Management Measures
 - D. Trading Signals Generated and Position Sizing
 - E. Portfolio PnL
 - F. Performance Metrics (mentioned above)



- Participants are encouraged to use programming languages such as Python for their implementation. You may also use external libraries and tools for data analysis and visualisation.
- Please note that the type of securities which can be traded are not just restricted to stocks. Participants may also construct pairs using a combination of stocks, derivatives, market indices, commodities, etc.

Evaluation Criteria:

Participants will be evaluated based on the following criteria:

- Pair Selection - How effectively and logically you are identifying and selecting pairs based on cointegration and other factors
- Strategy Development - The quality and robustness of your trading strategy
- Backtesting Results - The performance metrics of your strategy on historical data
- Visualisation - The clarity and effectiveness of your charts and other visual presentation
- Documentation - The completeness and comprehensibility of your documentation

Submission Format:

Each team has to submit two files, namely the code file and the strategy documentation file. Submit your files through the following form:

