Atlas Quant Challenge

1. Overview

In electronic markets, the limit order book (LOB) captures the live state of supply and demand for a financial instrument. Each snapshot shows multiple price levels on both the bid (buy) and ask (sell) sides, reflecting liquidity and trading pressure.

Given the timeseries of the limit order book, your challenge is to design a feature that demonstrates strong correlation with future price movement (Y).

This task tests your ability to extract meaningful microstructural signals, a core skill in quantitative research and trading strategy design.

2. Dataset Description

You are provided with CSV files containing limit order book snapshots for five days. Each row represents one snapshot and includes:

Column	Description
`bid_px_0`, `bid_px_1`, …, `bid_px_19`	Bid prices for levels 1 - 20 (level 1 = best bid)
`bid_qty_0`, `bid_qty_1`, …, `bid_qty_19`	Bid quantities for levels 1 - 20
`ask_px_0`, `ask_px_1`, …, `ask_px_19`	Ask prices for levels 1 - 20 (level 1 = best ask)
`ask_qty_0`, `ask_qty_1`, …, `ask_qty_19`	Ask quantities for levels 1 - 20
`Y`	Target variable: **future price movement**

3. Objective

Your task is to create a numeric feature that captures information predictive of Y. You will be evaluated on:

- **Predictive Power: Correlation (Pearson or Spearman) of your feature with Y.**
- **Evaluation will be performed on a separate out-of-sample dataset.**

4. Example Feature: Order Book Imbalance (OBI)

An effective feature built on limit order book is the Order Book Imbalance (OBI), which measures the relative strength of bid and ask liquidity:

$$\text{OBI} = \frac{\sum_{i=1}^{20} \text{bid\_qty}_i - \sum_{i=1}^{20} \text{ask\_qty}_i}{\sum_{i=1}^{20} \text{bid\_qty}_i + \sum_{i=1}^{20} \text{ask\_qty}_i}$$

Interpretation:
- OBI > 0: More buy-side pressure → likely upward movement
- OBI < 0: More sell-side pressure → likely downward movement

Example code for this feature is provided along with the datasets.

5. Submission Requirements:

You are provided with two Python files: *executor.py* and *feature.py*. Your implementation should be written in feature.py. Ensure that your final submission runs correctly with the original *executor.py*

Submission Deadline: November 3, 2025, 23:59 IST