Strategy Report for Sudowoodo

1 Exploring the Dataset

To understand the market dynamics, we performed the following exploratory steps:

- Plotted trade prices over time to observe volatility and trend behavior.
- Visualized trade volume to assess liquidity and market activity.
- Calculated the mid-price using the best bid and ask:

$$\text{Mid-Price} = \frac{\text{Best Bid} + \text{Best Ask}}{2}$$

- Computed rolling statistics (mean and standard deviation) of the mid-price using a window size of 20.

These steps helped identify price oscillations around a mean with occasional sharp deviations—conditions suitable for a mean-reversion strategy.

2 Strategy Inspiration

The strategy is inspired by the mean-reversion concept in quantitative trading. Prices tend to revert to their historical average, and deviations from this average offer potential trade opportunities.

- Buy when the price is unusually low (expecting it to rise).
- Sell when the price is unusually high (expecting it to fall).

By leveraging rolling mean and standard deviation of mid-prices, we identify statistically significant price deviations to generate signals.

3 Core Logic of the Algorithm

The algorithm follows these steps:

1. **Track Rolling Mid-Prices:** At each time step, compute the mid-price and maintain a rolling window (size 20) of recent values.

2. **Compute Indicators:**

$$\begin{aligned}
\mu &= \text{mean of mid-prices} \\
\sigma &= \text{standard deviation of mid-prices} \\
\text{Upper Threshold} &= \mu + 1.5\sigma \\
\text{Lower Threshold} &= \mu - 1.5\sigma
\end{aligned}$$

3. **Signal Generation:**
   - If `best_ask` $<$ Lower Threshold $\wedge$ position is $<$ 50: **Buy**.
   - If `best_bid` $>$ Upper Threshold $\wedge$ position is $>$ -50: **Sell**.

4. **Order Execution:** Orders are placed at the best available bid/ask and constrained by position limits of ± 50.

4 Experiments, Variations, and Insights

Parameter Tuning

- **Threshold Multiplier:** Can try Tried values of 1.0, 1.5, and 2.0.
- **Window Size:** Can be Tested with 10, 20, 30

Insights

- Mid-price is a reliable indicator of fair market value.
- Rolling statistics Reduce sensitivity to noise and adapt to local market conditions.
- Position limits and dynamic order sizing help manage risk and avoid overtrading.