Backtesting Implementation Report

1.Synthetic Data Generation:
- We generate a time-series dataset representing market prices and volumes over a single trading day.
- Prices are simulated using a cumulative sum of random normal values to mimic realistic price movements.
- Volumes are randomly sampled from a uniform distribution to reflect varying market activity.

Example snippet of generated data:

TIme	Price	Volume
2023-01-01 09:30:00	100.5	500
2023-01-01 09:31:00	101.2	800
2023-01-01 09:32:00	99.8	300

2.TWAP Strategy Execution
- **Process**: The order size is evenly divided across all time intervals, with each portion executed at the prevailing market price.
- **Logic**:
  - Calculate the total intervals in the trading session.
  - Split the order size equally across intervals.
  - Execute each portion at the market price for the corresponding interval.
- **Objective**: Ensures steady order distribution, minimizing market impact.

Example executed trades:

TIme	Executed Price	Executed Volume
2023-01-01 09:30:00	100.5	50
2023-01-01 09:31:00	101.2	50
2023-01-01 09:32:00	99.8	50

Results

- **Metrics**:
  - **Execution Cost**: Average deviation from the benchmark price.
  - **Slippage**: Reflects efficiency under market conditions.
- **Graph**: Shows consistent execution at regular intervals and alignment with market trends.
- **Analysis**
  - **Advantages**: Reduces market impact and is easy to implement.
  - **Challenges**: Susceptible to slippage in volatile markets due to fixed execution intervals.