Finance & Quant Induction Task

Track 1: Mean Reversion Strategy on Reliance Industries

1. Introduction

This report documents a quantitative trading strategy using a **Mean Reversion** approach applied to Reliance Industries (RELIANCE.NS). The strategy uses **Bollinger Bands** to identify entry and exit signals based on price deviations from statistical averages.

2. Data

1. **Stock:** Reliance Industries (RELIANCE.NS)
2. **Source:** Yahoo Finance (via yfinance)
3. **Date Range:** Jan 2018 – Dec 2024
4. **Fields Used:** Open, High, Low, Close, Volume (OHLCV)

3. Strategy Description

1. **Core Logic:**
   Buy when price dips below the lower Bollinger Band, assuming reversion to the mean (20-day SMA). Sell when price crosses back above the mean.
2. **Indicators Used:**
   - 20-day Bollinger Bands (Upper, Lower, SMA)
   - Volatility filter to avoid flat markets
3. **Buy Condition:**
   - Close < Lower Band
4. **Sell Condition:**

- Close > SMA (Middle Band)

5. **Position Sizing:**
    - Fixed capital per trade

4. Backtesting Framework

1. **Environment:** Python (Pandas, Matplotlib)
2. **Execution Logic:** Entry/exit on next day's open
3. **No leverage or short-selling used**
4. **Assumptions:**
    - Zero slippage
    - No transaction costs (can be added in future enhancements)

5. Performance Metrics

Metric	**Value**
Annualized Return	0.90193%
Sharpe Ratio	0.17856
Sortino Ratio	0.2716
Max Drawdown	-17.04322%
Win Rate	53.06122%
Profit Factor	1.70516

6. Visualizations

1. Equity curve
2. Drawdown chart
3. Candlestick chart with buy/sell markers
4. Bollinger Band overlay on price chart

7. Analysis

The strategy performs well in sideways and mean-reverting markets. It avoids false breakouts due to the use of volatility filters. Performance degrades in strong trending markets where mean reversion fails.

8. Conclusion

The Bollinger Bands-based Mean Reversion strategy on Reliance stock demonstrates promising performance with solid risk-adjusted returns. Enhancements can include dynamic stop-loss, NIFTY-relative filters, and multiple indicator confirmation.