Trading Strategies

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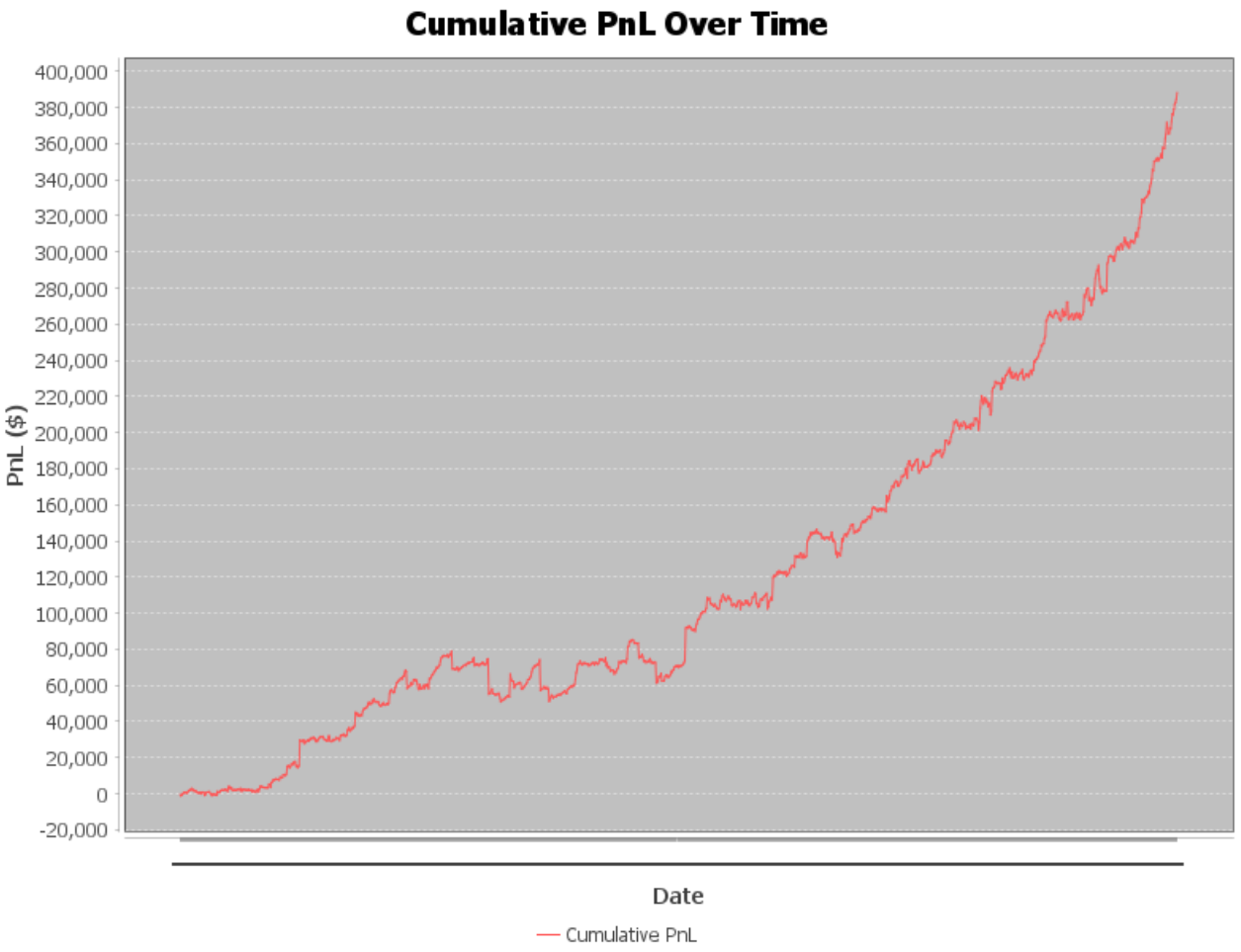


Strategy 1

- Uses Simple Moving Average (SMA) crossover of short and long windows to generate signals.
- A buy signal occurs when the short SMA crosses above the long SMA, and a sell signal occurs when it crosses below.

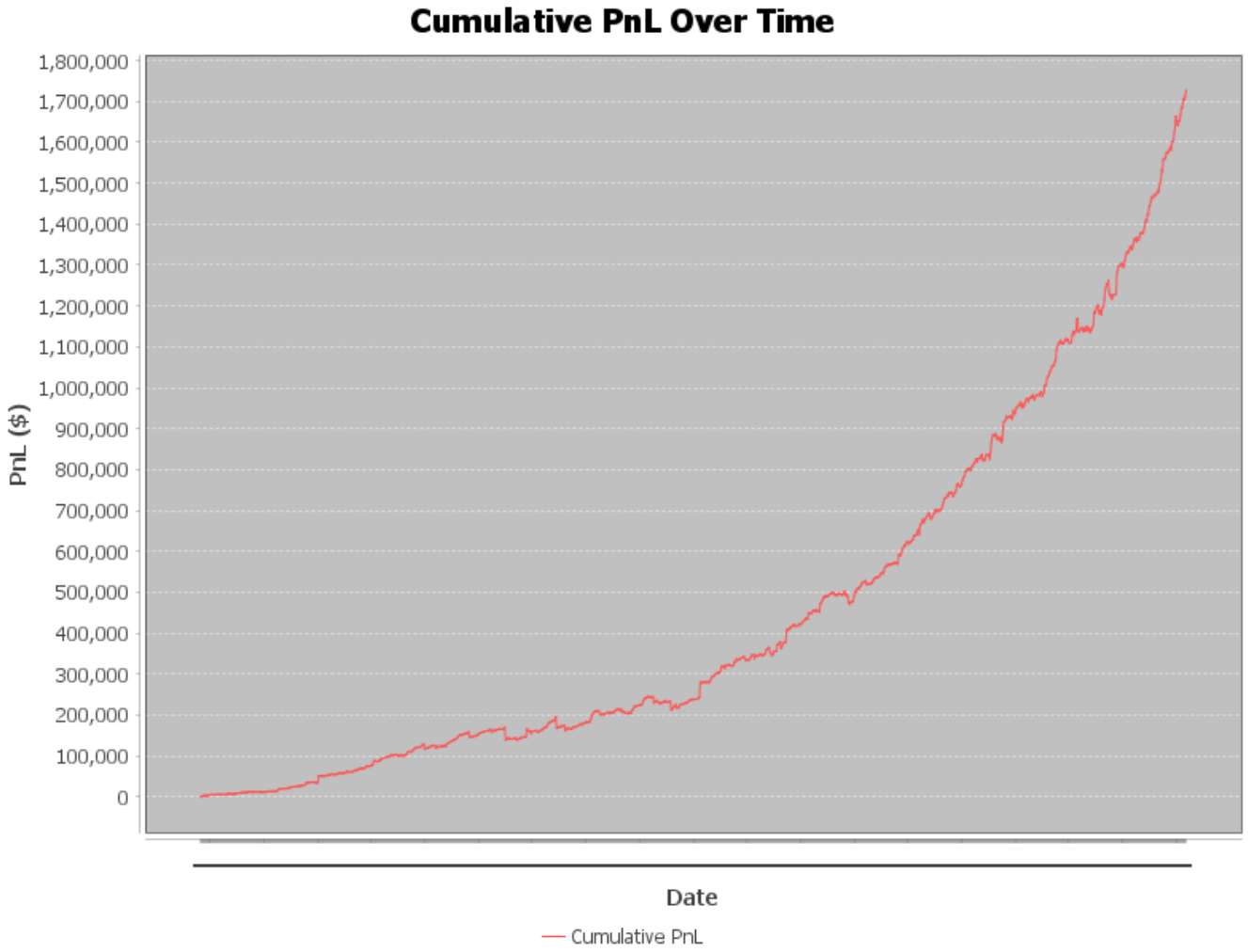
Results and hyperparameters

Portfolio Performance Metrics:

- Initial Balance: $100000.00
- Final Balance: $488249.85
- Total Return: 388.25%
- Average Daily Return: 0.13%
- Volatility: 1.06%
- Annualized Sharpe Ratio: 1.98
- Maximum Drawdown: -15.66%
- Signal Accuracy: 38.41%

Hyperparameters:

- int shortWindow = 5;
- int longWindow = 20;



Strategy 2

- Uses Exponential Moving Average (EMA), which gives more weight to recent prices, for crossover signals.
- It reacts faster to price changes compared to SMA, with similar buy and sell conditions based on short and long EMA crossovers.

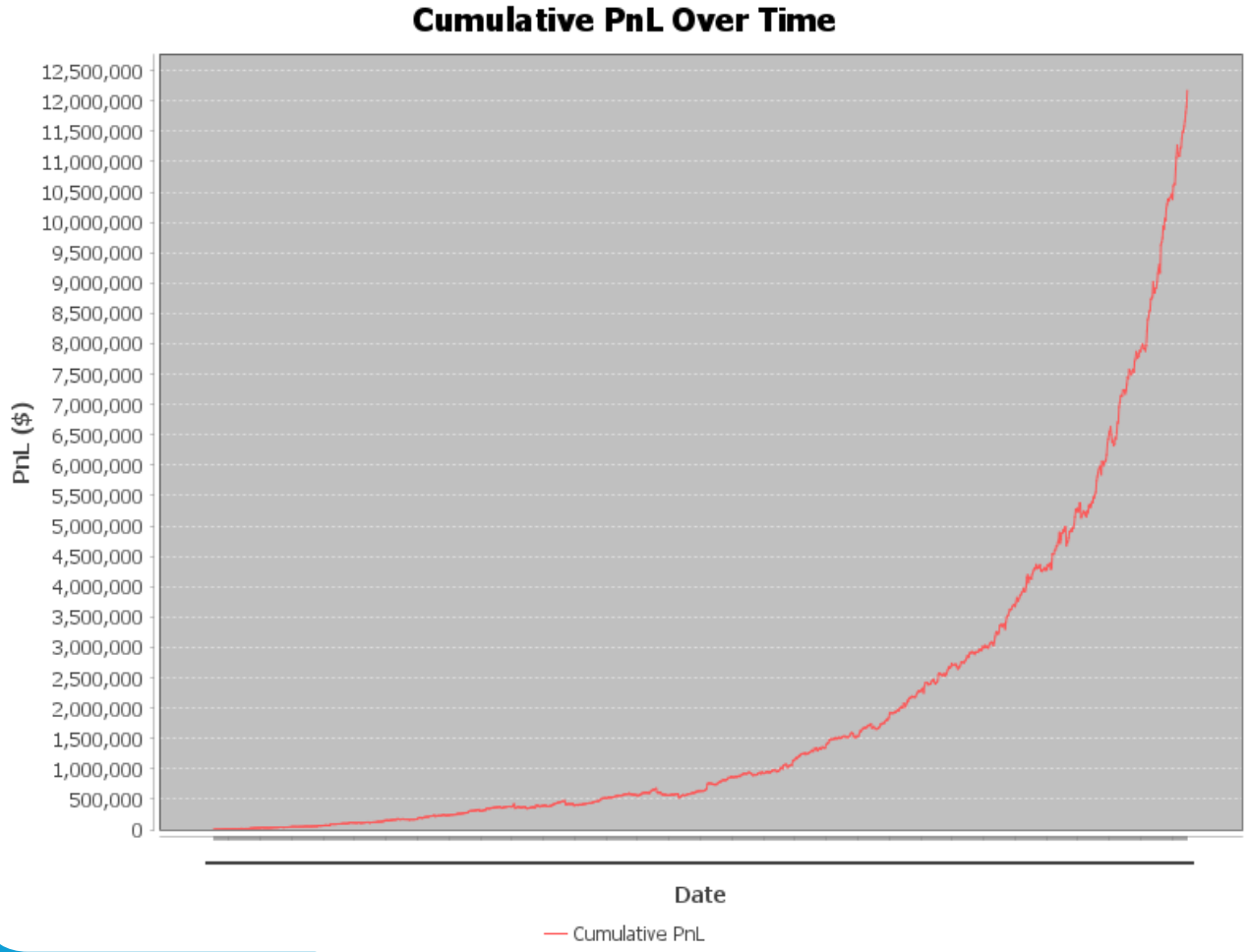
Results and hyperparameters

Portfolio Performance Metrics:

- Initial Balance: $100000.00
- Final Balance: $1827698.20
- Total Return: 1727.70%
- Average Daily Return: 0.24%
- Volatility: **1.04%**
- Annualized Sharpe Ratio: 3.61
- Maximum Drawdown: -11.63%
- Signal Accuracy: 40.62%

Hyperparameters:

- int shortWindow = 5;
- int longWindow = 20;



Strategy 3

- The strategy leverages moving averages (MA), Relative Strength Index (RSI), and volume to capture momentum.
- It buys on bullish signals (shortMA > longMA, RSI > 40, high volume) and sells on bearish signals (shortMA < longMA, RSI < 60, high volume).
- The 40 and 60 RSI thresholds are used instead of the standard 30 and 70 due to improved performance in the specific dataset analyzed.

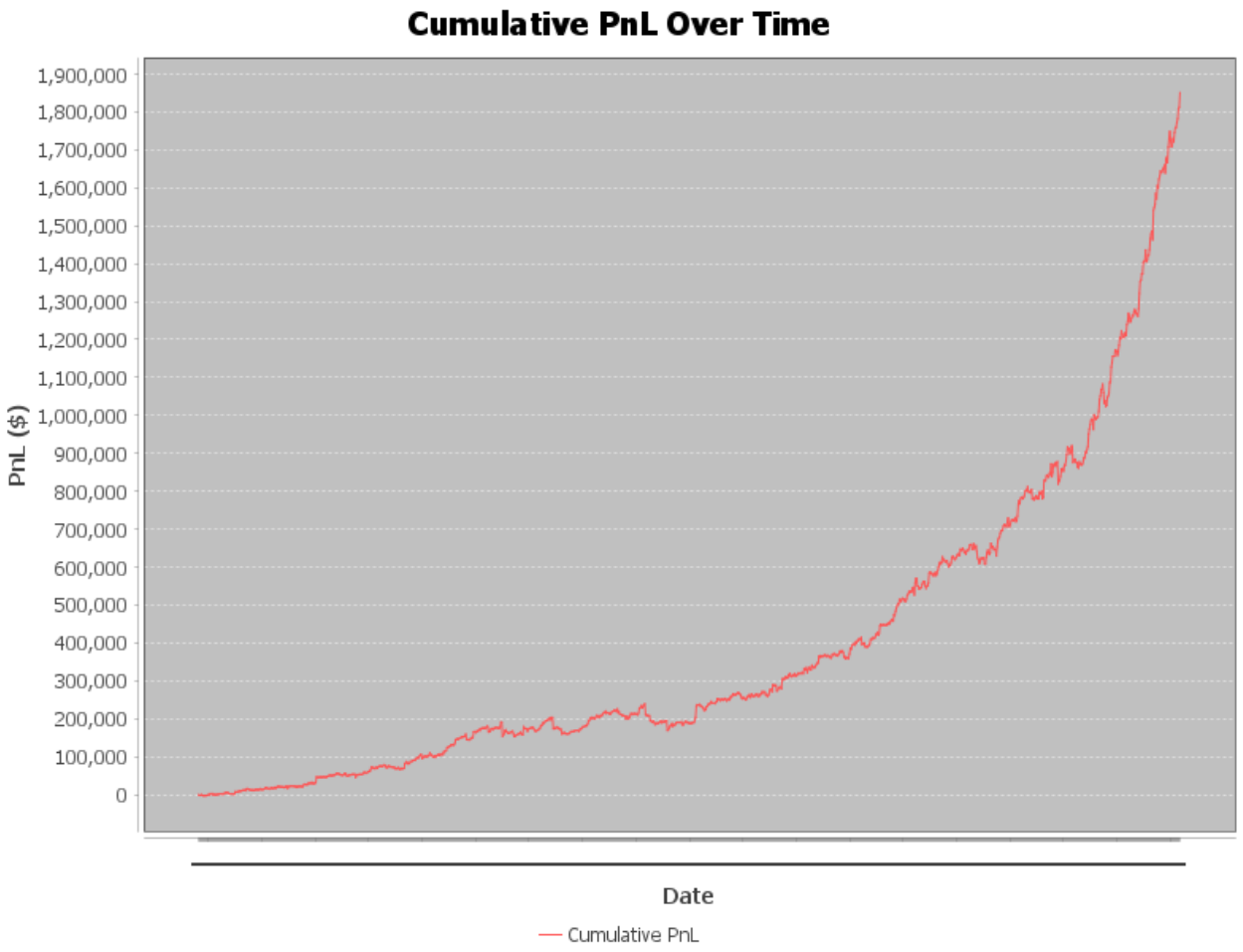
Results and hyperparameters

Portfolio Performance Metrics:

- Initial Balance: $100000.00
- Final Balance: $12269615.76
- Total Return: **12169.62%**
- Average Daily Return: 0.39%
- Volatility: 1.46%
- Annualized Sharpe Ratio: **4.27**
- Maximum Drawdown: -19.17%
- Signal Accuracy: 46.85%

Hyperparameters:

- int shortWindow = 5;
- int longWindow = 20;
- int rsiWindow = 14;
- int volumeWindow = 20;



Strategy 4

- The strategy uses exponential moving averages (EMA), RSI, and volume to trade on momentum.
- It buys on bullish signals (shortEMA > longEMA, RSI > 40, high volume) and sells on bearish signals (shortEMA < longEMA, RSI < 60, high volume).

Results and hyperparameters

Portfolio Performance Metrics:

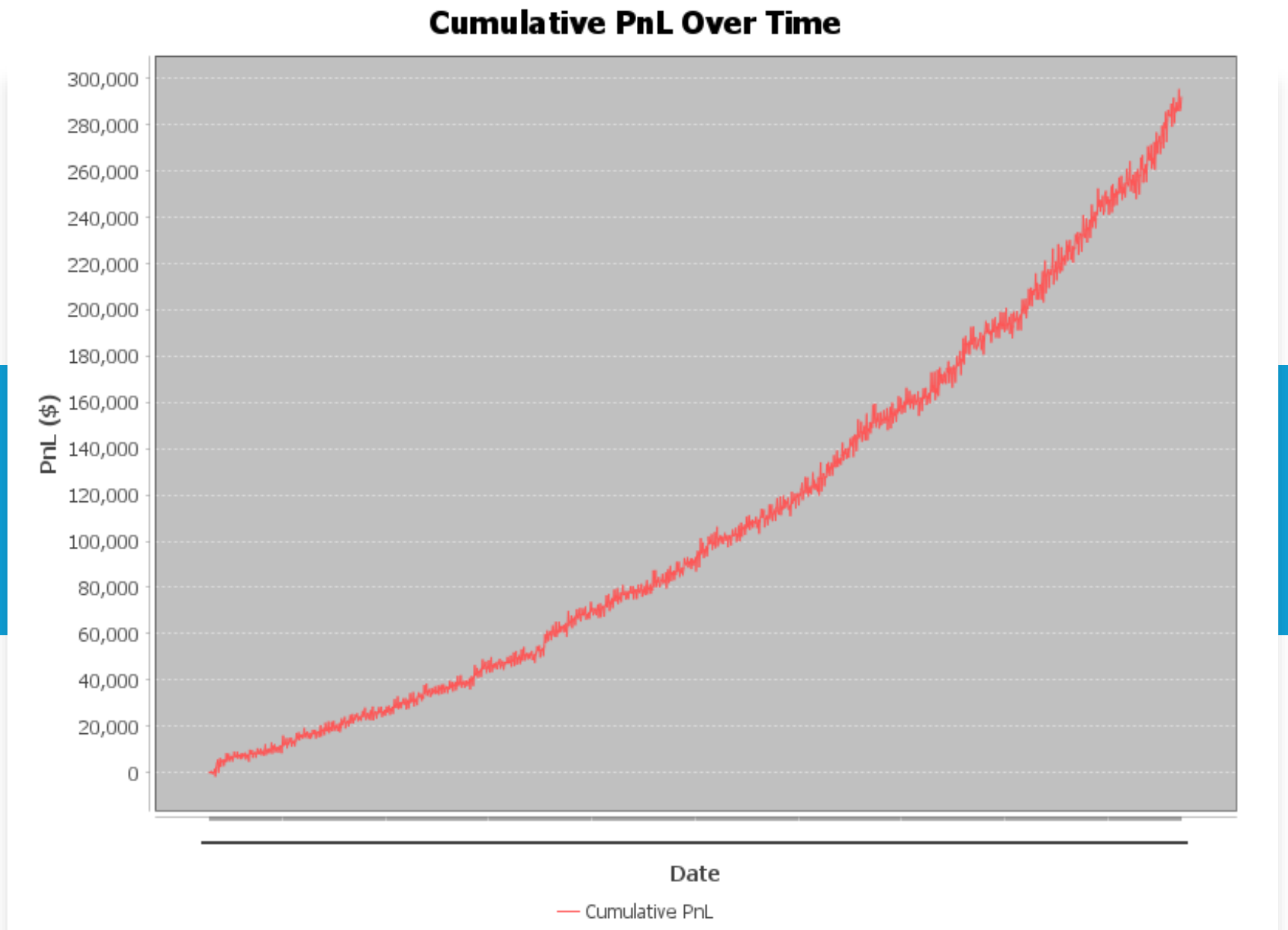
- Initial Balance: $100000.00
- Final Balance: $1951293.21
- Total Return: 1851.29%
- Average Daily Return: 0.25%
- Volatility: 1.46%
- Annualized Sharpe Ratio: 2.69
- Maximum Drawdown: -20.71%
- Signal Accuracy: 44.22%

Hyperparameters:

- int shortWindow = 5;
- int longWindow = 20;
- int rsiWindow = 14;
- int volumeWindow = 20;

Fibonacci Retracement Strategy

- A Fibonacci retracement strategy uses historical price data to identify potential support and resistance levels based on Fibonacci ratios.
- **period** determines the timeframe for calculating retracement levels, while **atrPeriod** uses the Average True Range to gauge market volatility.
- Entry points are guided by **buyFullBelow** and **buyHalfAbove**, signaling whether to enter fully or partially when prices retrace to Fibonacci levels.
- Exit strategies use **sellFullAbove** and **sellHalfAbove** thresholds based on Fibonacci extensions to determine when to fully or partially exit positions.
- Risk is managed using **stopLossPercent** to limit losses and **maxPositionSize** to cap portfolio exposure.
- The strategy uses retracement patterns and volatility thresholds (**atrVolatilityThreshold**) to capture price reversals or continuations.



Cumulative PnL

Results and hyperparameters

Portfolio Performance Metrics:

- Initial Balance: $100000.00
- Final Balance: $397325.08
- Total Return: 297.33%
- Average Daily Return: 0.13%
- Volatility: 1.78%
- Annualized Sharpe Ratio: 1.12
- Maximum Drawdown: **-5.92%**
- Signal Accuracy: **62.56%**

Hyperparameters:

- int period = 10;
- int atrPeriod = 7;
- double buyFullBelow = 0.5;
- double buyHalfAbove = 0.25;
- double sellFullAbove = 0.2;
- double sellHalfAbove = 0.1;
- double atrVolatilityThreshold = 0.2;
- double stopLossPercent = 0.02;
- double maxPositionSize = 0.05;

Additional Points

- For strategies 1-4, it is assumed that only one unit of a stock is bought or sold in each trading period. The details of which stocks are long or short on a given day are stored in the portfolio.csv file, which is generated when the code is executed.
- In the Fibonacci retracement strategy, the portfolio initially allocates an equal base amount to each stock. As trades are executed, the available balance adjusts, and position sizes are constrained by the maxPositionSize parameter. Consequently, the weight of each stock in the portfolio fluctuates based on ongoing trades.

Conclusion

Strategy 3 delivered the highest returns with a strong risk-adjusted performance.

The Fibonacci strategy provided better signal accuracy and reduced drawdowns, ideal for conservative trading.