Dual Momentum Strategy

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Presentation of the Strategy

The Strategy is a Daily Long-only Momentum Strategy that defines the Relative and Absolute Momentum :

- Relative Momemtum : The n best coins each day in a metrics defined later
- Absolute Momentum : If these coins have positive returns those dates

After, the coins selected will have an equal weight in the portfolio. If the Absolute condition is not filled, the strategy holds cash.

The Metrics and Parameters

The metrics used is a rolling z-score of the returns over a lookback period :

$$z_{lookback} = \frac{(returns_l - \overline{r})}{\overline{s}} \tag{1}$$

With :

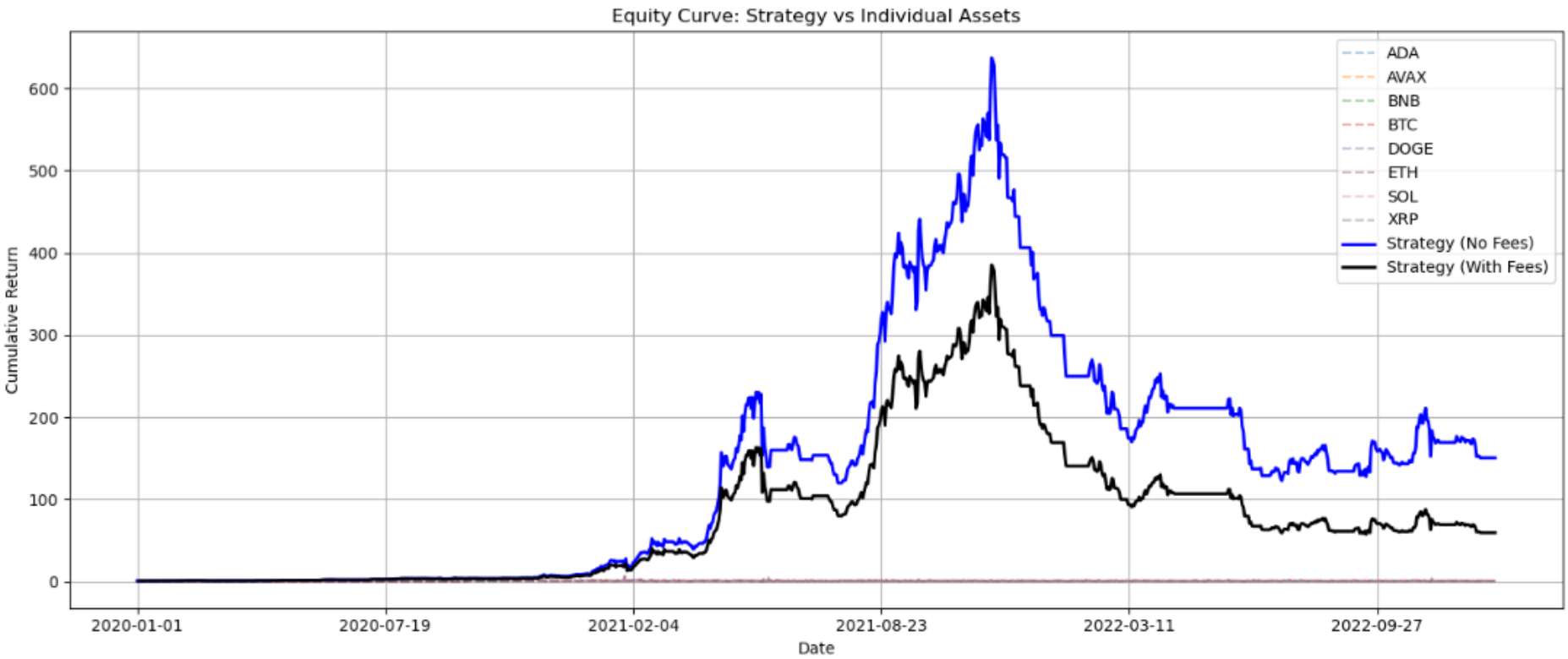
- l = lookback
- $\overline{r}$ = rolling $mean_l$
- r = $returns_l$
- $\overline{s}$ = rolling std_l

The parameters :

- Lookback (20 days)
- top_n, maximum number of coins in portfolio (3)
- The fees, initially 0.002 (0.2%)

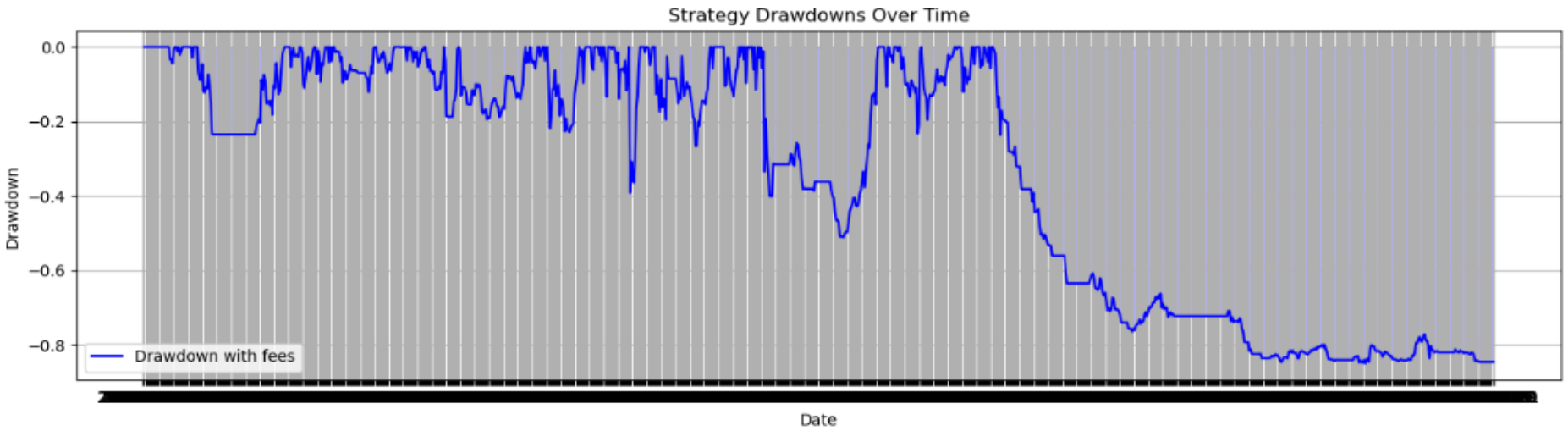
Returns

Here is the graph with the returns of the strategy against other coins :



Drawdowns

Here is the graph with the drawdowns of the strategy :



Performance Metrics

The performance metrics for the initial strategy :

- Sharpe Ratio : 1.88
- Sortino Ratio : 2.48
- Annualized return : 2.90
- Annualized volatility : 0.97
- Max Drawdown : -85.05%
- Winning Rate : 39.14%
- Avg Strategy Holding : 1.78 days
- Total Trades : 483 days

- Average Drawdowns = -33.75%

Random Search Optimization of Parameters

Random Search with $1 \leq l \leq 50$ and $1 \leq top_n \leq 5$)

Here are the results :

Best Parameters Pattern	**Sharpe Ratio Assiociated**
Lookback : 25, top_n : 3	2.3254
Lookback : 32, top_n : 2	2.2936
Lookback : 25, top_n : 4	2.2350

Performance Metrics with new Parameters

The performance metrics for the optimized strategy :

- Sharpe Ratio : 2.33
- Sortino Ratio : 3.30
- Annualized return : 4.71
- Annualized volatility : 0.93
- Max Drawdown : -69.01%
- Winning Rate : 40.42%
- Avg Strategy Holding : 1.70 days
- Total Trades : 452 days

- Average Drawdowns = -27.02%

Sensibility of Sharpe Ratio

Variation of the Sharpe Ratio according to the lookback and top_n parameters one by one :

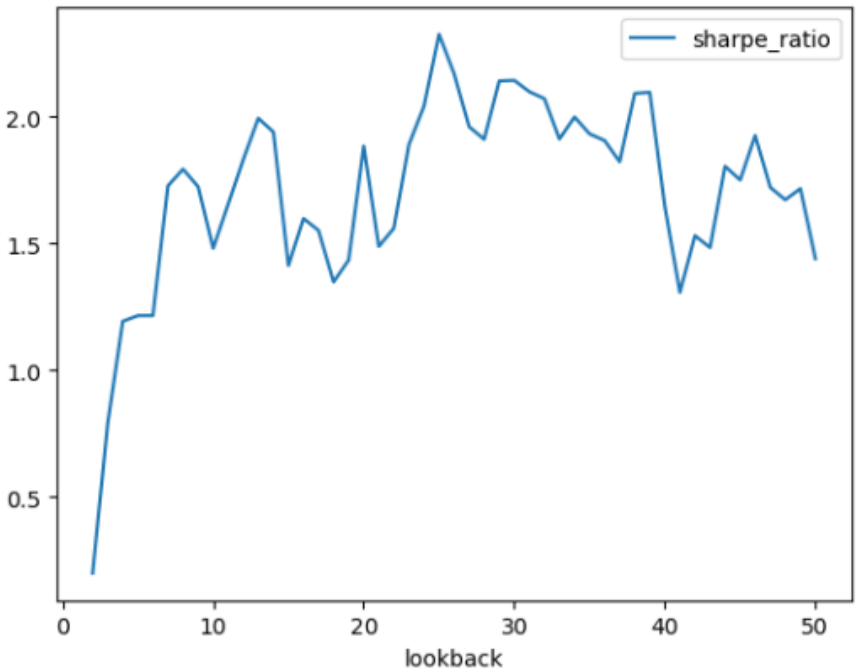


Figure 1: Lookback vs Sharpe

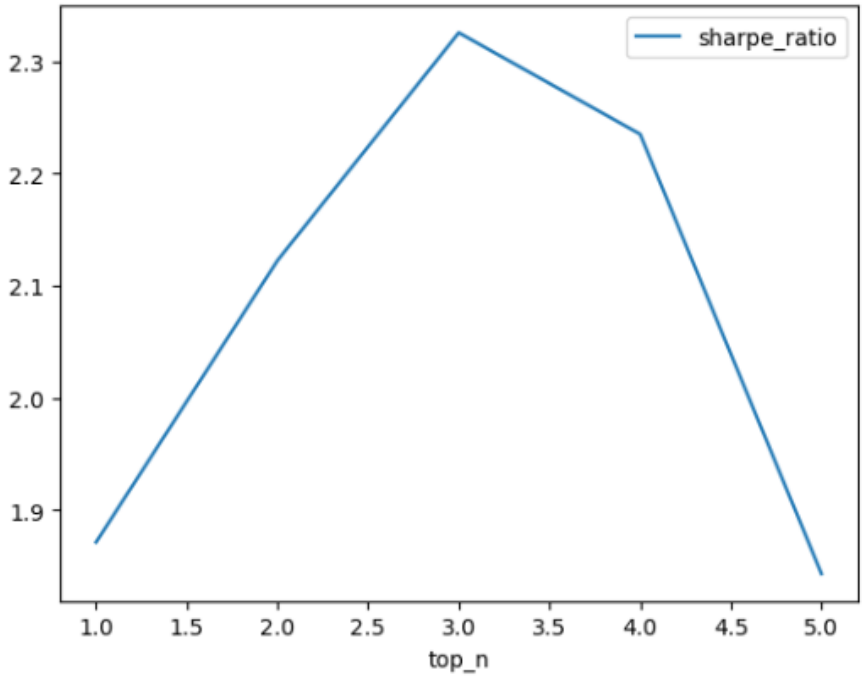
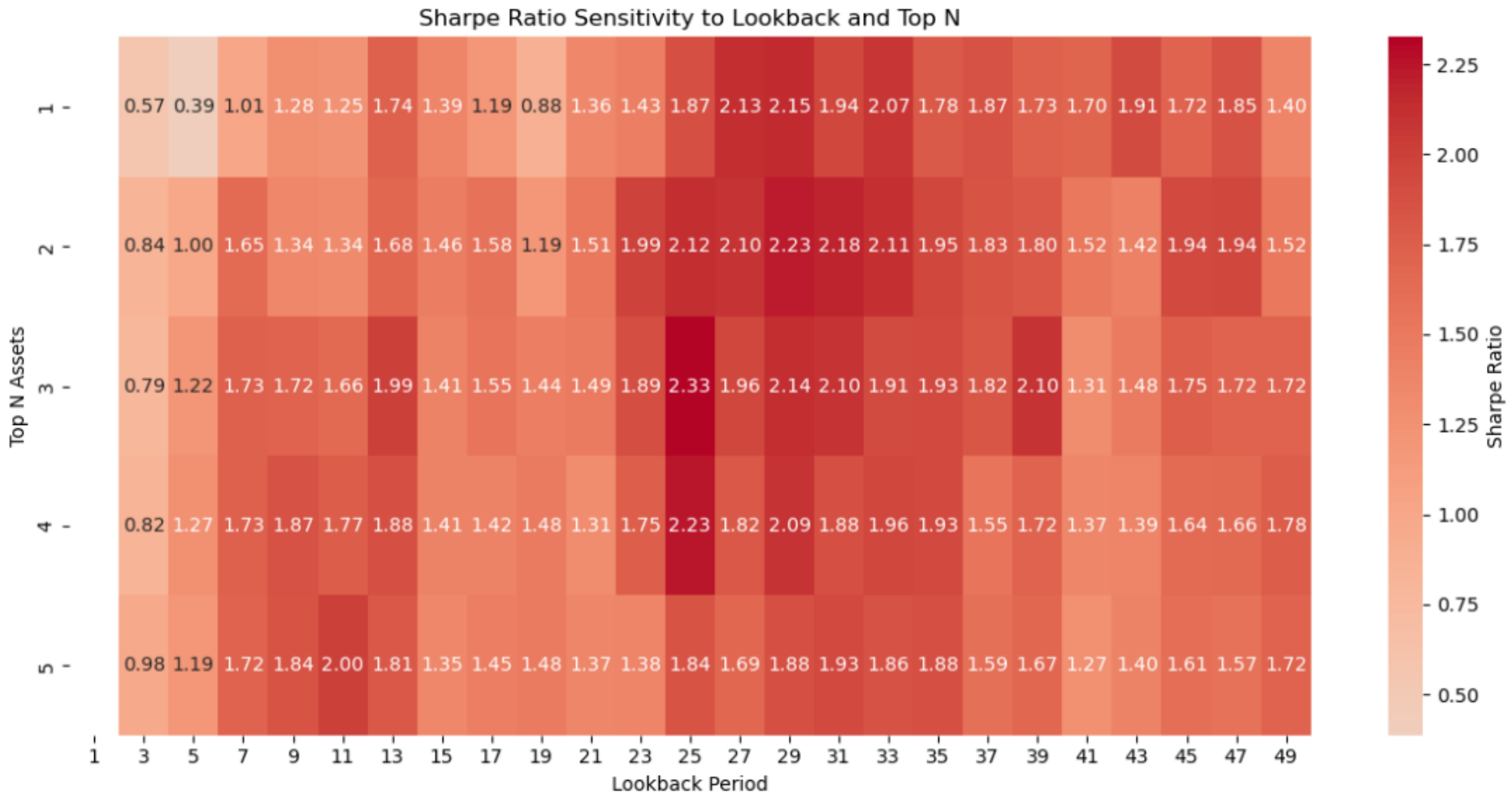


Figure 2: Top N vs Sharpe

Sensibility of Sharpe Ratio

Variation of the Sharpe Ratio according to the lookback and top_n parameters together :



With Weights

For this part, we will weight the coins in the portfolio according to their returns, here are the results (after the optimisation process, $l = 32$, $top_n = 2$):

- Sharpe Ratio : 2.24
- Sortino Ratio : 3.17
- Annualized return : 4.41
- Annualized volatility : 0.95
- Max Drawdown : -69.70%
- Winning Rate : 41.88%
- Avg Strategy Holding : 3.73 days
- Total Trades : 802 days

- Average Drawdowns = -26.96%

Conclusion of Upgrade A

Comparing the 2 results, I will continue with the standard version.

Results

The results of the validation test, after optimisation ($l = 16, top_n = 3$) :

- Sharpe Ratio : 2.88
- Sortino Ratio : 5.58
- Annualized return : 2.21
- Annualized volatility : 0.44
- Max Drawdown : -24.21%
- Winning Rate : 41.10%
- Avg Strategy Holding : 1.88 days
- Total Trades : 171 days

- Average Drawdowns = -9.54%

Conclusion

At first sight, the strategy is a good one and is validated by the data. However, it was only tested on 8 coins, and only coins that exist today after the multiple crashes. As such, this indicator should be confirmed by other coins to avoid Survivor-Biais