

Trading application documentation

For this trading application I have made a few simplifying assumptions. I assume that trades have no impact on the market and that there is no slippage or transaction costs. Furthermore, I assume that all trades are made at the close price and that short-selling is not allowed.

Bitcoin and Ethereum are significantly more volatile than regular stocks, but like stocks cryptocurrencies also exhibit momentum but with much more short-lived trends. Generally, Bitcoin and Ethereum are also highly correlated. My approach is designed for easy and clear implementation, while also making use of relationships between cryptocurrencies to reduce risk exposure. Therefore, I chose a momentum strategy with correlation filter. If the average returns over the past 14 days are positive, a long signal is assigned. After that, if the correlation over the past 20 days is larger than a particular threshold and both cryptocurrencies have a long signal, then you only go long in the cryptocurrency with the strongest momentum signal.

The key performance metrics used to evaluate this strategy are the Sharpe ratio, Sortino ratio, maximum drawdown, win rate, the average PnL (profit and loss) of the wins and losses. The Sharpe ratio is a universally accepted metric for evaluating the returns of a strategy adjusted for the risk. The Sortino ratio is important for evaluating the performance of the strategy compared to the downside risk. It shows how well the strategy performs when you care about the volatility of negative returns. The win rate shows the proportion of trades that result in profits, while the average PnL of the wins and losses shows the magnitude of the average profit or loss. Lastly, the maximum drawdown is an essential risk metric that measures the largest peak-to-trough decline in the portfolio value. It indicates the worst-case loss and is thus an important measure for risk management, particularly for losses.

There are many further ideas to improve the strategy. First, in reality transaction fees and implicit costs, such as bid-ask spreads and slippage, can diminish returns and thus should be accounted for. Also, modelling volatility and trading in derivatives can be useful to reduce risk. Lastly, short-selling and higher-frequency data (e.g., 5-minute or 1-minute prices) allow for the implementation of more advanced strategies.

I have used ChatGPT to speed up code for collecting data from Yahoo finance, functions of performance metrics, and plotting of results. All other ideas, strategy implementation, and interpretations are my own.