QFin

Momentum trading: Resistance and Support

Overview

Momentum Trading is a strategy that aims to capitalize off of the inertia of price movements. As in investing strategy this consists of investors taking a long position in securities that are on an upward trajectory and sell the security at its highest point before the price falls again. Momentum trading often occurs in the short term, as the trader takes advantage of trends which are often in the short term, but long positions can be held longer term, if the momentum seems to be sustained over a prolonged period of time. For most traders volatility is a concern, but momentum trading actually capitalizes off the short term price movements, which makes this strategy especially suitable for highly volatile crypto markets.

In traditional trading, the goal is to buy low and sell high. Momentum trading on the other hand goes against standard methods by trying to buy high and sell higher.

Cryptocurrency are ‘currencies’ built upon blockchain technology and have a cryptographic backbone. A key attraction of Cryptocurrencies over traditional currencies like the Australian Dollar or U.SD is that they are decentralized, meaning that they are not controlled by the state or central governing body. The two key features of cryptocurrency is that they are cryptographic hashes and digital signatures. Although cryptocurrencies are quite volatile, research has shown that the portfolio’s with exposure to cryptocurrency would likely outperform portfolios without it.

The momentum strategy implemented here uses the concept of resistance and support in order to determine when to buy and sell coins.

Resistance and support

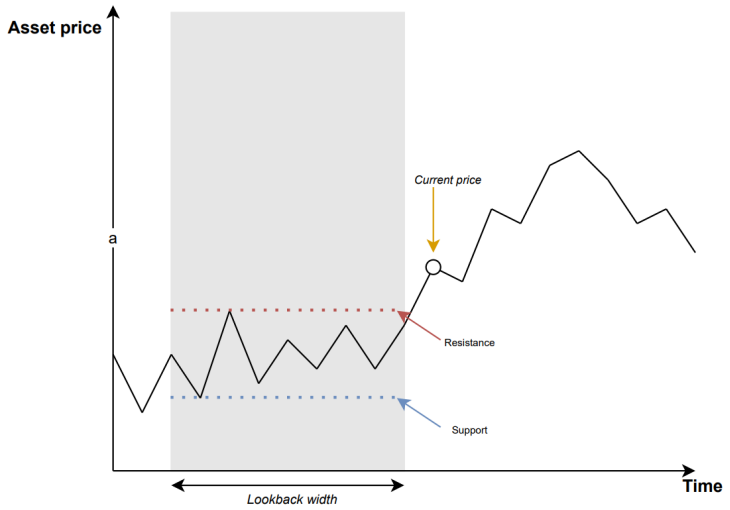
The concept of resistance and support, tracks price levels to tell traders when to enter or close a long position. The support is a price level where a downward trend is to be expected, whereas the resistance is a price level which anticipates the increase in prices and signals a good opportunity to enter a long position. The more often a price hits either level, shows the information to be more reliable at predicting future price movements.(1)

To start developing the algorithm, the resistance and support levels are calculated using historical data. If the price of the asset goes above the resistance price, the asset is bought. When the price of the asset dips below the support price, the asset is then sold.

There are different ways of calculating the support and the resistance. In our implementation, we look at defining a set window into the past, where the resistance is calculated by taking the maximum of the prices within that window, and the support is calculated by taking the minimum of the prices within that window. In the diagram (Figure 1)

below, the asset will be bought as the current price of the asset has gone above the resistance price.

Figure 1: Visualization of resistance, support and lookback width

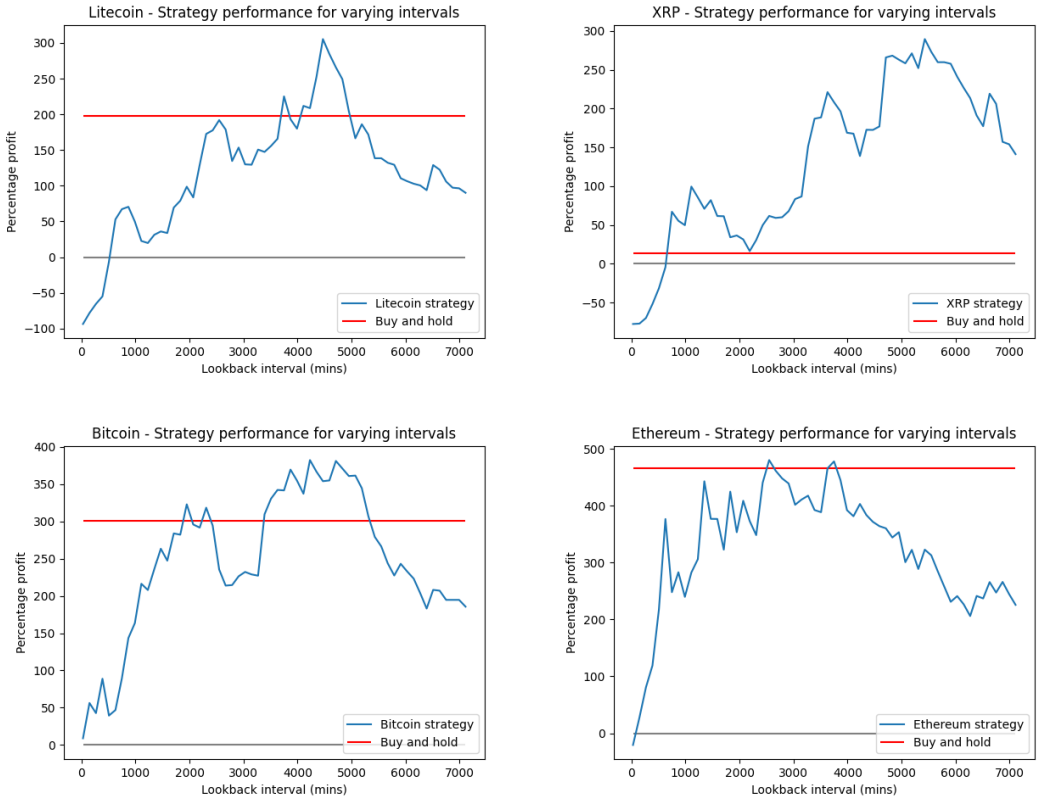


We implemented this trading algorithm on data from 01-01-2020 to 31-12-2020, where we traded our whole portfolio with each trade.

An interesting parameter to tune is the window size which is used to determine the support and the resistance. The smaller the window, the quicker the model “forgets” about older data, which makes the model prone to trading more often. The larger the window, the more the model “remembers” older data, making the model trade less as dips or rises in the price aren’t as significant as previous movements.

If we look at the models performance for different coins for differing window sizes (from 30 minutes to 5 days), we arrive at the following plots:

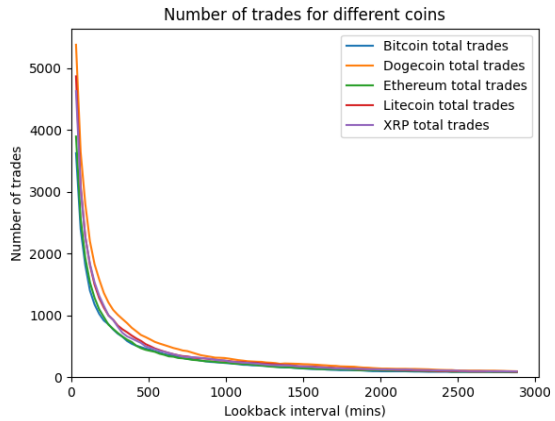
Figure 2: Algorithm performance on varying look back periods for different cryptocurrencies



From these plots (Figure 2), it is clear that for longer intervals (ie. above 16 hours) the strategy is profitable, with XRP outperforming the “buy and hold” strategy very significantly for larger windows. For the other coins though, the strategy underperforms the buy and hold strategy. The large profitability of the buy and hold strategy is due to the rise of popularity (and value) of cryptocurrencies during the year of 2020.

The effect that the window size has on the amount of trades made can be seen in the plot below (Figure 3), where increasing the window size sees an exponential dropoff in the number of trades executed. When implementing a real world trading strategy, it would be important to consider the number of trades and the associated fees from the coinbroker.

Figure 3: Relationship between lookback period and number of trades



It appears that across all coins, our strategy performs better than the Buy and Hold strategy with an interval of 4000 minutes (about 135 ticks). We are currently not certain if this arose simply due to chance. It could be that 135 ticks was a good balance between not losing money on short-term price swings, and also being able to capitalise on upwards price swings.

In relation to the Buy and Hold strategy, our strategy performed best in trading XRP. XRP was also the cryptocurrency with the least net profit from the Buy and Hold strategy, with a price that remained relatively stable throughout the trading period. This suggests our strategy works best with a lower volatility.

References:

1. Ellis CA, Parbery SA. Is smarter better? A comparison of adaptive, and simple moving average trading strategies. Research in International Business and Finance [Internet]. 2005 Sep [cited 2021 Sep 12];19(3):399–411. Available from: https://www.sciencedirect.com/science/article/abs/pii/S0275531905000310?casa_token=JLQpwQYPS58AAAAA:s4clRo3QncW-Wzu6FRgSCxp7WKlBn4OKr0M6g2KXBJ3r6yHmH18Ocix7oMYMoGP5FsPQFfkz2lgk