ML Technical Test - Forge Werks

Prior Context:

Technical Analysis is one of the approaches used to develop algorithmic trading strategies. A very simple example is the RSI indicator (Relative Strength Index). A momentum indicator used to gauge whether the market is overbought or oversold, helping identify trend strength and potential reversals.

Calculated in this way:

$$RSI = 100 - \frac{100}{1 - RS}$$

$$RS = \frac{Average\ Gains}{Average\ Losses}$$

n periods used to calculate the arithmetic average.

The finance industry has standard parameters used to calculate and trade these indicators. In this case, for RSI these are the parameters.

Parameters:

- **n = 14** The average will be calculated using the last 14 periods. (e.g. the last 14 days using daily data)
- **Overbought: RSI ≥ 70** Selling signal, price has likely been driven up excessively and could face a correction.
- **Oversold: RSI ≤ 30** Buying signal, price has been heavily sold and may rebound.

Trading Strategy:

Buying when the RSI crosses-up the oversold parameter and selling when the RSI crosses-down the overbought parameter.

Technical Test:

A group of intraday algorithmic traders have used a score maximization to select the best parameters trying to achieve a better performance than the strategy using standard parameters.

$$Score = 0.5\ x\ Sortino\ Ratio + 0.25\ x\ Win\ Rate + 0.25\ x\ Profit\ Rate$$

$$Sortino\ Ratio = Total\ Return\ /\ Standard\ Deviation\ of\ negative\ returns$$

$$Win\ Rate = Percentage\ of\ profitable\ trades\ out\ of\ total\ trades$$

$$Profit\ Factor = Gross\ Profits\ /\ Gross\ Losses$$

You will find a csv file with google's stock prices time-series data each 15 minutes for the last 30 days. Please develop a ML model to find the best parameters that maximize the mentioned score and explain your approach and results.

Bonus:

- How frequently should the ML model update the parameters? Take into account that the focus is intraday trading.
- How can the algorithmic traders group avoid overfitting as a result of the maximization process?
- How could you recommend the traders to validate the performance of the obtained parameters before trading in real life?