Moving Average Convergence Divergence Algorithm

1. Trading Strategy

Moving Average Convergence Divergence Algorithm (MACD) is a trend-following momentum indicator that shows the relationship between two moving averages of a stock's price. In my algorithm, the MACD is calculated by subtracting the 20-period Exponential Moving Average (EMA) from the 5-period EMA.

The result of that calculation is the MACD line. A five-day EMA of the MACD called the "signal line," is then plotted on top of the MACD line, which can function as a trigger for buy and sell signals. Traders may buy the security when the MACD crosses above its signal line and short the stock when the MACD crosses below the signal line.

Some technical indices are listed below

(1) Short term EMA, that is EMA5M, five-trading-day exponentially moving average, with EMA5M(t) = EMA5M(t-1) * 3/5 + current price * 2/5

(2) Long term EMA, that is EMA20M, twenty-trading-day exponentially moving average, with EMA20M(t) = EMA20M(t-1) * 18/20 + current price * 2/20

(3) DIF(t) = EMA5M(t) – EMA20M(t)

(4) DEA(t) = DIF(t) – DIF(t-1), with DIF(0) = 0

(5) MACD(t) = DIF(t) – DEA(t)

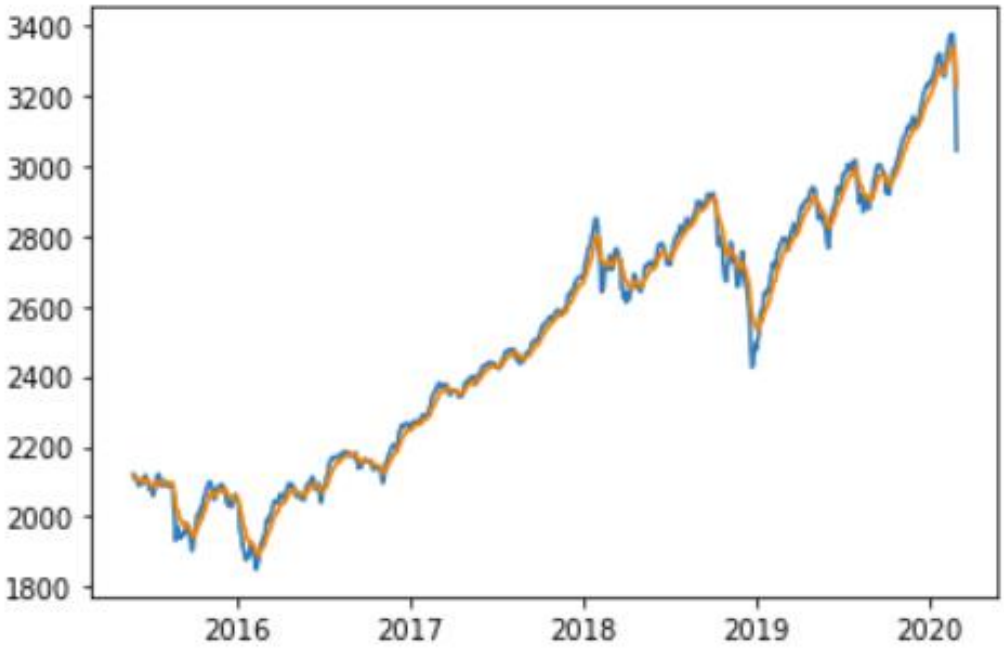
Trading Signals:

(1) MACD(t-1) < 0, MACD(t) > 0: buy

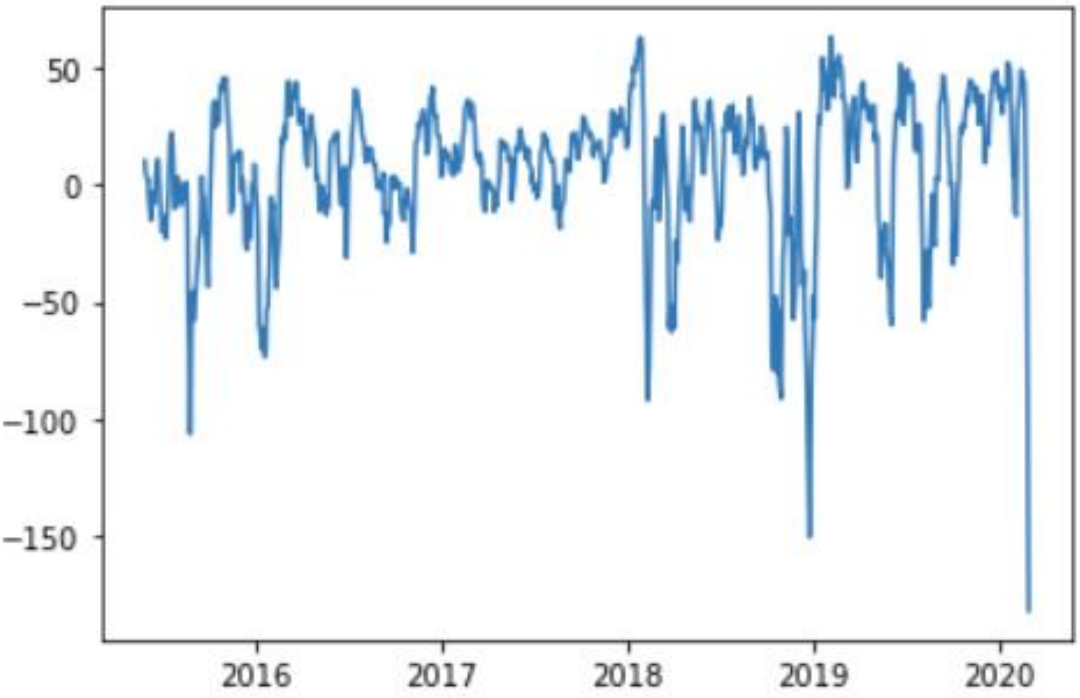
(2) MACD(t-1) > 0, MACD(t) < 0: sell

2. Prediction Result

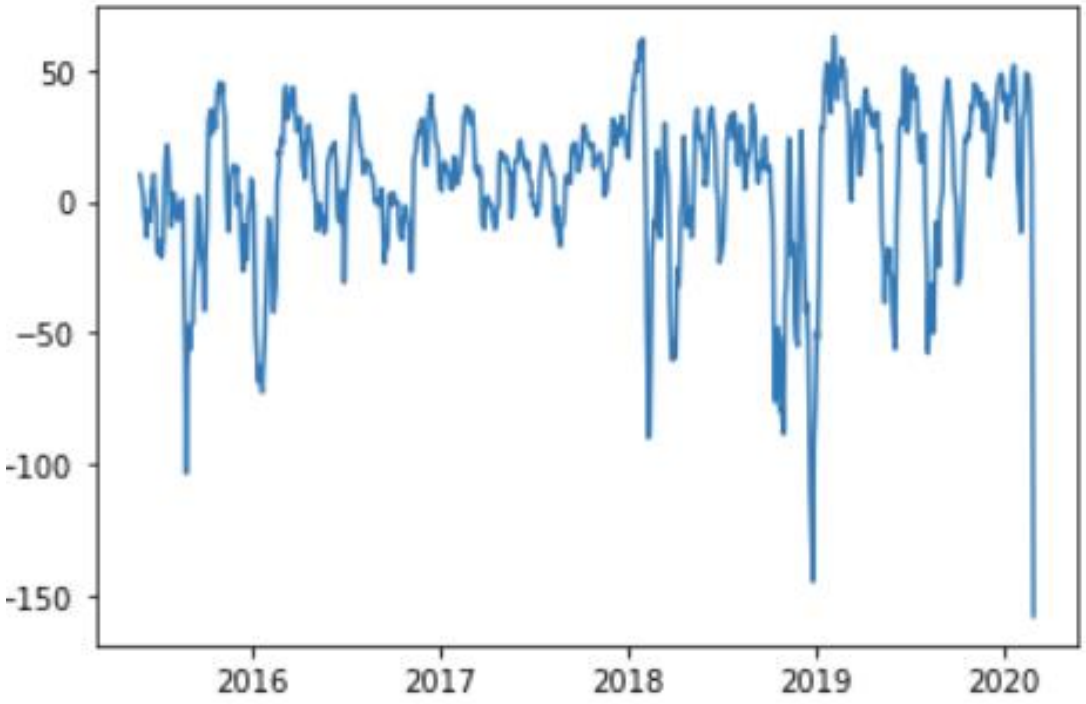
We use S&P 500 data to test our MACD strategy, with time ranges from 2015-04-30 to 2020-02-28. Here follows the result.



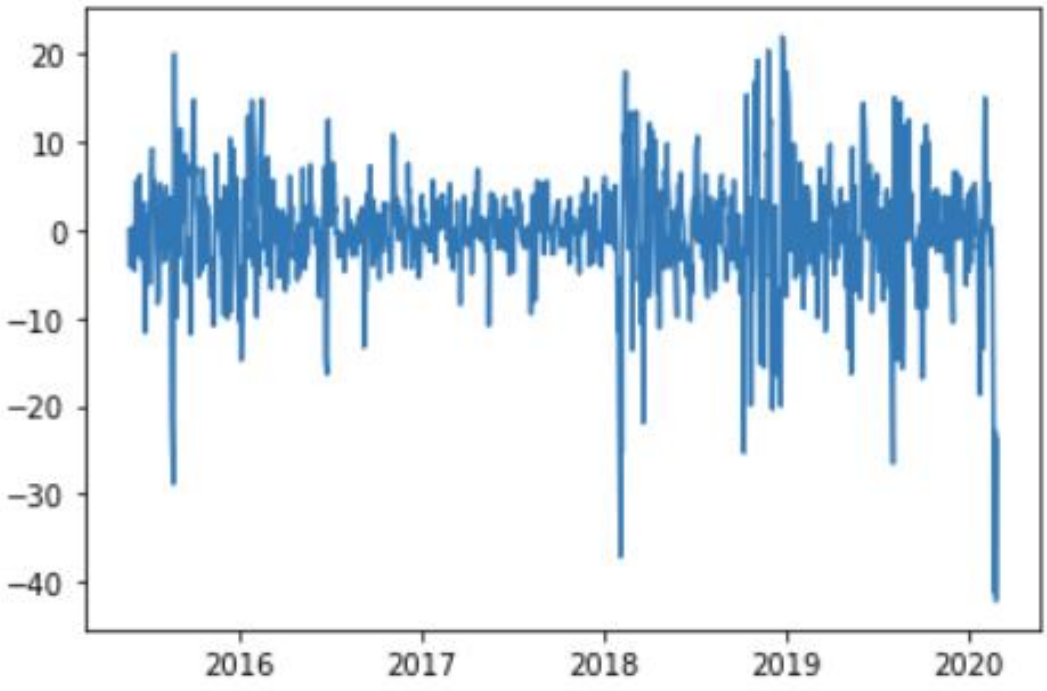
Picture1.EMA5 and EMA20



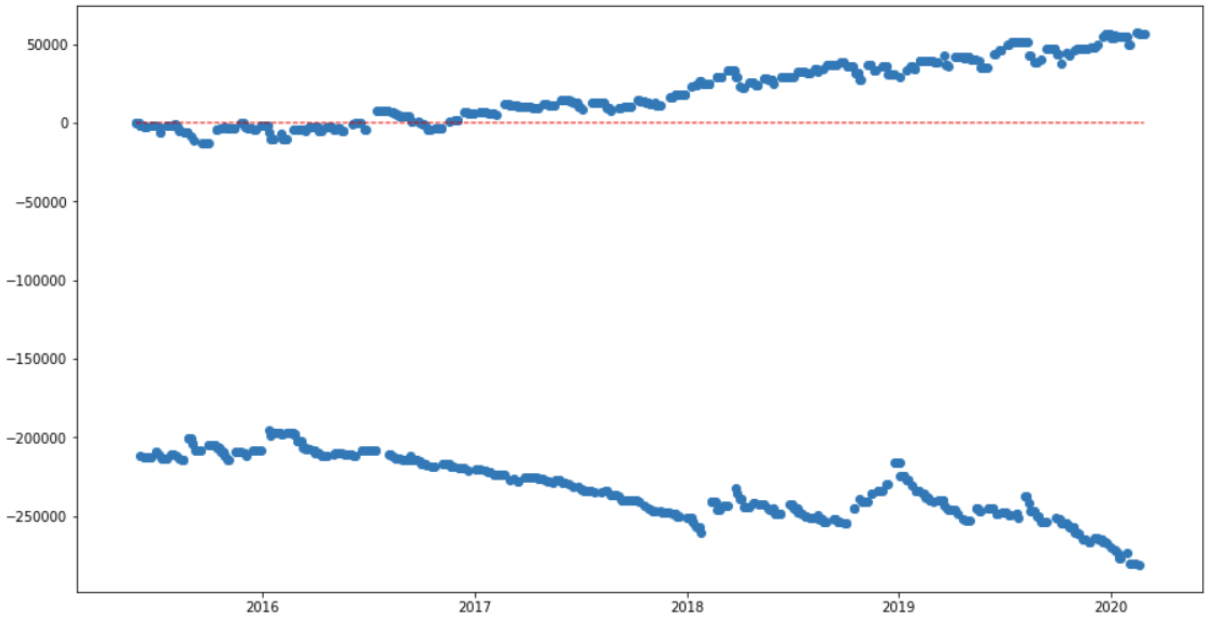
Picture2.DIF



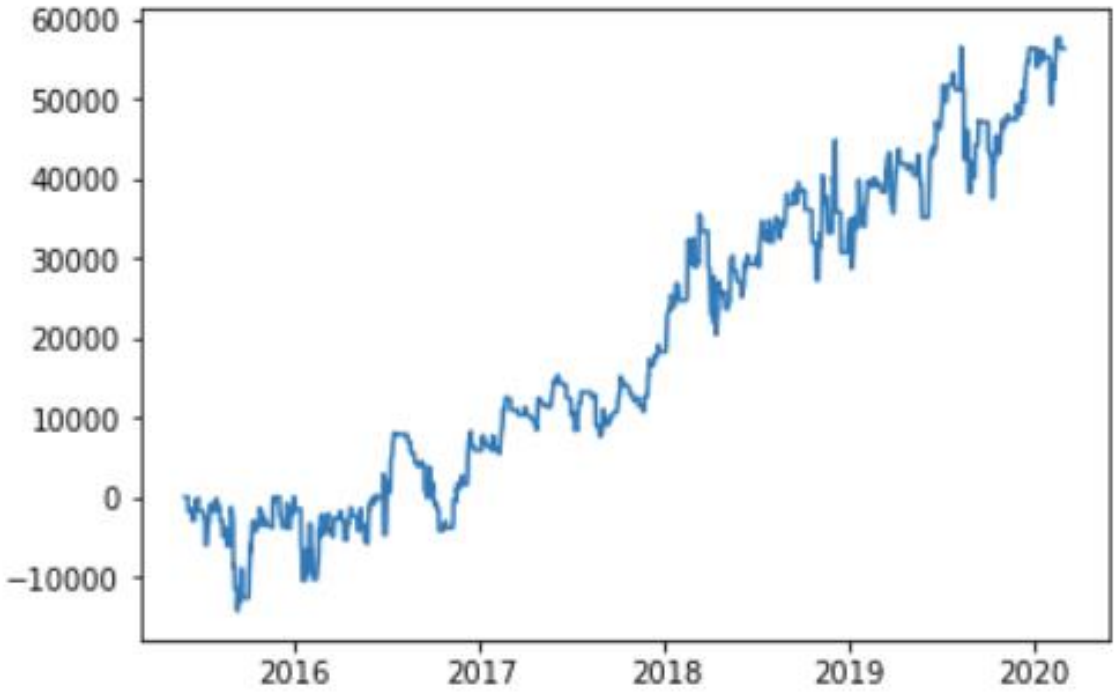
Picture3.DEA



Picture4.MACD



Picture5.PNL



Picture6.Profit_history

Conclusion, we can see that MACD has a good profit history in the long run, but may not perform well in a small period of time. As for the time range from 2020/1/1 to 2020/2/28, we can get that total profit is $2281.