

Technical Analysis

PROJECT 1

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COURSE

INTRODUCTION TO FINANCIAL ENGINEERING

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Introduction

Technical analysis serves as a crucial tool for traders and investors, offering a systematic approach to understanding market trends and predicting price movements. By examining historical data, we aim to make informed decisions regarding the chosen asset's future performance.

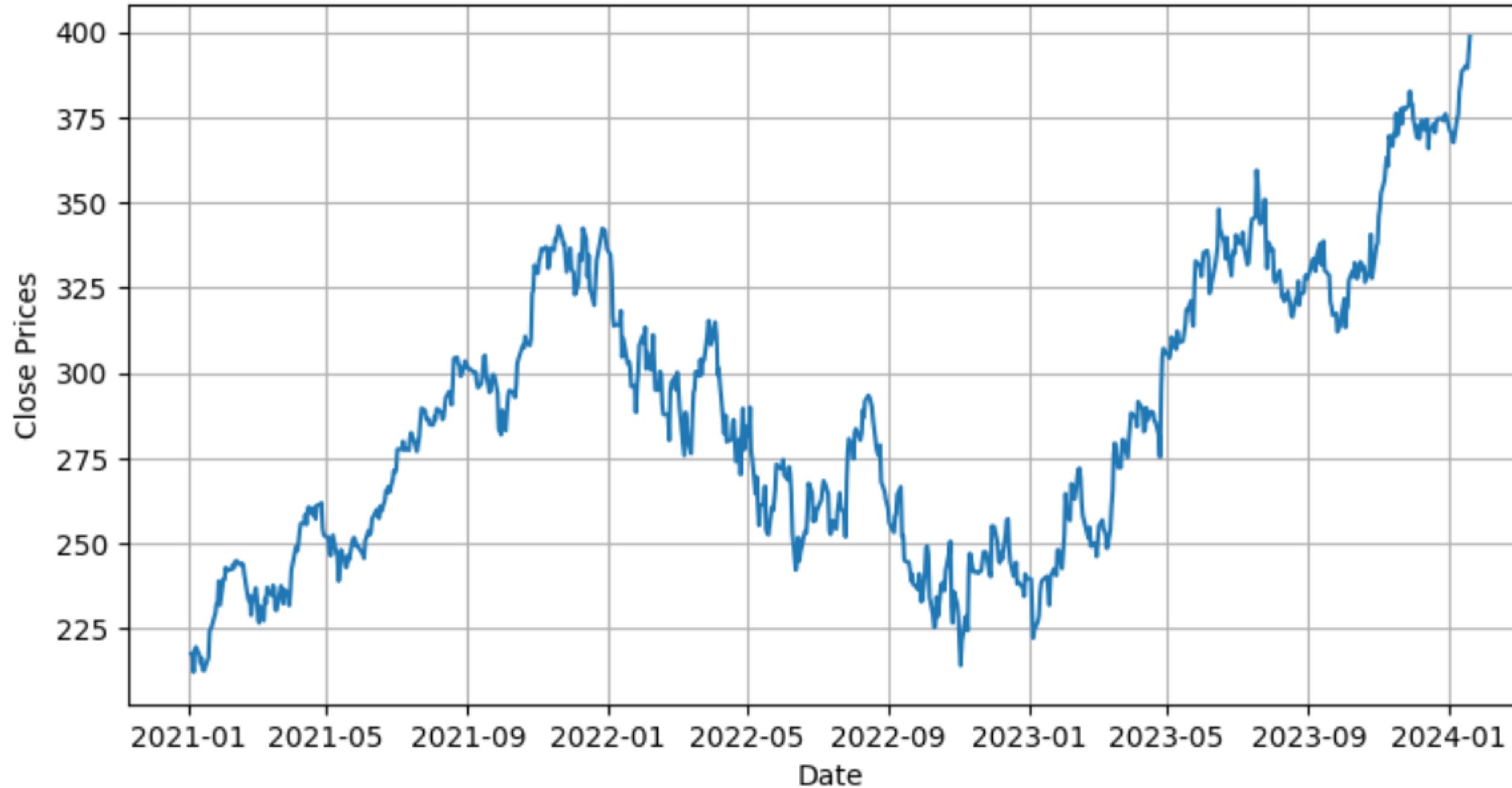
CHOSEN ASSET

- ITC Limited is a global leader in various business segments, including fast-moving consumer goods (FMCG), agribusiness, and hospitality. Traded under the ticker symbol ITC.NS, ITC Limited's stock plays a pivotal role in the financial markets.

DATASET OVERVIEW

- Time Period: January 1, 2018, to January 22, 2024
- Source: Yahoo Finance
- Data Frequency: Daily Closing Prices

ITC closing price



The graph provides a visual representation of the daily closing prices of ITC stock over the selected time period (January 1, 2021, to January 22, 2024).

Technical Indicators

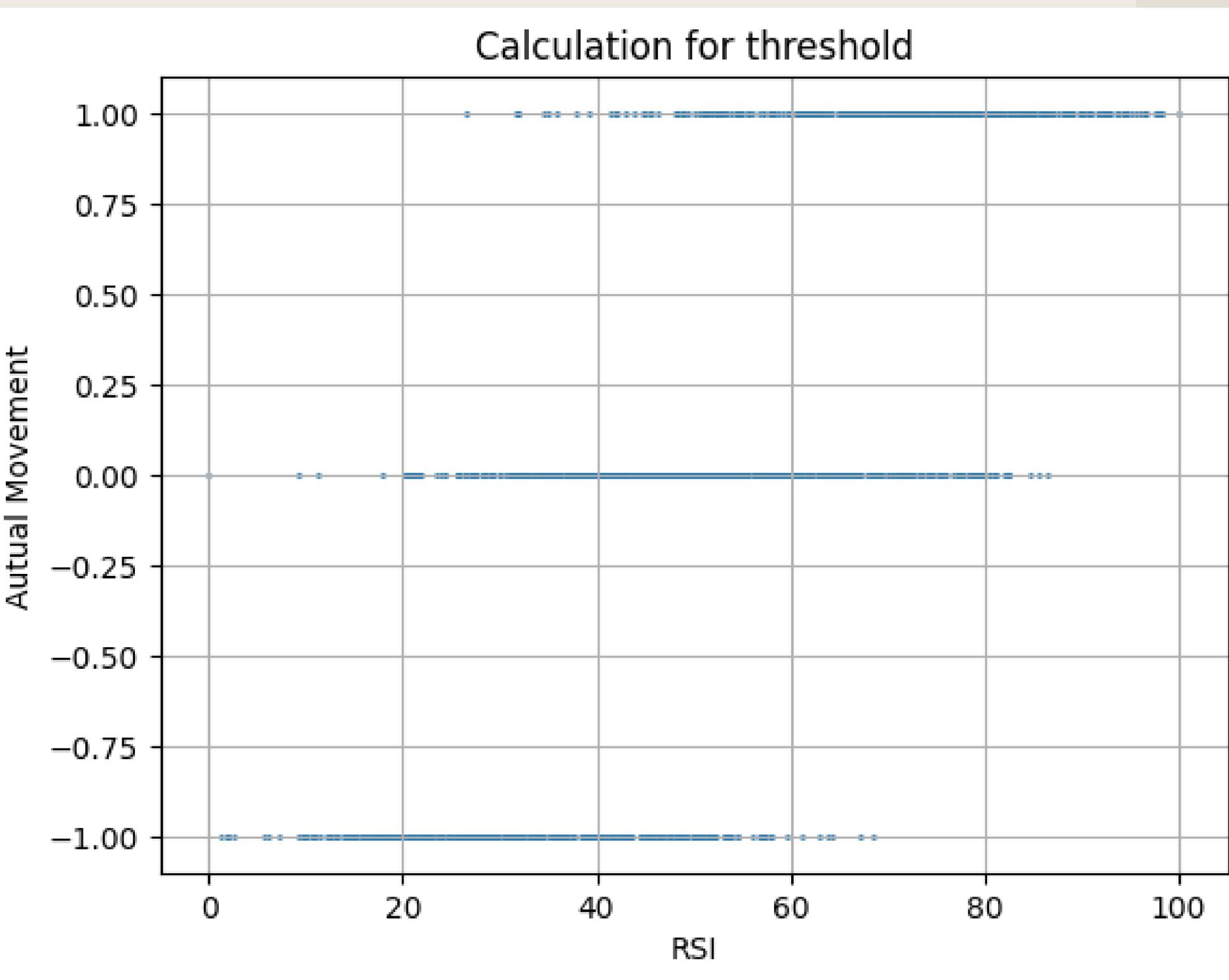
MOVING AVERAGES (MAV)

Definition: Moving Averages (MAV) are a widely used technical analysis tool that helps smooth out price data to identify trends over a specified period.

In this code, a 5-day simple moving average (SMA) is calculated for the closing prices. Bullish and bearish trading days are identified based on the relationship between short-term and long-term moving averages.

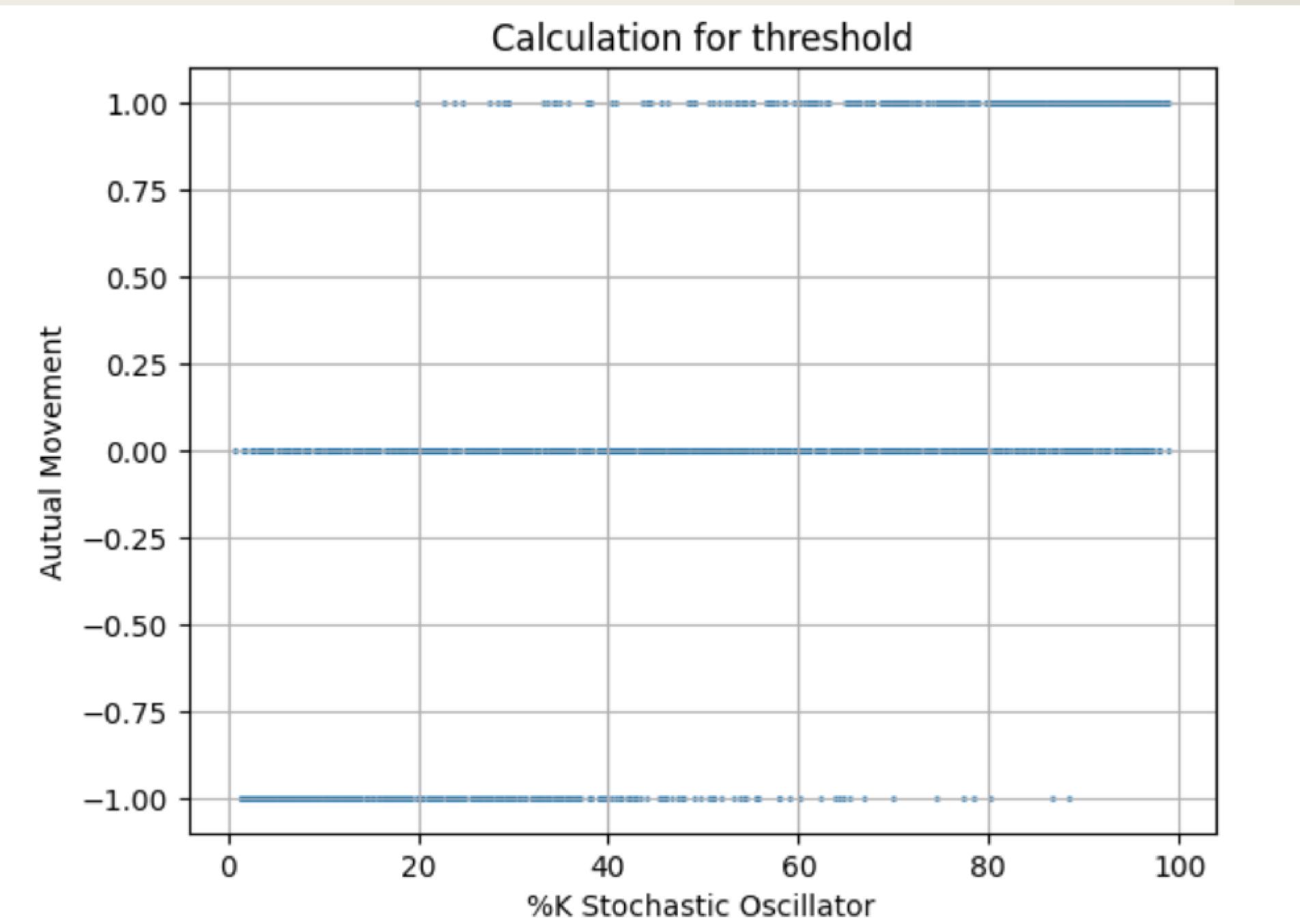
RELATIVE STRENGTH INDEX (RSI)

- Definition: RSI is a momentum oscillator that measures the speed and change of price movements. It is expressed as a numerical value between 0 and 100

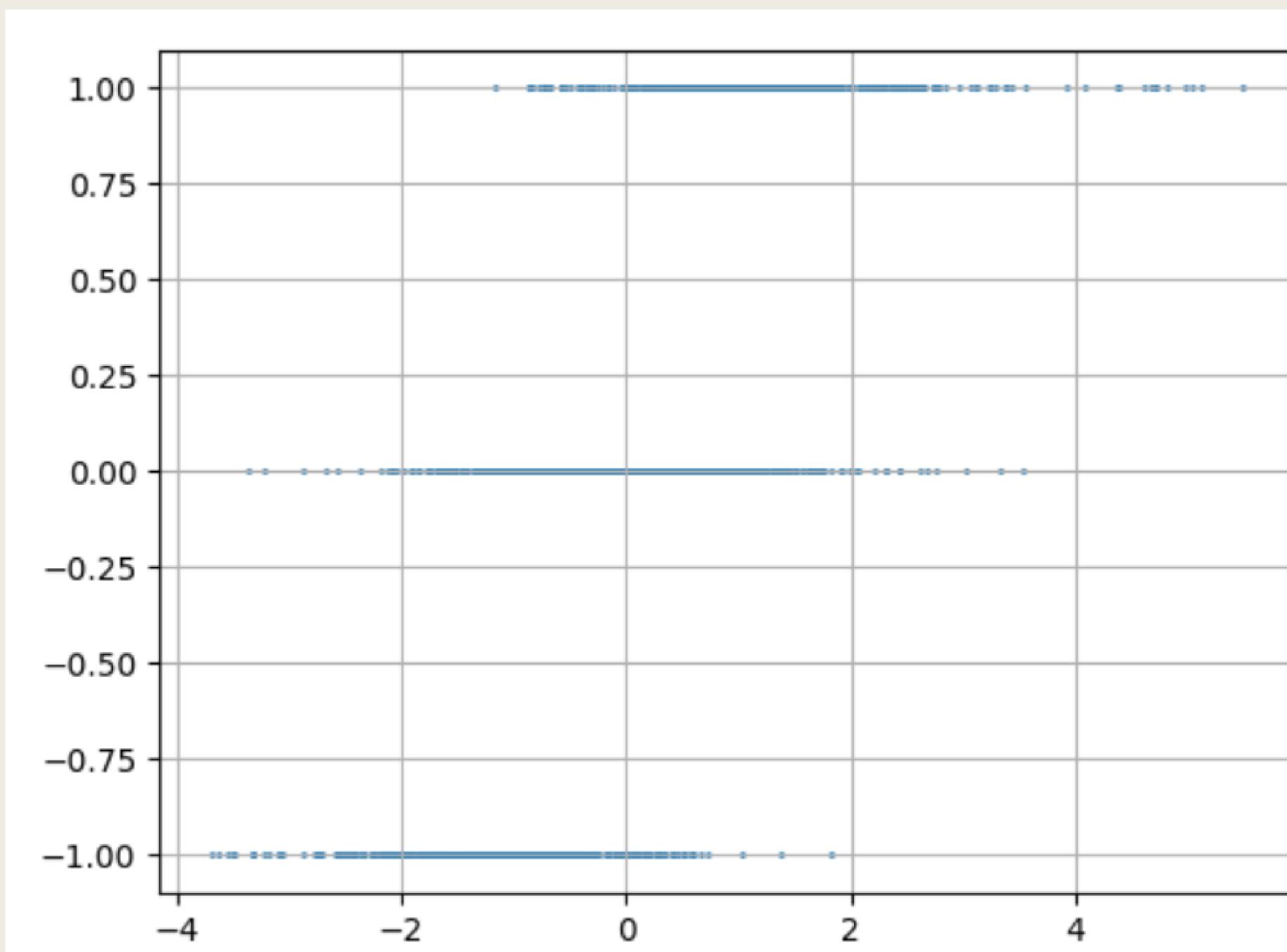


STOCHASTIC OSCILLATOR:

- Definition: The Stochastic Oscillator measures the location of a current price relative to its range over a certain period, providing a gauge of the momentum of a price.

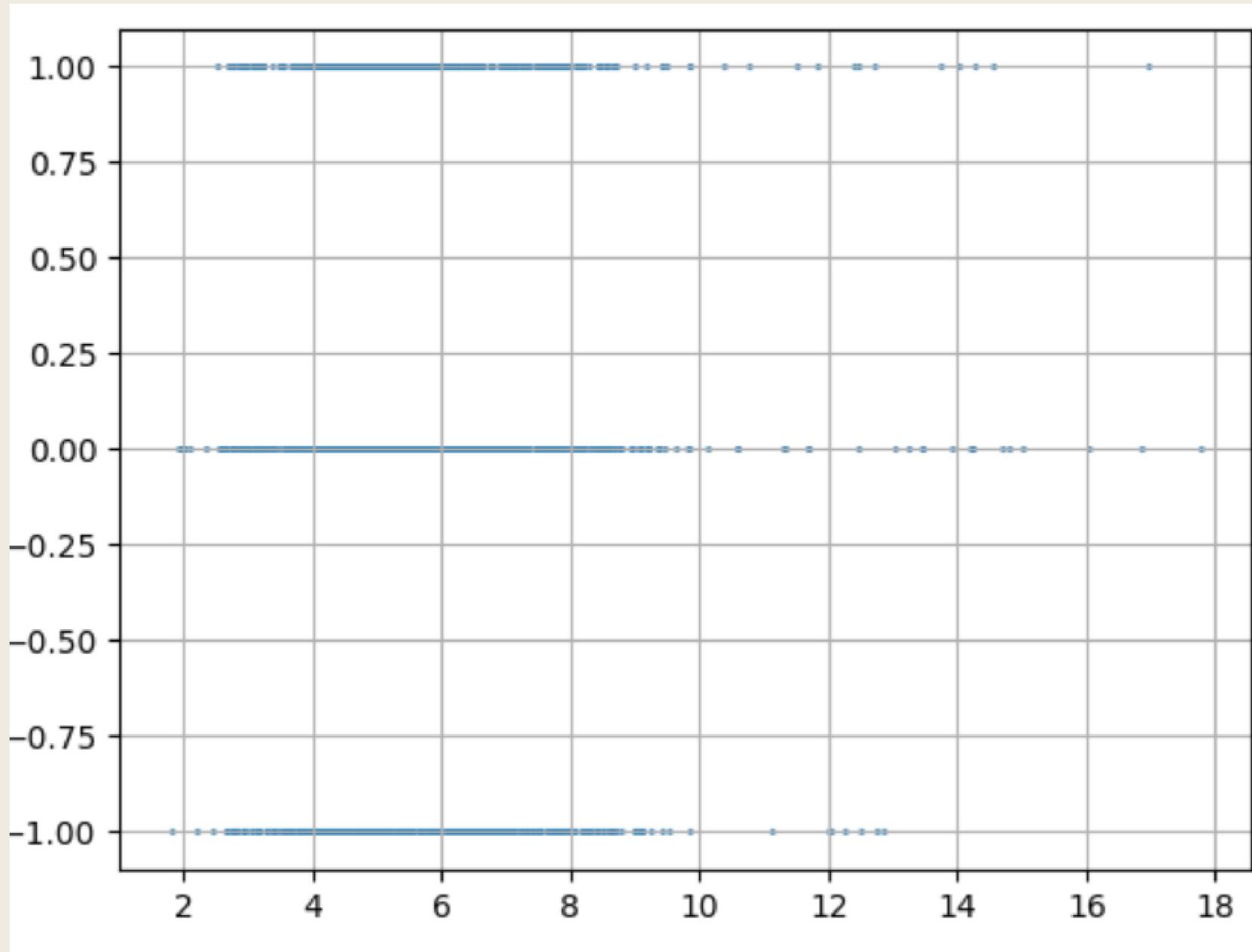


MOVING AVERAGE CONVERGENCE DIVERGENCE (MACD):



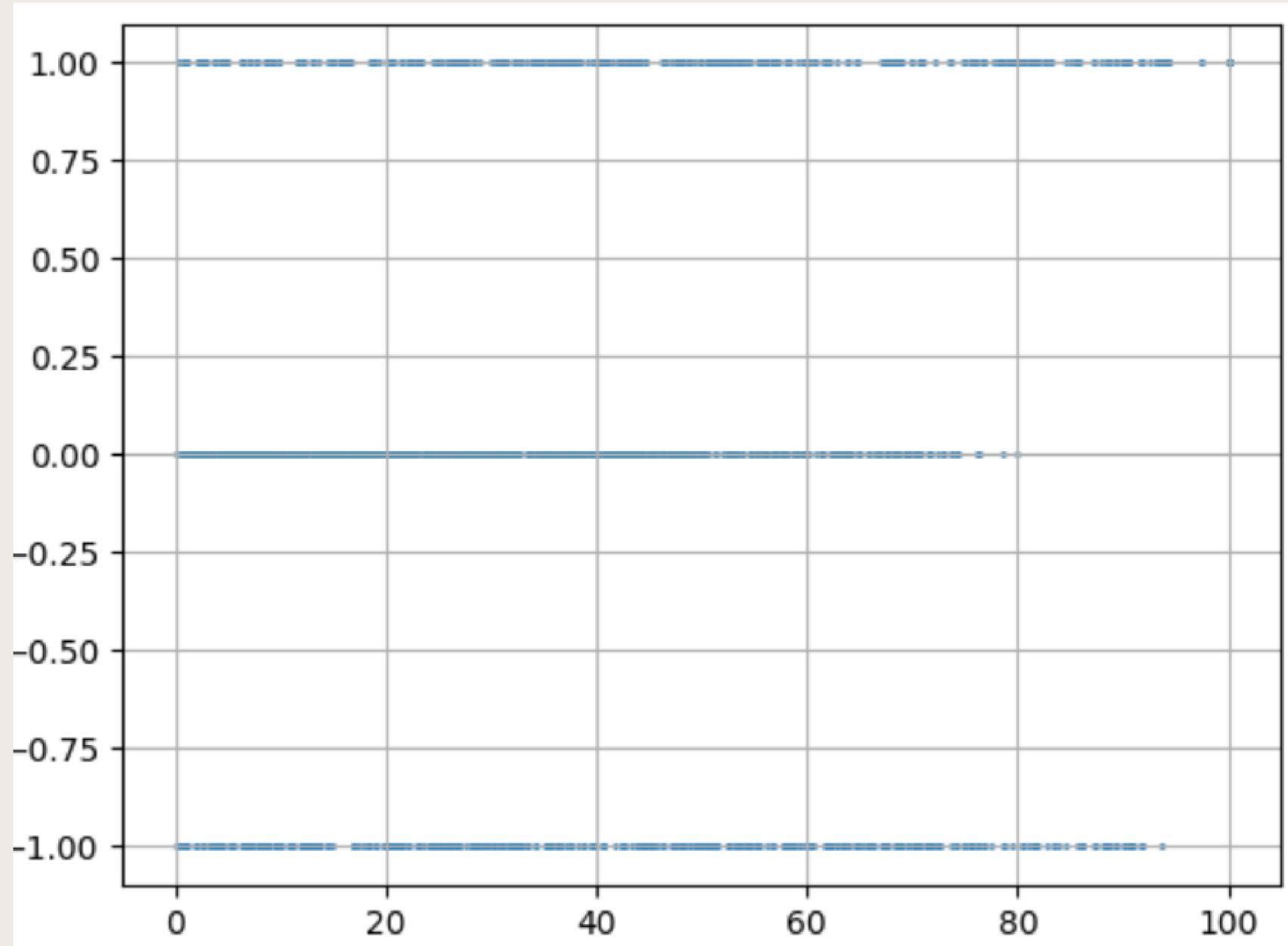
- Definition: MACD is a trend-following momentum indicator that shows the relationship between two moving averages of an asset's price.

AVERAGE TRUE RANGE (ATR)



- Definition: The Average True Range (ATR) is a technical indicator that measures market volatility. It calculates the average range between the high and low prices, taking into account gaps in price movements. A higher ATR value indicates higher volatility, while a lower value suggests lower volatility.

AVERAGE DIRECTIONAL INDEX (ADX)



Definition: The Average Directional Index (ADX) is a technical indicator that quantifies the strength of a trend. It is part of the Directional Movement System and is used to determine whether a market is trending or in a ranging phase. ADX values above 25 typically indicate a strong trend, while values below 20 suggest a weak trend or a ranging market.

Correlation Analysis

CORRELATION MATRIX

The correlation matrix provides a numeric representation of how each pair of indicators is correlated with the closing price. Values range from -1 to 1, with positive values indicating a positive relationship, negative values indicating a negative relationship, and values close to 0 implying a weak or no linear relationship.

WEIGHTS ASSIGNED BASED ON CORRELATIONS:

Weights were assigned to each indicator based on the absolute values of their correlations with the closing price. But this strategy is not a good one as it is not explaining the high correlation with the indicators which are not performing well.

So we assigned weights intuitively to the indicators based on their mutual correlations.

Combined Indicator

The combined indicator is formed by taking a weighted average of selected technical indicators. The formula is as follows:

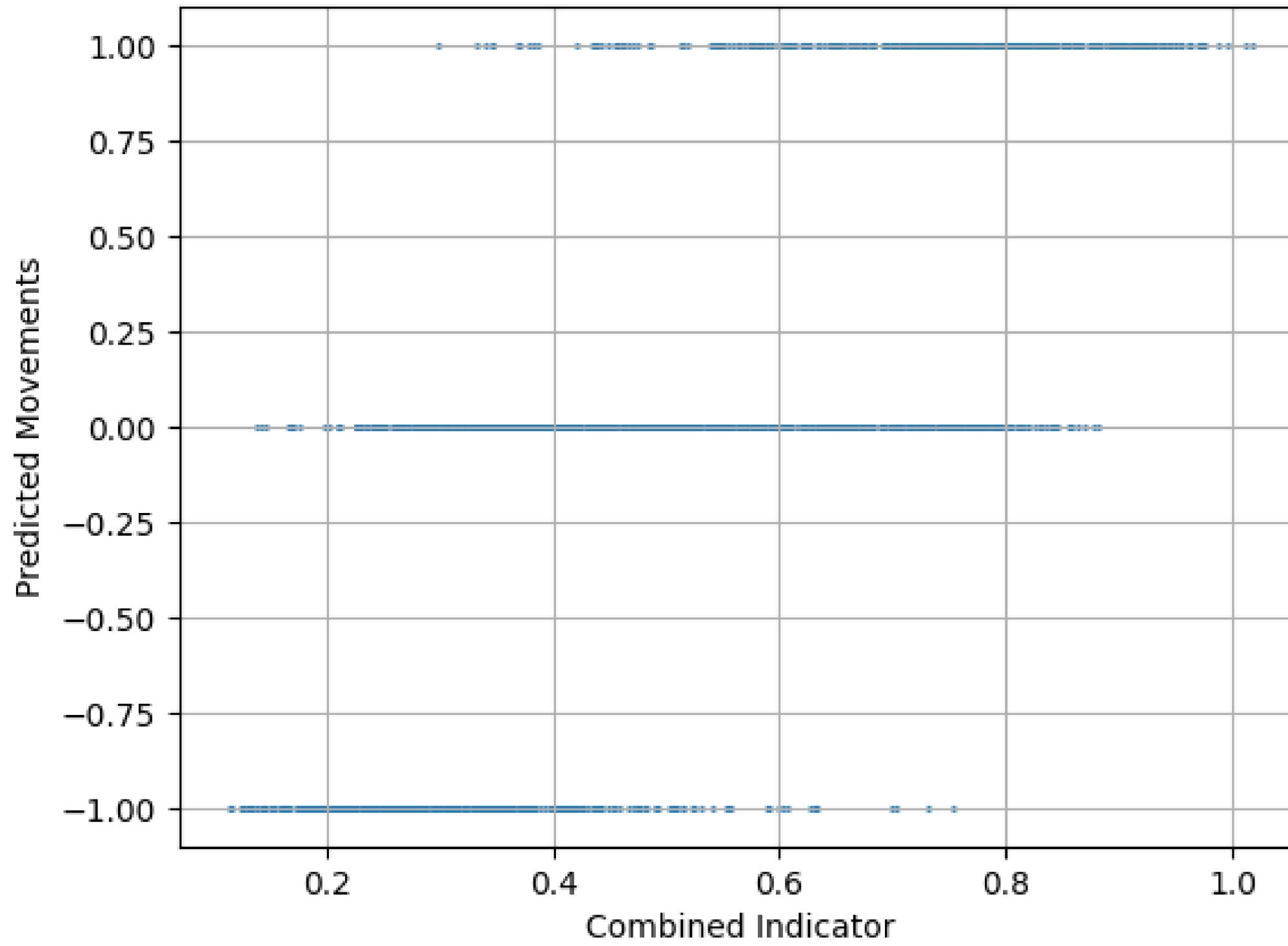
$$\text{Combined Indicator} = \sum_i \text{Weight}_i \times \text{Indicator}_i$$

Where:

- If there is a high correlation between two indicators then it is not good to give both of them high weightage as they capture the same information.
- And before checking for correlation we have to use MinMaxScaler so that they all have a range between 0 and 1.

Threshold

Threshold value for Combined Indicator

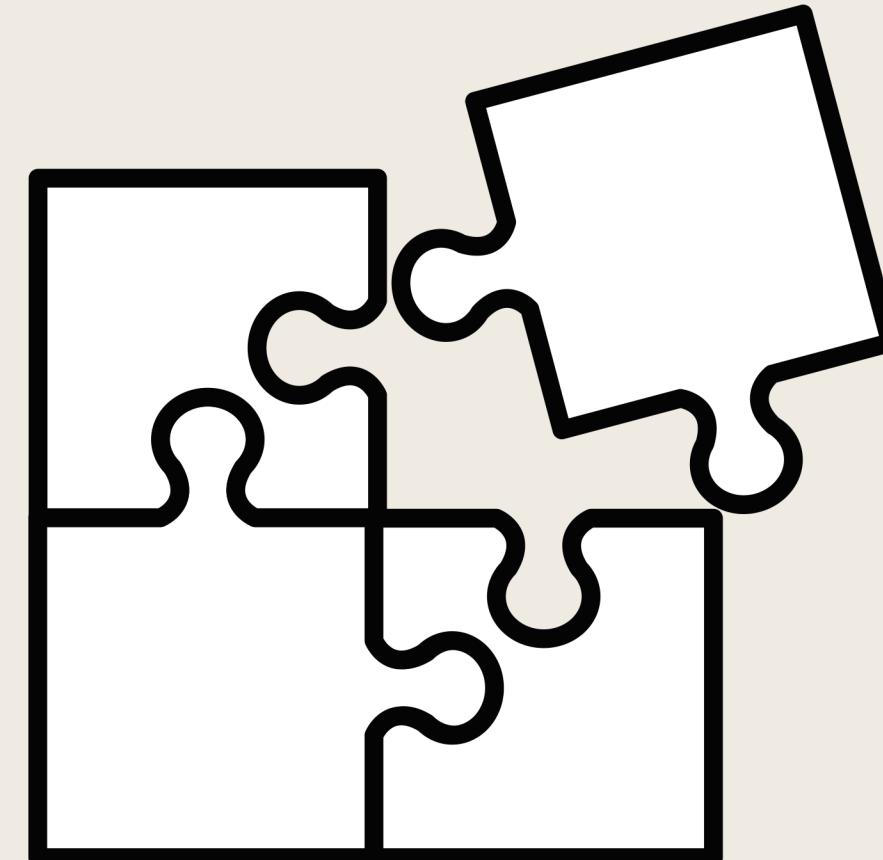


Accuracy Matrix Evaluation

- Overall Accuracy: percentage of correct predictions.
- Buy Opportunities:
 - Ratio for Considered Opportunities: Percentage of days predicted to buy and actually bought.
 - Ratio for Successful Bullish Predictions: Percentage of days predicted to buy and actually bought, out of the total days predicted to buy.
- Sell Opportunities:
 - Ratio for Considered Opportunities: Percentage of days predicted to sell and actually sold.
 - Ratio for Successful Bearish Predictions: Percentage of days predicted to sell and actually sold, out of the total days predicted to sell.
- Type 1 Loss: Type 1 Loss: Percentage of days predicted to sell but actually bought, out of the total days with predictions.

Considerations and Limitations:

Acknowledging the inherent limitations of our analysis is imperative. External factors, such as market volatility and unforeseen events, exert significant influence on the accuracy of predictions. Furthermore, the effectiveness of technical indicators may fluctuate across different market conditions. The financial landscape is dynamic, and these considerations are vital in interpreting results with caution and making well-informed decisions based on the available data and analysis.



Thank You