

Trend Analysis by Using Simple Moving Average

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Abstract: In technical analysis, traders use various indicators to help make buy and sell decisions. One such indicator is the moving average, which helps smooth out daily price movements to help establish a trend in price by creating a constantly updated average price.

By calculating the moving average, the impacts of random, short-term fluctuations on the price of a stock over a specified time frame are mitigated. Simple moving averages use a simple arithmetic average of prices over some timespan, which exponential moving averages place greater weight on more recent prices than older ones over the time period.

Moving average are calculated to identify the trend direction of a stock or to determine its support and resistance levels. It is a trend-following or lagging indicator because it is based on past prices.

Key Takeaways

- A moving average is a stock indicator commonly used in technical analysis.
- The moving average helps to level the price data over a specified period by creating a constantly updated average price.
- A simple moving average (SMA) is a calculation that takes the arithmetic mean of a given set of prices over a specific number of days in the past.

I. Introduction

Investors and market analysts can use a moving average as a technical indicator to ascertain a trend's direction. To get an average, it adds up all of the data points about a financial security over a given time period and divides the total by the number of data points. It is constantly updated using the most recent price data, which is why it is referred to as a "moving" average. By analyzing the price movements of an asset, analysts can utilize the moving average to look at support and resistance. A moving average shows how a security's price has moved in the past.

The data is then used by analysts or investors to ascertain the possible course of the asset price. Because it follows the underlying asset's price action to generate a signal or indicate the direction of a certain trend, it is referred to as a lagging indicator. A key technique in technical analysis, moving averages are used to smooth out price data and spot market trends. Traders use them to produce buy or sell signals and identify possible support and resistance levels. They are computed by average prices over a given time period. Simple moving averages (SMA) and exponential moving averages (EMA) are two examples of moving average types that have various properties and applications. With good reason, moving averages are very popular among market technicians. Moving averages help identify the underlying trends by smoothing out price activity. The relationship between a price and an average, or between two or more averages, can provide accurate trend signals. To determine an average, it adds together all of the financial security data points during a given time period and divides the total by the number of data points. It is constantly updated using the most recent price data, which is why it is referred to as a "moving" average.

Although it tends to lag behind the price activity, the moving average is created by averaging the closing prices of multiple days. The average is more sensitive to price fluctuations and closely follows the price action the shorter it is (i.e., the fewer days utilized in its computation). A lengthier average (one that takes into account more days) follows the price action more distantly and is less sensitive to shifts in the trend. The moving average is particularly well suited for historical testing and is simple to quantify.

One of the most widely utilized technical indicators in trading is the moving average. There are numerous varieties, each with unique traits and environments. We'll go over their operation and application in trading systems in this post. Additionally, we will provide you with some pointers on how to build a highly promising system that is specifically focused on moving averages.

What are Moving Averages

Moving averages are indicators used in technical analysis that show the typical price trend of a financial instrument over a specified "moving" period of time. In contrast to the classical average, the moving average progressively substitutes the most recent recorded value for the most distant one. This allows one to explain the market trend while obtaining an average value that pertains to a specific number of observations, such 50, 100, or 200.

How to calculate a Moving Average

A moving average is often computed by dividing the reference period "n" by the "moving" price value of a financial asset relative to a predetermined number of recorded values. In order to compute a 50-day moving average, for instance, we would have to take into account the asset's price values for the previous 50 days, subtracting the most distant value each day and adding the most recent

value. Although opening prices, lows, or highs can also be considered if desired, a moving average is typically measured using the closing price of a stock market session.

Determining the reference time frame is also quite flexible; the moving average can be computed on an hourly, daily, weekly, monthly, etc. basis. The horizon of our analysis determines this. The hourly or daily time frame is typically used by those that employ short-term techniques. On the other hand, the monthly or weekly time range is typically used by individuals looking for a more comprehensive examination. A market should find new support at its 200-day average if it is undergoing a typical bull market downturn. [Traders will use a 20-day average to identify short-term trend changes for short-term trading reasons].

The term "stock market" refers to the group of marketplaces and exchanges where regular transactions involving the purchase, sale, and issue of shares of publicly traded corporations occur. In general, a stock—also referred to as shares—represents a company's ownership rights. The "buy low, sell high" strategy is one in which the trader purchases the stock at a discount and then sells it at a premium in order to make a profit. Sadly, it is difficult to tell if a stock price is low enough or high enough, which makes it difficult to apply this method consistently. As a result, traders take into account additional variables such as consumer sentiment, the business cycle, and moving averages.

By generating a continuously updated average price, the moving average is a straightforward technical indicator that smooths the price data. When two moving averages cross over one another, trading signals are produced. The moving average is used to spot trends. A trading strategy is a set plan intended to generate a profit by following or shorting the market. When the short-term moving average crosses over the long-term moving average, traders employ the moving average crossover as a trading method; when it crosses under, they sell the stock.

The moving average, also known as a lagging indicator, is a trend indicator that is determined from historical data. Only when a significant price change has occurred can a lagging indicator provide a trading alert. Lag is the amount of time that passes between the actual trend reversal and the trading signal's issuance. Lag is a drawback of moving averages, which lowers the possible profit that a trader may make because the signal is issued when a significant price change occurs. This research suggests using a machine learning technique to address the drawbacks of the moving average strategy.

Regression analysis reduces the lag and predicts the point of trend reversal by anticipating the moving average crossover in advance.

How to Set the Period in Moving Averages

The number of candlesticks over which the moving average is calculated is expressed by the period. For instance, the data from the previous 20 candlesticks is included for the 20-period moving average. Three primary time periods can be used to set a moving average: A short period typically consists of five, ten, or twenty periods. The medium-term spans between 50 and 80 periods, whereas the long term spans between 100 and 300 times. Operational cues and entry/exit indications are frequently provided by crossing moving averages of various periods.

Why Use Moving Average in Systematic Trading?

Moving averages are employed as trend indicators to examine a financial instrument's performance and as trading signals to spot buying or selling opportunities.

A support or resistance function can also be utilized with a moving average. As with price lines, one can choose a moving average and trade on its breakout or, in the case of trend-following methods, on its hold.

Using Moving Average as Signals

Long or short entry signals can be obtained by using moving averages. There are two methods for doing this: Crossing the price and moving average crossing a minimum of two moving averages. In the first scenario, there may be a long entry signal if the price line crosses higher with the moving average inside the specified time range. However, there is a brief entering signal in the opposite situation.

Of course, the signals can also change simply altering the temporal horizon. A "slow" moving average, like a 200-day moving average, is sometimes combined with a "faster" moving average, like a 50-day moving average. In this instance, a bullish signal (also known as the "golden cross") occurs when the fast-moving average crosses upward with the slower-moving average. On the other hand, the sign is bearish (sometimes known as the "death cross") if it crosses downward.

Use of Moving Average:

Daily, weekly, and monthly fluctuations occur in the values of securities, market indexes, and mutual funds. As a result, it frequently becomes challenging to determine which direction the prices are truly moving. Therefore, the data is smoothed using a moving average to make the trend easier to see. Prices are trending upward when the moving-average line is rising, and downward when it is falling. A market in a trending range that is unable to decide which direction it is headed is indicated by a flat line.

II. Literature Review

Moving averages are among the most widely used technical indicators in the field of financial market analysis. Numerous studies and literature sources have explored their role in identifying price trends, reducing market noise, and assisting in trading decisions.

Technical Analysis and Moving Averages

According to Murphy (1999) in his book “Technical Analysis of the Financial Markets”, moving averages are fundamental tools used to smooth out price data over time, thereby making it easier to spot trends and reversals. The author highlights that moving averages are lagging indicators, meaning they follow price movements rather than predict them.

Simple Moving Average (SMA)

The Simple Moving Average calculates the average of a stock’s price over a fixed number of days. As per Pring (2000), SMA are easy to compute and interpret but can be slow to react to rapid price changes. However, they are effective for identifying long-term trends when applied over longer periods like 50-day or 200-day averages.

Exponential Moving Average (EMA)

In contrast to the SMA, the Exponential Moving Average (EMA) places greater weight on recent prices, allowing it to respond more quickly to price changes. Research by Brock, Lakonishok, and LeBaron (1992) found that using EMAs could improve returns in technical trading strategies, especially during trending markets.

Applications in Stock Trading

Studies by Lo, Mamay sky, and Wang (2000) indicate that technical indicators, including moving averages, may contain predictive power under certain market conditions. When used with other indicators (like MACD or RSI), moving averages can serve as a reliable tool in confirming trend directions and generating buy/sell signals.

Limitations of Moving Averages

Despite their usefulness, moving averages are not immune to limitations. During sideways or range-bound markets, moving averages often produce false signals. This issue is discussed by Achelous (2001), who recommends combining moving averages with volume analysis or other momentum indicators to reduce errors.

III. Methodology

This project adopts a quantitative analytical approach to study the application moving averages in technical analysis. This methodology involves the following steps

Data Collection

Historical stock price data is collected over a specified period from reliable financial sources such as NSE/BSE websites, or other stock market databases. The data includes daily closing prices of selected stocks.

Calculation of Moving Averages

There are three types of moving averages such as,

- Simple Moving Average (SMA)
- Exponential Moving Average (EMA)
- Weighted Moving Average (WMA)

Moving average can be calculated in three ways, but I have chosen one method, that is Simple Moving Average (SMA). Let’s look in detail,

Simple Moving Average (SMA)

The simple moving average (SMA) is a basic technical indicator that is calculated by summing the recent data points in a given set and dividing the total by the number of time periods. Traders use the simple moving average indicator to generate signals on when to enter or exit a market. An simple moving average is backward-looking, as it relies on the past price data for a given period. It can be calculated for different types of prices, i.e., high, low, open, and close.

A simple moving average (SMA) is a technical indicator that calculates the average price of an asset over a specified number of periods. As a trend-following or lagging indicator, the simple moving average uses historical price data to identify market trends and provide insights into current market conditions.

One of the main functions of the Simple Moving Average (SMA) is to help traders identify trend directions. It indicates whether an asset is in an uptrend, downtrend, or moving sideways. In addition, the simple moving average helps determine dynamic support and resistance

levels. As prices rise or fall, the simple moving average adjusts accordingly, offering traders a clearer view of where the market is likely to encounter support or resistance. This is especially useful in volatile markets, where prices are subject to sudden swings.

The simple moving average is also effective in **smoothing out price volatility and market “noise,”** making it easier for traders to identify both entry and exit points in the market. By filtering out some of the short-term fluctuations in price, the simple moving average allows traders to focus on the broader trend, allowing them to make more informed trading decisions.

In financial markets, both analysts and investors use the **Simple Moving Average (SMA)** indicator to generate buy and sell signals for various securities. The simple moving average helps to identify support and resistance levels, providing insights on when to enter or exit a trade.

To generate the simple moving average, traders must calculate it by adding up prices over a specific period and dividing the total by the number of periods. The result is then plotted on a graph to buy and sell signals for various securities. It helps to identify support and resistance levels, providing insights on when to enter or exit a trade.

This type of average is widely used, mainly because it is simple and easy to calculate. However, one major drawback of the simple moving average is that in its basic mathematical form, it gives equal weight to all data points, which may not always reflect recent price changes accurately.

The formula for Simple moving Average is written as follows:

$$SMA_n = \frac{X_1 + X_2 + \dots + X_n}{n}$$

where:

- X_1, X_2, \dots, X_n : The most recent n data points (e.g., daily temperatures, stock prices, rainfall, etc.)
- n: The number of periods (e.g., days, weeks, months)
- SMA_n : The average value over those n periods

Some commonly used time periods for calculating the simple moving average (SMA) include **10, 20, 50, 100, and 200 days**. The selection of timeframe depends on an investor’s trading strategy and objectives.

- **Short-term traders** may use **10-day or 20-day SMAs** to identify quick changes in price trend
- **Swing traders** typically rely on **50-day or 100-day SMAs** to analyse medium-term trends
- **Long-term investors** prefer using **200-day SMAs** to identify primary market trends and directions.

Additionally, traders may use **dual or triple SMAs**, combining different timeframes (e.g., 50-day and 200-day SMAs) to observe crossover points. These crossovers can provide stronger trading signals and enhance trend analysis.

Let’s walk through an example of how to calculate the simple moving average

Consider the following historical prices of JIOFIN stock

DATE	OPEN	HIGH	LOW	PREV.CLOSE
04-Aug-2025	329.85	335.50	328.60	329.50
01-Aug-2025	329.95	332.70	326.00	329.25
31-Jul-2025	317.00	332.65	316.45	320.30
30-Jul-2025	323.00	324.00	319.70	321.10
29-Jul-2025	306.30	322.50	306.30	307.35
28-Jul-2025	311.25	315.85	306.50	311.25
25-Jul-2025	315.55	315.55	310.20	316.45
24-Jul-2025	315.00	319.40	313.45	314.45
23-Jul-2025	311.60	315.20	311.60	310.80
22-Jul-2025	318.00	318.45	309.85	317.25

Let’s calculate the 3 – day simple moving average (SMA) using the “Pre. Close” column:

Calculate 3-day SMA

Simple moving average formula to calculate 3-day SMA

$$SMA_3 = \frac{\text{Sum of last 3 closing prices}}{3}$$

Date	SMA-3 (of Prev. close)
04-Aug-2025	$\frac{(329.50 + 329.25 + 320.30)}{3} = 326.35$
01-Aug-2025	$\frac{(329.25 + 320.30 + 321.10)}{3} = 323.55$
31-Jul-2025	$\frac{(320.30 + 321.10 + 307.35)}{3} = 316.25$
30-Jul-2025	$\frac{(321.10 + 307.35 + 311.25)}{3} = 313.23$
29-Jul-2025	$\frac{(307.35 + 311.25 + 316.45)}{3} = 311.68$
28-Jul-2025	$\frac{(311.25 + 316.45 + 314.45)}{3} = 314.05$
25-Jul-2025	$\frac{(316.45 + 314.45 + 310.80)}{3} = 313.90$
24-Jul-2025	$\frac{(314.45 + 310.80 + 317.25)}{3} = 314.17$

Final Answer: 3-day SMA Table

Date	Prev. Close	3-Day SMA
04-Aug-2025	329.50	326.35
01-Aug-2025	329.25	323.55
31-Jul-2025	320.30	316.25
30-Jul-2025	321.10	313.23
29-Jul-2025	307.35	311.68
28-Jul-2025	311.25	314.05
25-Jul-2025	316.45	313.90
24-Jul-2025	314.45	314.17

Calculate 5-day Simple Moving Average (SMA)

$$SMA_5 = \frac{\text{Sum of 5 Prev. Close values}}{5}$$

Date	5-day SMA (Prev. Close) Calculation	5-day SMA
04-Aug-2025	$\frac{(329.50 + 329.25 + 320.30 + 321.10 + 307.35)}{5}$	321.10
01-Aug-2025	$\frac{(329.25 + 320.30 + 321.10 + 307.35 + 311.25)}{5}$	317.85
31-Jul-2025	$\frac{(320.30 + 321.10 + 307.35 + 311.25 + 316.45)}{5}$	315.29
30-Jul-2025	$\frac{(321.10 + 307.35 + 311.25 + 316.45 + 314.45)}{5}$	314.92

29-Jul-2025	$\frac{(307.35 + 311.25 + 316.45 + 314.45 + 310.80)}{5}$	312.86
28-Jul-2025	$\frac{(311.25 + 316.45 + 314.45 + 310.80 + 317.25)}{5}$	314.84

Calculate 7-day Simple Moving Average (SMA)

$$SMA_7 = \frac{\text{Sum of last 7 Prev. Close values}}{7}$$

Date	7-day SMA (Prev. Close) Calculation	7-SMA
04-Aug-2025	$\frac{(329.50 + 329.25 + 320.30 + 321.10 + 307.35 + 311.25 + 316.45)}{7}$	319.60
01-Aug-2025	$\frac{329.25 + 320.30 + 321.10 + 307.35 + 311.25 + 316.45 + 314.45}{7}$	317.45
31-Jul-2025	$\frac{(320.30 + 321.10 + 307.35 + 311.25 + 316.45 + 314.45 + 310.80)}{7}$	314.24
30-Jul-2025	$\frac{(321.10 + 307.35 + 311.25 + 316.45 + 314.45 + 310.80 + 317.25)}{7}$	314.66

Here the final result showing the calculated 3-day, 5-day, and 7-day Simple Moving Average (SMA) for the given stock prices:

Date	Prev. Close	3-day SMA	5-day SMA	7-day SMA
04-Aug-2025	329.50	326.35	321.10	319.60
01-Aug-2025	329.25	323.55	317.85	317.45
31-Jul-2025	320.30	316.25	315.29	314.24
30-Jul-2025	321.10	313.23	314.92	314.66
29-Jul-2025	307.35	311.68	314.92	-
28-Jul-2025	311.25	314.05	314.84	-
25-Jul-2025	316.45	313.90	-	-
24-Jul-2025	314.45	314.17	-	-

Visualization

The Simple Moving Average is plotted along with the actual stock price on a graph to visualize trends. This graph help illustrate how moving averages smooth out price fluctuations and highlight trend directions.

```
import matplotlib.pyplot as plt
import pandas as pd
# Data from your image
dates = ["22-Jul", "23-Jul", "24-Jul", "25-Jul", "28-Jul", "29-Jul", "30-Jul", "31-Jul", "01-Aug", "04-Aug"]
closing_prices = [317.25, 311.60, 313.45, 310.20, 306.50, 306.30, 319.70, 316.45, 326.00, 328.60]
# Create DataFrame
df = pd.DataFrame({ 'Date': dates, 'Closing Price': closing_prices })
# Calculate SMAs
df['3-Day SMA'] = df['Closing Price'].rolling(window=3).mean()
df['5-Day SMA'] = df['Closing Price'].rolling(window=5).mean()
```

```
df['7-Day SMA'] = df['Closing Price'].rolling(window=7).mean()
```

```
# Plotting
```

```
plt.figure(figsize=(12, 6))
```

```
plt.plot(df['Date'], df['Closing Price'], marker='o', label='Closing Price', color='blue')
```

```
plt.plot(df['Date'], df['3-Day SMA'], label='3-Day SMA', linestyle='--', color='green')
```

```
plt.plot(df['Date'], df['5-Day SMA'], label='5-Day SMA', linestyle='--', color='orange')
```

```
plt.plot(df['Date'], df['7-Day SMA'], label='7-Day SMA', linestyle='--', color='red')
```

```
plt.title('JIOFIN Closing Prices & Moving Averages')
```

```
plt.xlabel('Date')
```

```
plt.ylabel('Price')
```

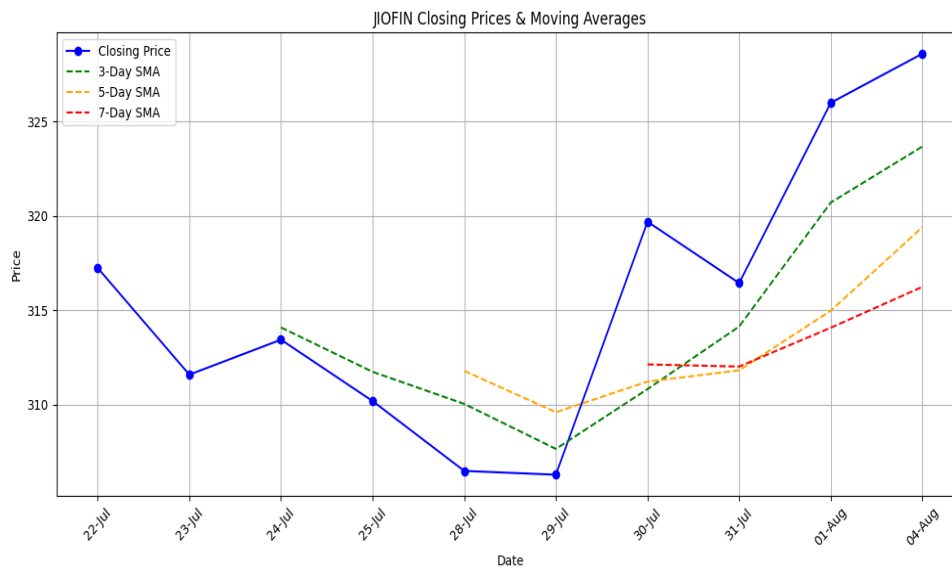
```
plt.xticks(rotation=45)
```

```
plt.grid(True)
```

```
plt.legend()
```

```
plt.tight_layout()
```

```
plt.show()
```



Data Analysis and Interpretation Based on the calculated 3-day, 5-day, and 7-day Simple Moving Average (SMA) of the given stock prices:

Uptrend in Stock Price:

The 3-day Simple Moving Average (SMA) has steadily increased from **314.17** (24-Jul) to **326.35** (04-Aug), indicating a recent **short-term upward trend** in the stock price.

Medium-Term Confirmation:

The 5-day Simple Moving Average (SMA) also rose from **312.86** to **321.10**, which supports the short-term trend and shows **positive momentum** in the medium term.

Long-Term Strengthening:

The 7-day Simple Moving Average (SMA) moved from 314.24 to 319.60, showing that even the longer trend is strengthening, suggesting growing investor confidence.

Price Crossing Averages:

The latest closing price (329.50 on 04-Aug) is above all the Simple Moving Average (SMA)

Example-2

DATE	OPEN	HIGH	LOW	PREV. CLOSE
06-Aug-2025	1,391.90	1,395.90	1,383.30	1,391.70
05-Aug-2025	1,411.00	1,411.00	1,388.10	1,411.50
04-Aug-2025	1,395.10	1,416.10	1,391.70	1,393.70
01-Aug-2025	1386.90	1,405.90	1,384.30	1,390.20
31-Jul-2025	1,388.10	1,402.60	1,382.20	1,410.10
30-Jul-2025	1,418.10	1,423.30	1,401.30	1,417.10
29-Jul-2025	1,383.00	1,420.20	1,383.00	1,387.60

Calculate 3-day SMA:

Simple Moving Average Formula for calculate 3-day SMA

$$SMA_3 = \frac{\text{Sum of last 3 closing prices}}{3}$$

Date	3-Day SMA Calculation	3-Day SMA
06-Aug-2025	$\frac{(1391.70 + 1411.50 + 1393.70)}{3}$	1398.97
05-Aug-2025	$\frac{(1411.50 + 1393.70 + 1390.20)}{3}$	1398.47
04-Aug-2025	$\frac{(1393.70 + 1390.20 + 1410.10)}{3}$	1398.00
01-Aug-2025	$\frac{(1390.20 + 1410.10 + 1417.10)}{3}$	1405.80
31-Jul-2025	$\frac{(1410.10 + 1417.10 + 1387.60)}{3}$	1404.93

5-Day SMA Calculation:

Simple moving Average formula for calculate 5-day SMA

$$SMA_5 = \frac{\text{Sum of 5 Prev. Close values}}{5}$$

Date	5-Day SMA Calculation	5-Day SMA
06-Aug-2025	$\frac{(1391.70 + 1411.50 + 1393.70 + 1390.20 + 1410.10)}{5}$	1399.44
05-Aug-2025	$\frac{(1411.50 + 1393.70 + 1390.20 + 1410.10 + 1417.10)}{5}$	1404.92
04-Aug-2025	$\frac{(1393.70 + 1390.20 + 1410.10 + 1417.10 + 1387.60)}{5}$	1399.74

Here the final result showing the calculated 3-day and 5-day simple moving average (SMA) for the given stock prices

Date	3-Day SMA	5-Day SMA
06-Aug-2025	1398.97	1399.44
05-Aug-2025	1398.47	1404.92
04-Aug-2025	1398.00	1399.74
01-Aug-2025	1405.80	–
31-Jul-2025	1404.93	–

Visualization

The Simple Moving Average is plotted along with the actual stock price on a graph to visualize trends. This graph help illustrate how moving averages smooth out price fluctuations and highlight trend directions.

```
import pandas as pd
import matplotlib.pyplot as plt

# Create the data
data = {
    'Date': ['06-Aug-2025', '05-Aug-2025', '04-Aug-2025', '01-Aug-2025', '31-Jul-2025'],
    '3-Day SMA': [1398.97, 1398.47, 1398.00, 1405.80, 1404.93],
    '5-Day SMA': [1399.44, 1404.92, 1399.74, None, None] # Use None for missing values
}

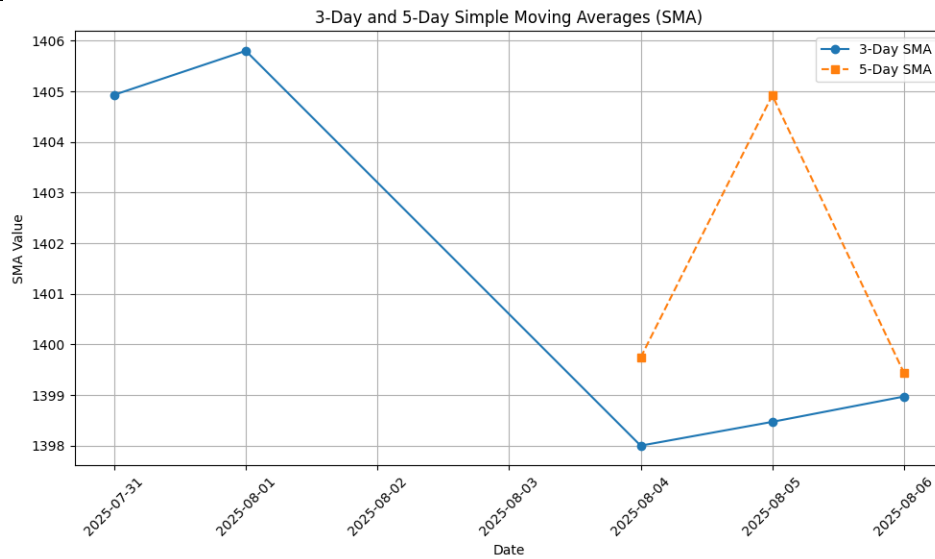
# Convert to DataFrame
df = pd.DataFrame(data)

# Convert 'Date' to datetime and sort
df['Date'] = pd.to_datetime(df['Date'], format='%d-%b-%Y')
df.sort_values('Date', inplace=True)

# Plot the SMAs
plt.figure(figsize=(10, 6))
plt.plot(df['Date'], df['3-Day SMA'], marker='o', label='3-Day SMA')
plt.plot(df['Date'], df['5-Day SMA'], marker='s', label='5-Day SMA', linestyle='--')

# Format the plot
plt.title('3-Day and 5-Day Simple Moving Averages (SMA)')
plt.xlabel('Date')
plt.ylabel('SMA Value')
plt.grid(True)
plt.legend()
plt.xticks(rotation=45)

# Show the plot
plt.tight_layout()
plt.show()
```



Data Analysis and Interpretation

3-Day SMA Trend:

- Starts high (around 1404.93 on 31-Jul), then **declines steadily** to 1398.97 by 06-Aug.
- Indicates a **short-term bearish trend**, reflecting recent price weakness.

5-Day SMA Trend:

- Starts being available only from 04-Aug (once 5 data points are available).
- Drops from ~1404.92 on 05-Aug to 1399.44 on 06-Aug.
- Confirms a **medium-term weakening** trend as well.

No Crossover Observed:

Since the 3-Day SMA is below the 5-Day SMA throughout the period shown (where both exist), it suggests that **momentum is weakening**, and **no bullish signal** (short-term crossing above long-term) is present.

Conclusion

- The plot visually confirms a **downtrend** in both short-term (3-Day) and medium-term (5-Day) SMAs.
- This could indicate a **bearish market sentiment** in the near term.
- Traders might interpret this as a **signal to avoid long positions** or prepare for potential price rebounds if SMAs flatten or reverse in future data.

Example-3

Date	Open	High	Low	Prev. Close
07-Aug-2025	3,016.00	3,051.60	3,010.90	3,032.30
06-Aug-2025	3,063.00	3,066.80	3,026.00	3,063.90
05-Aug-2025	3,074.40	3,077.50	3,042.00	3,074.40
04-Aug-2025	3,009.10	3,079.40	2,991.60	3,003.00
01-Aug-2025	3,029.90	3,036.80	3,000.00	3,036.80
31-Jul-2025	3,041.70	3,059.80	3,015.00	3,053.60
30-Jul-2025	3,060.00	3,069.00	3,047.20	3,056.00
29-Jul-2025	3,060.00	3,074.00	3,041.20	3,079.30
28-Jul-2025	3,110.00	3,118.00	3,069.90	3,135.80

25-Jul-2025	3,140.00	3,156.90	3,125.60	3,148.00
24-Jul-2025	3,165.10	3,173.70	3,140.00	3,179.10
23-Jul-2025	3,159.60	3,182.00	3,157.60	3,159.60
22-Jul-2025	3,159.60	3,180.10	3,154.60	3,158.20
21-Jul-2025	3,190.00	3,197.60	3,152.00	3,189.90
18-Jul-2025	3,225.00	3,228.80	3,187.00	3,140.00

6-Day SMA Calculation:

Simple moving Average formula for calculate 6-day SMA

$$SMA_6 = \frac{\text{Sum of 6 Prev. Close values}}{6}$$

Date	Calculate 6-day SMA	6-day SMA
25-Jul-2025	$\frac{(3158.2 + 3159.6 + 3179.1 + 3148.0 + 3135.8 + 3079.3)}{6}$	3143.00
29-Jul-2025	$\frac{(3159.6 + 3179.1 + 3148.0 + 3135.8 + 3079.3 + 3056.0)}{6}$	3126.30
30-Jul-2025	$\frac{(3179.1 + 3148.0 + 3135.8 + 3079.3 + 3056.0 + 3053.0)}{6}$	3108.63
31-Jul-2025	$\frac{(3148.0 + 3135.8 + 3079.3 + 3056.0 + 3053.0 + 3036.8)}{6}$	3084.92
01-Aug-2025	$\frac{(3135.8 + 3079.3 + 3056.0 + 3053.0 + 3036.8 + 3003.0)}{6}$	3054.08
04-Aug-2025	$\frac{(3079.3 + 3056.0 + 3053.0 + 3036.8 + 3003.0 + 3074.4)}{6}$	3049.18
05-Aug-2025	$\frac{(3056.0 + 3053.0 + 3036.8 + 3003.0 + 3074.4 + 3063.9)}{6}$	3047.95
06-Aug-2025	$\frac{(3053.0 + 3036.8 + 3003.0 + 3074.4 + 3063.9 + 3032.3)}{6}$	3043.33
07-Aug-2025	$\frac{(3036.8 + 3003.0 + 3074.4 + 3063.9 + 3032.3 + 3047.0)}{6}$	3042.90

3-day SMA Calculation

10-day SMA Calculation

Simple Moving Average Formula for calculate 10-day SMA

$$SMA_{10} = \frac{\text{Sum of last 10 closing prices}}{10}$$

Date	10-day SMA Calculation	10-day SMA
07-Aug-2025	$(3,063.90+3,074.40 + 3,003.00+ 3,036.80 +3,053.60 + 3,056.00 +3,079.30+ 3,135.80 + 3,148.00 + 3,179.10) \div 10$	3,082.99
06-Aug-2025	$(3,074.40 + 3,003.00 + 3,036.80 +3,053.60+ 3,056.00 + 3,079.30 +3,135.80+ 3,148.00 + 3,179.10 + 3,159.60) \div 10$	3,092.06

05-Aug-2025	$(3,003.00 + 3,036.80 + 3,053.60 + 3,056.00 + 3,079.30 + 3,135.80 + 3,148.00 + 3,179.10 + 3,159.60 + 3,158.20) \div 10$	3,100.34
04-Aug-2025	$(3,036.80 + 3,053.60 + 3,056.00 + 3,079.30 + 3,135.80 + 3,148.00 + 3,179.10 + 3,159.60 + 3,158.20 + 3,189.90) \div 10$	3,119.53

Final table of 10-day SMA

Date	10-day SMA
04-Aug-2025	3,119.53
05-Aug-2025	3,100.34
06-Aug-2025	3,092.06
07-Aug-2025	3,082.99

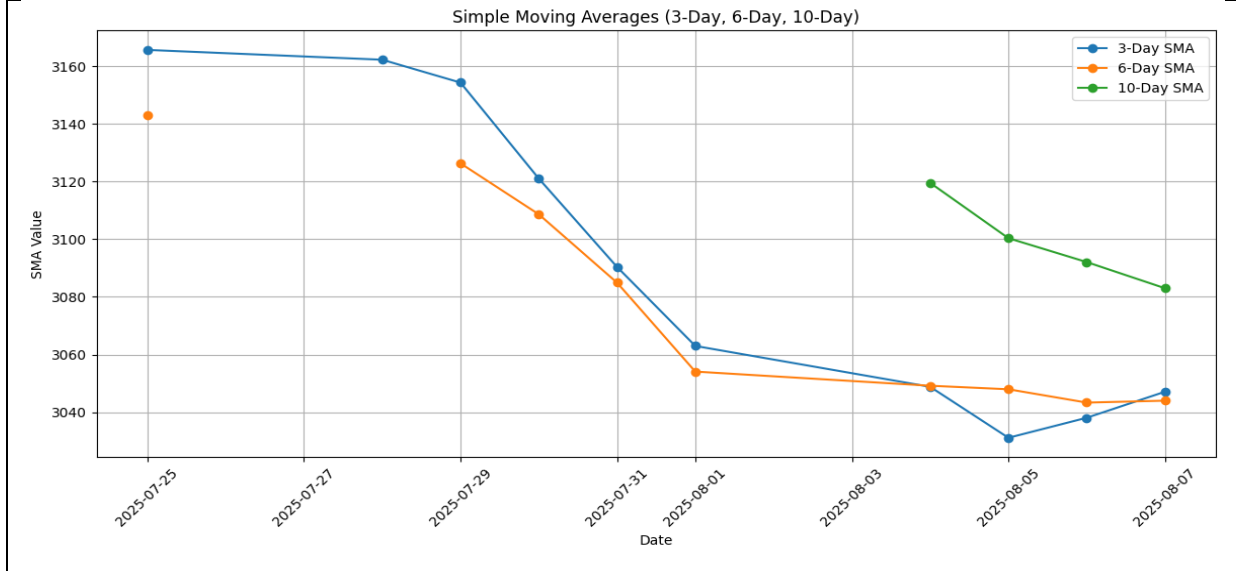
Final Result of 6-day, 3-day, and 10-day SMA:

Date	3-day SMA	6-day SMA	10-day SMA
25-Jul-2025	3,165.63	3,143.00	—
28-Jul-2025	3,162.23	—	—
29-Jul-2025	3,154.30	3,126.30	—
30-Jul-2025	3,121.03	3,108.63	—
31-Jul-2025	3,090.37	3,084.92	—
01-Aug-2025	3,062.97	3,054.08	—
04-Aug-2025	3,048.80	3,049.18	3,119.53
05-Aug-2025	3,031.13	3,047.95	3,100.34
06-Aug-2025	3,038.07	3,043.33	3,092.06

07-Aug-2025	3,047.10	3,044.00	3,082.99	
<p>Visualization</p>				
<p>The Simple Moving Average is plotted along with the actual stock price on a graph to visualize trends. This graph help illustrate how moving averages smooth out price fluctuations and highlight trend directions.</p>				
<pre>import pandas as pd import matplotlib.pyplot as plt # Data from the table data = { "Date": ["25-Jul-2025", "28-Jul-2025", "29-Jul-2025", "30-Jul-2025", "31-Jul-2025", "01-Aug-2025", "04-Aug-2025", "05-Aug-2025", "06-Aug-2025", "07-Aug-2025"], "3-Day SMA": [3165.63, 3162.23, 3154.30, 3121.03, 3090.37, 3062.97, 3048.80, 3031.13, 3038.07, 3047.10], "6-Day SMA": [3143.00, None, 3126.30, 3108.63, 3084.92, 3054.08, 3049.18, 3047.95, 3043.33, 3044.00], "10-Day SMA": [None, None, None, None, None, None, 3119.53, 3100.34, 3092.06, 3082.99], } # Convert to DataFrame df = pd.DataFrame(data) # Convert 'Date' to datetime for plotting df["Date"] = pd.to_datetime(df["Date"], format="%d-%b-%Y") # Plotting plt.figure(figsize=(12, 6)) plt.plot(df["Date"], df["3-Day SMA"], label="3-Day SMA", marker='o') plt.plot(df["Date"], df["6-Day SMA"], label="6-Day SMA", marker='o') plt.plot(df["Date"], df["10-Day SMA"], label="10-Day SMA", marker='o') # Formatting the plot plt.title("Simple Moving Averages (3-Day, 6-Day, 10-Day)") plt.xlabel("Date") plt.ylabel("SMA Value") plt.xticks(rotation=45) plt.grid(True) plt.legend() plt.tight_layout()</pre>				

Show plot

plt.show()



Analysis:

3-Day SMA (Short-Term Trend)

- The **3-day SMA** shows **frequent fluctuations**, reflecting the **short-term market movements**.
- It peaked around **25-Jul (3165.63)** and **gradually declined to 3047.10 by 07-Aug**.
- This indicates **short-term weakness or consolidation** in prices during this period.

6-Day SMA (Mid-Term Trend)

- The **6-day SMA** also shows a **declining pattern**, but it is **smoother and less volatile** than the 3-day SMA.
- It started from **3143.00 on 25-Jul** and **dropped to 3044.00 on 07-Aug**, signalling a **broader mid-term downtrend**.
- This confirms that the short-term weakness observed in the 3-day SMA is **not just a blip**, but part of a **more sustained trend**.

10-Day SMA (Longer-Term Trend)

- The **10-day SMA**, available from 04-Aug, starts at **3119.53** and declines to **3082.99 by 07-Aug**.
- This trend supports the **overall bearish or corrective tone** seen in the market.
- However, the slope is **less steep**, meaning the **longer-term outlook is weakening, but more gradually**.

Conclusion

- All three SMAs — **short, mid, and long-term** — are **declining** over the period.
- This indicates a **broad-based correction or downtrend** in prices, not just a short-term dip.
- The **3-day SMA leads the decline**, followed by the **6-day** and then the **10-day SMA**, which is typical in a weakening market.
- Traders might interpret this as a **bearish signal**, especially if the shorter SMAs stay below the longer SMAs.

Tools Used

Software: Python (using libraries such as Pandas, Matplotlib)

IV. Conclusion

Moving averages serve as a fundamental and widely used tool in financial markets for analyzing trends and smoothing out short-term price fluctuations. By averaging past data points, moving averages help investors and traders identify the direction of market trends and make more informed decisions. Whether using Simple Moving Average (SMA) or more responsive types like Exponential Moving Average (EMA), these indicators play a crucial role in technical analysis. Although moving averages are not predictive tools, they provide valuable insights into market behavior and are often used in conjunction with other indicators for enhance accuracy. As markets continue to evolve, understanding the strengths and limitations of moving averages remains essential for anyone involved in financial analysis and trading.

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