**Metrics Based on OCLV Stock Data**

**Price Features**

**Daily Return:** Measures the percentage of change, from the opening to closing price of a trading day, helping to identify daily market segments and intraday momentum. Positive values suggest bullish behavior; negative values suggest bearish pressure.

**High Low Spread**: Shows how much the price has moved up and down during the day compared to the opening price. A bigger spread means the market was more active or uncertain.

**Open\_close\_spread:** Shows how much the price has changed from open to close as a percentage. If I have in the dataset the daily return, this does the same thing.

**Rolling\_Mean(n\_days):** Shows the average closing price over the last N days to smooth out daily noise. Short periods show quick momentum. Longer ones reveal overall trend direction.

**Rolling\_Standard\_Deviation(n\_days):** Shows how much the price has been moving up and down over the last N days. A higher value means more volatility, which can hint at upcoming moves or changes in trend.

**Cumulative\_Return:** Shows how much the price has grown or dropped since the start. It helps track overall performance over time. Great for comparing with other stocks or strategies

**Log Return:** Shows the daily percentage change in a way that is better for math and long-term calculations. Measures daily return using logarithms, which is more accurate for compounding over time. Its used commonly used in financial modelling and time series analysis.

**Rolling Max**: Shows the highest closing price in the last N days, useful for spotting recent peaks, or resistance levels.

**Rolling Min**: Shows the lowest closing price in the last N days, helps to identify recent lows or support levels.

**Price Momentum**: Measures how much the price has moved over the last N days. A positive value means the price is higher than N days ago, indicating upward momentum; a negative value shows downward momentum.

**Z-Score(N-days)**: Tells how far today’s price is from the average over the last N days, measured in standard deviations. It helps spot overbought or oversold conditions.

Shows if the price is unusually high or low compared to recent history.

**Lag Features:** Stores the closing price from N days ago. Useful for building time series models that rely on past values to predict future ones. Keeps a record of past prices so the model can learn from history.

**Bollinger Bands Width:** Bollinger Bands show price volatility and possible overbought / oversold conditions. These lines show if the price is unusually high or low and how much it’s moving. Wide bands = high volatility; narrow bands = calm market.

**bollinger\_upper and bollinger\_lower**: Define the price range using 2 standard deviations above/below the moving average.

**bollinger\_width**: Measures the gap between bands — wider means more volatility.

**Volume based metrics**

**Volume\_changing**: using volume.pct\_change() tells us how much the trading volume has increased or decreased *compared to the previous day*, expressed as a percentage.

For example, if yesterday’s volume was 1,000 and today’s is 1,200, that’s a +20% change. It’s like saying, “**How much more (or less) are people trading today vs. yesterday**?”

**Volume Spike**: on the other hand, is about detecting *unusual trading activity*. We compare today’s volume to the *average volume over the last few days* (say, 5 days) using something like volume / volume.rolling(5).mean(). If the result is much greater than 1, it means today’s volume is significantly higher than normal, a potential sign of big news, panic, or market excitement.

**Volume\_Spike\_Alert**: This line checks each row in your dataset to see if the current trading volume is **more than twice the 5-day average volume**. If it is, it marks that day as True in the new column volume\_spike\_alert; otherwise, it marks it as False.

A spike like this could mean **breaking news, insider action, or large investor moves**, something is causing a surge of interest. In finance, such sudden volume jumps often *precede price movements*, so this alert helps you monitor for potential market-moving events.

**Café Analogy:**

Imagine you’re tracking how busy a café is. If on a normal day you get 50 customers, and suddenly today you see 120 walk in, you’d say, *"Whoa, something’s up!"* That’s exactly what this alert is doing in the stock market.

In short:

* pct\_change() shows **day-to-day difference**,
* volume spike flags **unusual behavior vs. recent trend**.

**Momentum Indicators**

**ROC -> Rate of Change (ROC)**: Is a momentum indicator. It tells you how much a stock’s price has moved up or down relative to its price N days ago. Think of it as a percentage-based speedometer for price movement.

ROC = (Current Price - Price N Days Ago) / Price N Days Ago

**Example:**

If a stock was $100 ten days ago and today it’s $110,

ROC = (110 - 100) / 100 = 0.10 → 10%

That means the price has grown **10% over 10 days**.

**Positive ROC**: price is trending up (bullish momentum).

**Negative ROC**: price is falling (bearish momentum).

**Roc crossing Zero**: often signals **trend reversals**.

**RSI -> Relative Strength Index (RSI)**: **RSI tells us how strong recent gains are compared to recent losses** over a chosen period (usually 14 days). The result is a number between **0 and 100.**

**Above 70** → Stock is likely *overbought* (too much buying, may correct soon).

**Below 30** → Stock is likely *oversold* (too much selling, may rebound).

**How it is calculated:**

**Average Gain** over N days

**Average Loss** over N days

**RS = Average Gain / Average Loss**

**RSI = 100 - (100 / (1 + RS))**

**Example on Real World Analogy**

Let’s say that we try to track football teams over 14 games

If they’ve won most games (avg gain), they’re *in great form* → RSI is high.

If they’ve lost a lot (avg loss), they’re *out of form* → RSI is low.

It’s the same with stocks — RSI is like a **"heat meter"** for price momentum.

**MACD - Moving Average Convergence Divergence**

**MACD: shows the relationship between two moving averages of a stock’s price**, a fast one (12 days) and a slow one (26 days). It helps detect **trend direction, strength, and potential reversals**.

**EMA\_12** → Short-term trend (like a race car reacting fast)

**EMA\_26** → Long-term trend (like a truck reacting slowly)

**MACD Line** = EMA\_12 − EMA\_26 → tells you when the fast and slow trends are diverging (bullish) or converging (bearish)

**Signal Line** = EMA of MACD (over 9 days) → helps smooth the MACD and gives you entry/exit signals

**MACD crosses above Signal Line** → Bullish (buy signal)

**MACD crosses below Signal Line** → Bearish (sell signal)