Technical Indicators

1) Moving Average Convergence Divergence (MACD)

2) Bollinger Bands

Moving Average Convergence Divergence (MACD)

Moving Averages

Moving Average is a commonly used indicator in technical analysis. As the name suggests it takes the average of given set of prices. The prices can be opening prices of candels, closing prices, high or low. Most commonly closing prices are used to calculate the moving average. Moving Averages can be of many types but most popular ones are SMA or simple moving average and EMA or exponential moving average.
SMA simply calculates the arithmetic mean of given set of prices over specific number of days in past.
EMA calculates the weighted average of given set of prices over specific number.

Figure 1: A 21 days SMA applied on NIFTY50 index daily timeframe chart.

MACD

MACD or Moving average convergence divergence, developed by Gerald Appel, is a technical indicator which uses moving averages and is used to identify entry and exit point in a trade. It is aslo used to determine trend and trend momentum. The MACD line is difference between 26 day EMA and 12 day EMA over closing prices. Second line also called signal line is the 9 day EMA of MACD.

When signal line is below the MACD line, the trend is bullish and a trader can look for buying opportunities. when signal line is above the MACD line, the trend is considered as bearish and a trader can look for shorting opportunities. Along with these two lines, a histogram is also plotted which represents the distance between signal line and MACD line. If signal line is below MACD line, the bars are green and plotted above the zero line. If the signal line is above the MACD line, the bars are red and plotted below the zero line.

$$\textbf{MACD} = 12 \text{ Day EMA} - 26 \text{ Day EMA}$$

MACD is a lagging indicator as it uses Moving averages in it's calculations and Moving Averages is a lagging indicator.
A simple MACD strategy is crossover of MACD line and Signal line. When MACD line and signal line crosses each other and signal line is below the MACD line, enter the trade with long position and when signal line comes over MACD line, go for shorting the stocks.

Figure 2: MACD applied on NIFTY50 index daily timeframe chart.

Writing code for MACD in TradingView

1] Open new indicator template in pine editor. Give it a title "Moving Average convergence divergence" and short title "MACD".

```
// This Pine Script™ code is subject to the terms of the Mozilla Public License 2.0 at https://mozilla.org/MPL/2.0/
// © sonkarsmadhur

//@version=5
indicator(title = "Moving Average Convergence Divergence" , shorttitle ="MACD" , overlay = false)

```

Figure 3: Giving Our Indicator Title

2] Take input from user of period on which MA should be calculated. "fastMALength" is period for 12 days MA. I named it fast because it moves quickly in comparison to 26 days MA. "slowMALength" is period for 26 days MA.

```
//@version=5
indicator(title = "Moving Average Convergence Divergence" , shorttitle ="MACD" , overlay = false , timeframe = "")

fastMA_Length = input.int(defval = 12 , title = "Fast Length")
slowMA_Length = input.int(defval = 26 , title = "Slow Length")
```

Figure 4: Taking user input for MA period

3] Making fast and slow EMA.

```
//@version=5
indicator(title = "Moving Average Convergence Divergence" , shorttitle ="MACD" , overlay = false , timeframe = "")

fastMA_Length = input.int(defval = 12 , title = "Fast Length")
slowMA_Length = input.int(defval = 26 , title = "Slow Length")

fastMA = ta.ema(close , fastMA_Length)
slowMA = ta.ema(close , slowMA_Length)
```

4] Defining MACD = fastMA - slowMA and signal line as EMA of MACD over 9 days.

```
//@version=5
indicator(title = "Moving Average Convergence Divergence" , shorttitle ="MACD" , overlay = false , timeframe = "")

fastMA_Length = input.int(defval = 12 , title = "Fast Length")
slowMA_Length = input.int(defval = 26 , title = "Slow Length")

fastMA = ta.ema(close , fastMA_Length)
slowMA = ta.ema(close , slowMA_Length)

MACD = fastMA - slowMA
signal = ta.ema(MACD , 9)
```

Figure 5: Defining MACD and Signal lines

5] Plotting MACD and Signal Lines.

```
//@version=5
indicator(title = "Moving Average Convergence Divergence" , shorttitle ="MACD" , overlay = false , timeframe = "")

fastMA_Length = input.int(defval = 12 , title = "Fast Length")
slowMA_Length = input.int(defval = 26 , title = "Slow Length")

fastMA = ta.ema(close , fastMA_Length)
slowMA = ta.ema(close , slowMA_Length)

MACD = fastMA - slowMA
signal = ta.ema(MACD , 9)

plot(MACD , color = color.blue)
plot(signal , color = color.orange)
```

Figure 6: Plotting MACD Line and signal by plot function

6] Now for plotting the difference of MACD line and signal line , I will store the difference value in a variable

```
//@version=5
indicator(title = "Moving Average Convergence Divergence" , shorttitle ="MACD" , overlay = false , timeframe = "")

fastMA_Length = input.int(defval = 12 , title = "Fast Length")
slowMA_Length = input.int(defval = 26 , title = "Slow Length")

fastMA = ta.ema(close , fastMA_Length)
slowMA = ta.ema(close , slowMA_Length)

MACD = fastMA - slowMA
signal = ta.ema(MACD , 9)

plot(MACD , color = color.blue)
plot(signal , color = color.orange)

MACD_Signal_Difference = MACD - signal
```

Figure 7: Creating a variable to store difference between MACD and signal line

7] Plotting the zero line and histogram to show the difference between MACD and signal level. if-else statement is used to assign value to the color variable. If MACD ¿= signal color will be green, else it will be red. The variable is initialized with value red. While plotting we have used the style argument and have given value column , so it will plot our difference as histogram. The default value of styling is line.

```
color_ = color.red

if MACD_Signal_Difference >= 0
    color_ := #008604
else
    color_ := color.red

plot(0, "Zero" , color = color.gray)
plot(MACD_Signal_Difference , title = "Histogram" , style = plot.style_columns , color = color_)
```

Figure 8: MACD Indicator Using Pine Script

Figure 9: Difference between actual (bottom) and our MACD (above)

Of course , MACD made by me is not as advance as that available at trading view but it is capable to produce signals , its settings are not as advance as original MACD.

Trading With MACD

You can use simple crossover strategy to enter trades. Two examples are shown below. The stocks is of Varun Beverages Limited or VBL. One should keep in mind that indicators just indicate that you should enter the trade they does not confirm that you must enter the trade. No strategy is 100 % perfect and so is crossover strategy.

Figure 10: Here is a crossover , when signal comes below the MACD line, you should exit the trade at next crossover. Since MACD is lagging indicator, you will not be able to book maximum profit which is a disadvantage of MACD.

Figure 11: Here is a shorting opportunity because signal line comes over MACD line after crossover.

Bollinger Bands (BB)

Bollinger bands is a price envelope which contains a upper line and lower line. Along with this it also contain a middle line. It was developed by John Bollinger. The middle line is a 20 Days Simple Moving Average, but you can change you period according to your preference. The upper line is 2 standard deviation above the SMA and lower band is 2 standard deviation below the SMA. Here also you can choose which standard deviation you want.

UPPER BAND : 20 Days SMA + 2 * (Standard Deviation)
MIDDLE BAND : 20 Days SMA
LOWER BAND : 20 Days SMA - 2 * (Standard Deviation)

Prices have tendency to bounce within the bands. The price will try to come near the Moving Average. If prices are near upper band , this means that stock is overbought. If prices are near lower band , this means that stocks is oversold. However, this does not means that prices will reverse their trend, as stocks can remain in overbought and oversold conditions for a longtime.

When the bands tighten during a period of low volatility, it raises the likelihood of a sharp price move in either direction. This may begin a trending move. Watch out for a false move in opposite direction which reverses before the proper trend begins.
One use of BB is to judge volatility in the stock, is BB envelope is narrow then stock is less volatile, if the envelope is much broader than stock is much more volatile.
Another use of BB is when prices bounces back from upper and lower band you can enter the trade and set target till the middle band as prices tends to come to middle band.

Writing a code for Bollinger Bands in Trading View

1] Define the name of indicator, since BB should be printed in chart , I would make overlay = true.

```
1  // This Pine Script™ code is subject to the terms of the Mozilla Public License 2.0 at https://mozilla.org/MPL/2.0/
2  // © sonkarsmadhur
3
4  //@version=5
5  indicator("Bollinger Bands" , shorttitle = "BB" , timeframe = "" , overlay = true)
6
```

2] Will take input from user for period on which SMA should be calculated , after that we will create SMA with specified period.

```
4  //@version=5
5  indicator("Bollinger Bands" , shorttitle = "BB" , timeframe = "" , overlay = true)
6
7  MA_Length = input.int(defval = 20 , title = "Length")
8  SMA = ta.sma(close,MA_Length)
9
```

Figure 12: Making SMA

3] Take input from user for standard deviation and then define upper band and lower band accordingly.

```
9
10 stddev = input.int(defval = 2 , title = "StdDev")
11 upperBand = SMA + stddev*ta.stdev(close,MA_Length)
12 lowerBand = SMA - stddev*ta.stdev(close,MA_Length)
13
```

4] Plot the upper band , middle band and lower band.

```
13
14    plot(upperBand , color = color.red)
15    plot(lowerBand , color = color.green)
16    plot(SMA , color = color.blue)
```

Figure 13: Plotting Bollinger Bands

Figure 14: Obtained Bollinger Band

Figure 15: Actual Bollinger Band

Obviously the BB available at Trading View is much advance than mine because you can change various settings in original BB. But both BB tells us same information.

Trading using BB

You can enter trade when price starts to bounce back from either upper band or lower band. You can enter the trade after the MACD crossover to confirm move, but keep in mind that MACD will give late results and you can miss some good opportunities.

Figure 16: Prices started to bounce back from lower band and after sometime MACD crossover also happened, so one can enter the trade.

Figure 17: One can short the stock as price started bouncing back from upper band.

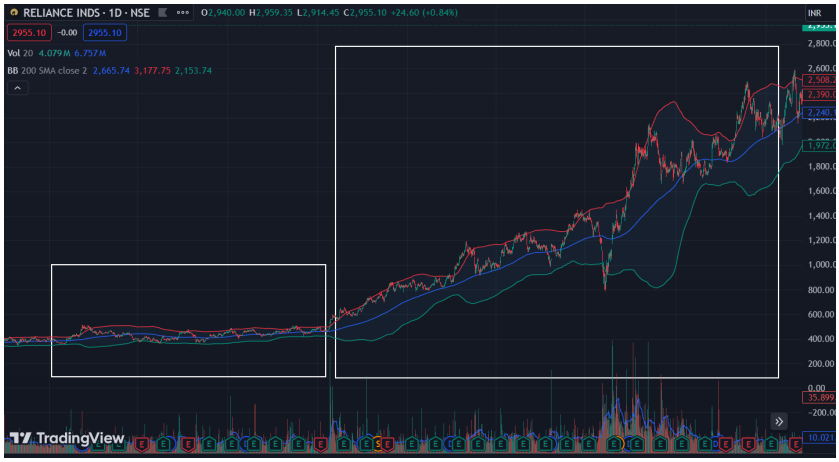

Figure 18: As we can see the envelope was very narrow for a very long time and that resulted in heavy uptrend