TAME® INDICATORS & PATTERNS

Help Document

NSE TAME ® (Technical Analysis Made Easy) is a technical analysis tool provided by NSE to its Trading members. This tool provides users an exhilarating experience in carrying out technical analysis.

TAME provides a variety of charts, and most of the popular technical indicators. It has a friendly and interactive user – interface which gives great flexibility to customize, view and analyse charts and indicators. The interface presents the data in a manner most suitable to support trading decisions.

TAME charting is available to all NSE markets.

National Stock Exchange of India Limited

June 2010

HELP DOCUMENT

Contents

1. ACCUMULATION / DISTRIBUTION (AD)

Concept

A momentum indicator that attempts to gauge supply and demand by determining whether investors are generally "accumulating" (buying) or "distributing" (selling) a certain stock by identifying divergences between stock price and volume flow.

Calculation

"Close Location Value" or CLV is a value based on the location of the close, relative to the range for the period. The CLV ranges from plus one to minus one with the center point at zero. There are basically five combinations:

$$CLV = \frac{(C - L) - (H - C)}{H - L}$$

1. If the stock closes on the high, the top of the range, then the value would be plus one.
2. If the stock closes above the midpoint of the high-low range, but below the high, then the value would be between zero and one.
3. If the stock closes exactly halfway between the high and the low, then the value would be zero.
4. If the stock closes below the midpoint of the high-low range, but above the low, then the value would be negative.
5. If the stock closes on the low, the absolute bottom of the range, then the value would be minus one.

The CLV is then multiplied by the corresponding period's volume, and the cumulative total forms the Accumulation/Distribution Line.

Use

A bullish signal is given when the Accumulation/Distribution Line forms a positive divergence. Be wary of weak positive divergences that fail to make higher reaction highs or those that are relatively young. The main issue is to identify the general trend of the Accumulation/Distribution Line. A two-week positive divergence may be a bit suspect. However, a multi-month positive divergence deserves serious attention. The same principles that apply to positive divergences apply to negative divergences. The key issue is to identify the main trend in the Accumulation/Distribution Line and compare it to the underlying security. Young negative divergences, or those that are relatively flat, should be looked upon with a healthy dose of skepticism.

2. ADX

Concept

An indicator used in technical analysis as an objective value for the strength of trend. ADX is non-directional so it will quantify a trend's strength regardless of whether it is up or down.

Calculation

1. +DM = Today's High - Yesterday's High (when price moves upward)
    -DM = Yesterday's Low - Today's Low (when price moves downward)

You cannot have both +DM and -DM on the same day. If there is an outside day (where both calculations are positive) then the larger of the two results is taken. An inside day (where both calculations are negative) will always equal zero.

2. Calculate the true range for the day. True range is the largest of:
    Today's High - Today's Low,
    Today's High - Yesterday's Close, and
    Yesterday's Close - Today's Low

3. +DM14 =(Prev +DM * 13 + Current +DM) /14
    -DM14 =(Prev -DM * 13 + Current -DM) /14
    TR14 = (Prev TR * 13 + Current TR) /14

4. Next, calculate the Directional Indicators:
    +DI14 = +DM14 divided by TR14
    -DI14 = -DM14 divided by TR14

5. Then, calculate the components of the Average Directional Movement Index (ADX):

    *   Calculate the DI Difference:
    *   Record the difference between +DI14 and -DI14 as a positive number.
    *   Calculate the Directional Index (DX):
    *   DX = DI Difference divided by the sum of +DI14 and -DI14
    *   ADX = (Prev DX * 13 + Current DX) / 14

Use

The ADX is an oscillator that fluctuates between 0 and 100. Even though the scale is from 0 to 100, readings above 60 are relatively rare. Low readings, below 20, indicate a weak trend and high readings, above 40, indicate a strong trend. The indicator does not grade the trend as bullish or bearish, but merely assesses the strength of the current trend. A reading above 40 can indicate a strong downtrend as well as a strong uptrend.

ADX can also be used to identify potential changes in a market from trending to non-trending. When ADX begins to strengthen from below 20 and moves above 20, it is a sign that the trading range is ending and a trend is developing.

3. AVERAGE TRUE RANGE (ATR)

Concept

The value returned by the average true range is simply an indication as to how much a stock has moved either up or down on average over the defined period. High values indicate that prices are changing a large amount during the day. Low values indicate that prices are staying relatively constant. Note that both trending and level prices can have high or low volatility.

Calculation

$$Current\ ATR\ = \frac{(Prior\ ATR\ x\ 13) +\ Current\ TR}{14}$$

Where

ATR = Average True Range
TR = True Range
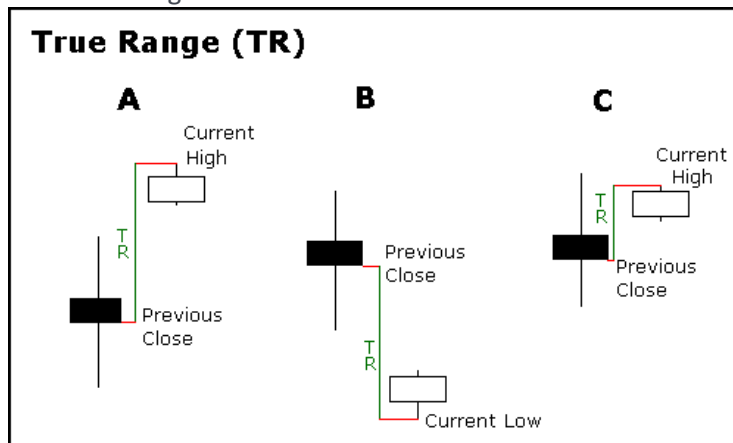
Use

Extreme levels (both high and low) can mark turning points or the beginning of a move. As a volatility-based indicator like Bollinger Bands, the ATR cannot predict direction or duration, simply activity levels. Low levels indicate quiet trading (small ranges), and high levels indicate violent trading (large ranges). A prolonged period of low ATR readings might indicate consolidation and the beginning of a continuation move or reversal. High ATR readings usually result from a sharp advance or decline and are unlikely to be sustained for extended periods.

Another point to note is that because the ATR shows volatility as an absolute level, low price stocks will have lower ATR levels than high price stocks. For example, a $10 security would have a much lower ATR reading than a $200 stock. Because of this, ATR readings can be difficult to compare across a range of securities. Even for a single security, large price movements, such as a decline from 70 to 20, can make long-term ATR comparisons difficult.

4. BOLLINGER BANDS (BBANDS)

Concept

Bollinger Bands consist of a set of three curves drawn in relation to prices. The central curve is an N-day simple moving average. The distance of the upper and lower curve from the central curve is determined by standard deviation of the prices in last N days: a measure of the volatility of prices. Typically, the upper band is SMA plus two times the standard deviation, and the lower band is SMA minus two times standard deviation.

Formula

The three Bollinger bands for N-day are calculated as -

$$Central\ Band = \ SMA(N)$$
$$Upper\ Band = Central\ Band + k \ \times \ \sigma\,(N)$$
$$Lower\ Band = Central\ Band - k \ \times \ \sigma\,(N)$$

$$Here, \sigma\ (N)\ is\ the\ standard\ deviation\ of\ the\ closing\ price\ for\ last\ N\ days.$$

$$k\ is\ a\ parameter\ to\ be\ set\ by\ the\ user, which\ is\ usually\ set\ to\ 2.$$

Use

Current prices close to upper band indicate overbought market, where as prices close to lower band indicate oversold market. According to the creator of the indicator, John Bollinger – "The purpose of Bollinger Bands is to provide a relative definition of high and low. By definition prices are high at the upper band and low at the lower band. This definition can aid in rigorous pattern recognition and is useful in comparing price action to the action of indicators to arrive at systematic trading decisions."

5. CHAIKIN MONEY FLOW (CHMF)

Concept

Chaikin Money Flow (CMF) oscillator is calculated from the daily readings of the Accumulation/Distribution Line. The basic premise behind the Accumulation Distribution Line is that the degree of buying or selling pressure can be determined by the location of the Close relative to the High and Low for the corresponding period (Closing Location Value). The formula for Chaikin Money Flow is the cumulative total of the Accumulation/Distribution Values for 21 periods divided by the cumulative total of volume for 21 periods.

Calculation

$$ChMF = \frac{Cumulative\ total\ of\ the\ Accumulation/Distribution\ Values\ for\ n\ periods}{Cumulative\ total\ of\ volume\ for\ n\ periods}$$

Use

The number of periods can be changed to suit a particular security and time frame. The 21-day Chaikin Money Flow is a good representation of the buying and selling pressure for the past month. Chaikin Money Flow is bullish when it is positive and bearish when it is negative. The next item to assess is the range, the length of time Chaikin Money Flow has remained positive or negative. Even though divergences are not an intricate part of the strategy behind Chaikin Money Flow, the absolute level and the general direction of the oscillator can be important. Normally, higher the magnitude of the indicator, higher is the strength of the trend.

6. CHAIKIN VOLATILITY(CHV)

Concept

Developed by Marc Chaikin, the Chaikin Volatility indicator quantifies volatility as the widening of the range between high and low prices by comparing the spread between the instrument's high and low prices over n-periods. Chaikin's Volatility indicator is created by first calculating an exponential moving average of the difference between the High and Low price for each period over n-periods (typically 10 periods) and then by calculating the percentage change in the exponential moving average over n-periods (also typically 10 periods).

Calculation

Calculate an exponential moving average (Parameter 1 - Default 10 days) of the difference between High and Low for each period:

$$EMA\,[H - L]$$

Calculate the percentage change in the moving average over a further period Parameter 2 - Default 10 days)

$$ChV = \frac{(EMA\,[H - L] -\ EMA\,[H - L\ 10\ days\ ago])}{(EMA\,[\,H - L\ 10\ days\ ago])} * 100$$

Use

There are sharp increases in volatility prior to market tops and bottoms, followed by low volatility as the market loses interest. Also prior to a breakout, the volatility tends to become very low. Hence a decrease in volatility in a trading range usually provides a good signal for impending breakout.

7. COMMODITY CHANNEL INDEX (CCI)

Concept

Commodity Channel Index (CCI) measures the variation of a security's price from its statistical mean. High values show that prices are unusually high compared to average prices whereas low values indicate that prices are unusually low. Contrary to its name, the CCI can be used effectively on any type of trading instrument, not just commodities.

Calculation

There are 4 steps involved in the calculation of the CCI:

◆ Calculate the last period's Typical Price (TP) = (H+L+C)/3 where H = high, L = low, and C = close.
◆ Calculate the 20-period Simple Moving Average of the Typical Price (SMATP).
◆ Calculate the Mean Deviation. First, calculate the absolute value of the difference between the last period's SMATP and the typical price for each of the past 20 periods. Add all of these absolute values together and divide by 20 to find the Mean Deviation.
◆ The final step is to apply the Typical Price (TP), the Simple Moving Average of the Typical Price (SMATP), the Mean Deviation and a Constant (.015) to the following formula:
◆ CCI = (Typical Price - SMATP) / (.015 X Mean Deviation)

Use

CCI can be used to identify overbought and oversold levels. A security would be deemed oversold when the CCI dips below -100 and overbought when it exceeds +100. From oversold levels, a buy signal might be given when the CCI moves back above -100. From overbought levels, a sell signal might be given when the CCI moved back below +100.

Divergences can also be applied to increase the robustness of signals. A positive divergence below -100 would increase the robustness of a signal based on a move back above -100. A negative divergence above +100 would increase the robustness of a signal based on a move back below +100.

Trend line breaks can be used to generate signals. Trend lines can be drawn connecting the peaks and troughs. From oversold levels, an advance above -100 and trend line breakout could be considered bullish. From overbought levels, a decline below +100 and a trend line break could be considered bearish.

8. DETRENDED PRICE OSCILLATOR (DPO)

Concept

It attempts to eliminate the trend in prices by filtering out cycles longer than its moving average. It accomplishes this by comparing the current price to a moving of price (n/2)+1 periods ago. By detrending prices, shorter-term cycles are more easily identified allowing for a quicker determination of potential overbought and oversold levels.

Calculation

$$DPO = Price\ \{X/2 + 1\}\ periods\ ago\ less\ the\ X-period\ simple\ moving\ average.$$

Use

The Detrended Price Oscillator shows the difference between a past price and a simple moving average. In contrast to other price oscillators, DPO is not a momentum indicator. Instead, it is simply designed to identify cycles with its peaks and troughs. Cycles can be estimated by counting the periods between peaks or troughs. Users can experiment with shorter and longer DPO settings to find the best fit. DPO is also based on absolute levels and this makes it difficult for comparative purposes.

9. Ease Of Movement (EMV)

Concept

The Ease of Movement (EMV) is a momentum indicator that may be useful in determining the strength of a trend. This indicator attempts to identify the amount of volume required to move prices. Generally a value greater than zero is an indication that the stock is being accumulated (bought) and negative values are used to signal increased selling pressure.

Calculation

$$EMV = \frac{\left(\frac{H+L}{2}\right) - \left(\frac{pH+pL}{2}\right)}{\left(\frac{V}{H+L}\right)}$$

Use

The indicator shows high positive values when prices move upward on light volume, high negative values when prices move down on light volume and low values if price is not moving or if it takes heavy volume to move prices, signaling distribution or accumulation. Signals are normally taken from an exponential moving average plotted on the Ease of Movement Indicator. They are more effective in a trending market. A buy signal is generated when the EMA crosses over zero and a sell signal is generated when the EMA crosses below zero.

10. EXPONENTIAL MOVING AVERAGE (EMA)

Concept

Exponential moving average is very similar to Simple Moving Average, the difference being that it assigns more importance to latest data. This is done by assigning weights to the data points under considerations, such that a more recent data point gets an exponentially higher weightage than older data points.

Formula

Exponential moving average of N days is calculated as

$$EMA(Today) = Closing\ price(Today) \times \propto +\ EMA(Previous)\ \times (1{-}\propto)$$

Where the exponential smoothing factor, α is given by

$$\propto = 2 \div (N + 1)$$

Use

Exponential Moving Average is used in the same way as the Simple Moving Average, the only difference being that EMA reacts faster to recent price values than the simple moving average. EMA is also used for calculation of many other indicators, like Moving Average Convergence Divergence (MACD) etc.

11. FIBONACCI RETRACEMENT (FR)

Concept

Fibonacci retracement levels are used as support or resistance levels and computed using the Fibonacci ratio. Fibonacci ratios derived from Fibonacci series (0,1,1,2,3,5,8,13….) have been said to explain many natural occurrences. The various Fibonacci ratios are 0.236, 0.382, 0.500, 0.618, etc.

Formula

The lowest and the highest prices are determined during a trend. The difference between the lowest and the highest price is determined. Various Fibonacci ratios (0.236, 0.382, 0.500, 0.618) are applied to this difference and based on the trend the various retracement levels are displayed.

Use

Fibonacci retracement levels can be used as support or resistance levels. In an uptrend, the general idea is to go long the market on a retracement to a Fibonacci support level.

12. FIBONACCI EXTENSION (FE)

Concept

Fibonacci extension levels are used as support or resistance levels and computed using the Fibonacci ratio. Fibonacci ratios derived from Fibonacci series (0,1,1,2,3,5,8,13….) have been said to explain many natural occurrences. The various Fibonacci ratios are 0.236, 0.382, 0.500, 0.618, etc.

Formula

The lowest, highest & partially retraced prices are determined during a trend. The difference between the lowest and the highest price is determined. Various Fibonacci ratios (0.236, 0.382, 0.500, 0.618) are applied to this difference which is later aggregated to the retraced price. There upon based on the trend the various trend extension levels are displayed.

Use

Fibonacci extension levels can be used as support or resistance levels.

13. FULL STOCHASTIC (FS)

Concept

Stochastic Oscillator is a momentum indicator that shows the location of the current close relative to the high/low range over a range of past periods. Closing prices near the top of the range indicates buying pressure where as closing prices near the bottom of the range indicates selling pressure.

Formula

For calculating full stochastic, we first calculate %K (fast) as

$$\%K\ (fast) = \frac{Recent\ close - Lowest\ Low\ over\ N_1\ periods}{Highest\ High\ over\ N_1\ periods - Lowest\ Low\ over\ N_1\ periods} \times 100$$

Full Stochastic Oscillator consists of two lines, %K(full) and %D(full). These are calculated as

$$\%K\ (full)\ =\ N_2\ day\ Moving\ average\ of\ \%K(fast)$$

$$\%D\ (full)\ =\ N_3\ day\ moving\ average\ of\ \%K(full)$$

Use

Closing levels that are consistently near the top of the range indicate accumulation (buying pressure) and those near the bottom of the range indicate distribution (selling pressure). Readings below 20 are considered oversold and readings above 80 are considered overbought. Buy and sell signals can be given when %K crosses above or below %D.

14. MONEY FLOW INDEX (MFI)

Concept

MFI is based on the concept of money flow. If typical price, (High+Low+Close/3) today is higher than the previous day, it is said that "typical price * volume amount of money has flown into the security" as vice versa. MFI is an oscillator, whose value is calculated using the ratio of total positive money flow in the last N days to the negative money flow in the same duration.

Formula

MFI is calculated in the following manner:

1. **First, typical price is calculated using the formula**

$$Typical\ Price = \frac{High\ price + Low\ Price + Closing\ price}{3}$$

2. **Positive and negative money flows are calculated as**

$$If\ Typical\ price\ (Today) > \ Typical\ price\ (Previous\ day)$$

$$Positive\ money\ flow = Typical\ Price\ (Today)\ \times Volume\ (Today); Negative\ Money\ flow = 0$$

$$Otherwise,$$

$$Positive\ money\ flow = 0; Negative\ Money\ flow = Typical\ Price\ (Today)\ \times Volume\ (Today)$$

3. **N-day Money ratio is calculated as**

$$Money\ Ratio\ MR(N) = \frac{N - day\ average\ positive\ money\ flow}{N - day\ average\ negative\ money\ flow}$$

4. **Finally, Money flow Index (MFI) is calculated as**

$$MFI\ (N) = 100 - \frac{100}{1 + MR(N)}$$

Use

High values of MFI indicate overbought levels; whereas low values indicate oversold levels.

Positive and negative divergences between the security and the MFI (Prices move in one direction and MFI moves in the opposite direction) can be used as buy and sell signals respectively, for they often indicate the imminent reversal of a trend.

15. MOVING AVERAGE CONVERGENCE DIVERGENCE (MACD)

Concept

Moving Average Convergence Divergence (MACD) is the difference between a fast and a slow exponential moving average. Typically, 12 and 26 days EMAs are used. MACD is the difference between the values of these two EMAs. A signal line is formed by calculating the EMA (typically 9-day) of the MACD. The difference between MACD and the signal line is calculated and plotted as a histogram.

Formula

MACD is calculated as -

$$MACD = EMA(12) - EMA(26)$$

The Signal line is plotted as -

$$Signal\ line = EMA(MACD, 9)$$

And the histogram is plotted as -

$$Histogram = MACD - Signal\ Line$$

Use

Most common signal is MACD crossing over the signal line. A buy signal is generated when MACD crosses up through the signal line, where as a sell signal is generated when it crosses down through the signal line. Since the histogram is the difference between the MACD and the signal line, it helps in identifying this crossover. Buy/Sell signals are also generated by divergences (A divergence is said to exist if the price moves in one direction and the indicator moves in opposite direction). A positive divergence arises when market makes a low or moves sideways, but the MACD makes an upward move.

16. ON BALANCE VOLUME (OBV)

Concept

The OBV is calculated by adding the current period's volume to a cumulative OBV total when the trading instrument's price closes up and by subtracting the current period's volume from the cumulative OBV total when the trading instrument's price closes down.

Calculation

The OBV is calculated by adding the current period's volume to a cumulative OBV total when the trading instrument's price closes up and by subtracting the current period's volume from the cumulative OBV total when the trading instrument's price closes down.

Use

A rising (bullish) OBV line indicates that the volume is heavier on up days. If the price is likewise rising, then the OBV can serve as a confirmation of the price uptrend. In such a case, the rising price is the result of an increased demand for the security, which is a requirement of a healthy uptrend. However, if prices are moving higher while the volume line is dropping, a negative divergence is present. This divergence suggests that the uptrend is not healthy and should be taken as a warning signal that the trend will not persist. The numerical value of OBV is not important, but rather the direction of the line. A user should concentrate on the OBV trend and its relationship with the security's price.

17. PARABOLIC SAR (PSAR)

Concept

Parabolic SAR (PSar) was developed by J. Welles Wilder Jr. and helps in determining the entry and exit points. SAR stands for stop and reverse. SAR computes stop loss levels using previous day's data.

Formula

Some of the concepts in PSAR computation are:

◆ Extreme price: This is the highest price recorded to date during a long trade or the lowest price recorded to date during a short trade.

◆ Acceleration factor: The acceleration factor is a rate at which the SAR converges with the price. Typically, the minimum acceleration factor is kept at 2% with a step of 2% for every new level reached in the exiting trend up to a maximum of 20% .

The computation of PSar is based on the following steps:

- Rules to determine the current position:

Initial	If today close > previous close the P = long
	If today close < previous close the P = short
Subsequent	If previous P = long and previous (SAR+AFD) > current low, P = Short
	If previous P = long and previous (SAR+AFD) < current low, P = Long
	If previous P = Short and previous (SAR-AFD) < current high, P =Long
	If previous P = Short and previous (SAR-AFD) > current high, P =Short

- Rules for determining extreme price

Initial	If P = long higher of current and previous high price
	If P = short lower of current and previous low price
Subsequent	If P = long and unchanged, higher of all highs during the current long trend
	If P = short and unchanged, lower of all lows during the current short trend
	If P = long and changed, high price
	If P = short and changed, low price

- Rules for determining AF

Initial	0.02 or as configured
Subsequent	If P is unchanged and EP is unchanged, current AP = previous AP
	If P is unchanged & EP is changed, current AP = previous AP + 0.02 (or as configured)
	If P is changed current AP = 0.02 (or as configured)

- AFD formula: AF * Absolute of (EP – SAR)

- Rules for determining SAR

Initial	If P = long, previous days low price
	If P = short, previous days high price
Subsequent	If P = long and unchanged, lower of previous (SAR + AFD) and last two low price

	If P = short and unchanged, higher of previous (SAR – AFD) and last two high price
	If P has changed take the previous extreme price

Use

The SAR points below the price point indicate a short position while the SAR point above the price point indicates a long position. When the market penetrates this "stop and reverse" point, the current position should be liquidated and the opposite position should be taken. Ie if long, liquidate the long position and establish a short position. If short, liquidate the short position and establish a long position.

18. PIVOT POINTS (PP)

Concept

Pivot point and levels derived from it are price levels at which the direction of price movement can possibly change.

Formula

Pivot points are computed using high, low, and close price of previous trading session. Accordingly seven points are displayed as under:

Pivot point (PP)	(High + Low + Close)/3
First support (S1)	(2 x PP) - High
Second Support (S2)	PP - (High - Low)
Third Support (S3)	Low - 2*(High - Pivot)
First Resistance (R1)	(2 x PP) - Low
Second Resistance (R2)	PP + (High - Low)
Third resistance (R3)	High + 2*(Pivot – Low)

Use

Pivot points represent critical support and resistance levels. The general convention for use of pivot points is given below:

- ◆ If market opens above pivot point then the bias for the day is long trades.
- ◆ If the market opens below the pivot point then the bias for the day is for short trades.
- ◆ Signs of reversal or break-outs can be determined by looking at the R1 (initial resistance) or S1 (initial support)
- ◆ The subsequent levels are indicatives for over bought or over-sold positions and used for exit strategy.

19. PRICE OSCILLATOR (POS)

Concept

It is a momentum oscillator with some trend-following characteristics. It expresses the difference between two moving averages as a percentage value that quantifies where the fast moving average is in relation to the slow moving average. The Percentage Price Oscillator is very similar to the Moving Average Convergence/Divergence (MACD), except the MACD expresses the difference of two moving averages as an absolute value. Expressing the difference as a percentage value makes it easier to compare trading instruments with difference prices.

Calculation

$$\frac{[EMA(short\ period) - EMA\ (long\ period)]}{EMA(long\ period)} * 100$$

Use

The Price Oscillator is calculated by subtracting the longer moving average from the shorter moving average. The resulting plot forms an oscillator that fluctuates above and below zero according to the differences in the moving averages. If the shorter moving average is above the longer moving average, then the indicator will be positive. If the shorter moving average is below the longer moving average, then the indicator will be negative. A buy signal is generated when this crosses above zero and a sell signal is generated when it crosses below zero.

20. RATE OF CHANGE (ROC)

Concept

Rate of Change, ROC is a very simple indicator. An N-day ROC is simply the percentage change in prices over the past N days.

Formula

ROC is calculated as

$$ROC(N) = \frac{Price\ (Today) -\ Price\ (N\ days\ back)}{Price\ (N\ days\ back)} \times 100$$

Use

ROC can be used as momentum indicator to identify overbought/oversold positions.

21. RELATIVE STRENGTH INDEX (RSI)

Concept

RSI is an oscillator, whose value oscillates between 0-100, calculated based on relative strength – a measure of momentum. An N-period relative strength is the ratio of gains in the price in last N days, divided by the losses in last N days.

Formula

Relative Strength Index is calculated in the following manner:

1. **Gains and losses are calculated as**

$$If\ Close(Today) >\ Close\ (Previous\ day)$$

$$Gain = Close(Today) -\ Close\ (Previous\ day), Loss = 0$$

$$Otherwise,$$

$$Gain = 0, Loss = Close\ (Previous\ day) -\ Close\ (Today)$$

2. **Average gain and average loss are calculated as**

$$Initial\ average\ gain\ (or\ loss) = \frac{Total\ of\ gains\ (or\ losses) during\ the\ last\ N\ periods}{N}$$

$$Average\ gain\ (or\ loss) = \frac{Previous\ average\ gain\ (or\ loss) \times (N-1) +\ current\ gain\ (or\ loss)}{N}$$

3. **Relative Strength, RS for the last N days is calculated as**

$$Relative\ Strength,\quad RS(N) = \frac{Average\ gain\ in\ last\ N\ days}{Average\ losses\ in\ last\ N\ days}$$

4. **Finally, Relative Strength Index is calculated as**

$$Relative\ Strength\ Index,\quad RSI(N) =\ 100 - \frac{100}{1 + RS(N)}$$

Use

Higher values of RSI indicate overbought market; where as low values indicate oversold market. 30 and 70 are usually set as thresholds for a buy and sell signal respectively. Buy/Sell signals are also generated by observing divergence between security and indicator (A divergence is said to exist if the price moves in one direction and the indicator moves in opposite direction). Underlying security usually reverses the direction and follows the direction of the indicator.

22. SIMPLE MOVING AVERAGE (SMA)

Concept

An N-day Simple Moving Average is calculated by calculating the average of N most recent prices

Formula

Simple moving average of N days is calculated as

$$SMA(N) = \frac{\sum_{(Today-N)}^{Today} Closing\ Price}{N}$$

Use

SMA smoothens the price movements and hence is more helpful to identify trends. Short term SMAs react faster to prices than longer term SMAs. A cross of short term average over the longer term one indicates beginning of an uptrend and vice versa.

23. STANDARD DEVIATION (STDEV)

Concept

It measures how widely values (closing prices for instance) are dispersed from the average.

Calculation

$$\sigma = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(x_i - \mu)^2}$$

Use

The larger the difference between the closing prices and the average price, the higher the standard deviation will be and the higher the volatility. The closer the closing prices are to the average price, the lower the standard deviation and the lower the volatility. A decrease in volatility after a period of consolidation provides a good indication of an impending breakout. Also a high volatility reading is often a precursor to trend reversal.

24. VOLUME WEIGHTED MOVING AVERAGE (VWMA)

Concept

An N-day volume weighted moving average (VWMA) is the average of the past N days closing prices, each weighted in proportion to the volume on that day.

Calculation

$$Volume-Weighted\ Average\ =\ VMA\ =\ \frac{V1P1\ +\ V2P2\ +\ V3P3\ +\ \dots\ +\ VN\ PN}{K}$$

$$where\ K\ =\ V1\ +\ V2\ +\ V3 + \dots + VN\ =\ \Sigma\ Vk$$

Use

This indicator gives buy and sell signals upon crossovers with price or another MA. Thus a buy signal is generated when a fast moving volume weighted moving average crosses above a slow moving simple moving average and a sell signal is generated when it crosses below the slow moving simple moving average.

25. WILLIAMS %R (%R)

Concept

William %R shows the relationship of the close relative to the high-low range over a set period of time. A value of %R close to zero indicates that the closing price is near the top of the range over N-days, where as a value close to -100 indicates that the closing price is near the bottom of the range. It is a momentum indicator especially popular for measuring overbought and oversold levels.

Formula

William's %R is calculated as

$$\%R \ = \frac{Highest\ High\ price\ over\ N\ periods - Close\ (today)}{Highest\ High\ price\ over\ N\ periods - Lowest\ Low\ price\ over\ N\ periods} \times -100$$

Use

It is used for identification of overbought/oversold levels. Low values (usually below -80) are considered as oversold levels where as values above -20 are considered overbought levels.

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