

asset's current price and its average price over a certain period:

$$CCI = \frac{Price_t - MA(Price_t, n)}{MD(Price_t, n)/0.015}$$

where MA is the moving average, MD is the mean deviation, and n is the period.

TR (True Range): The True Range is a measure of market volatility and is defined as the maximum of the following:

$$TR = \max(High_t - Low_t, |High_t - Close_{t-1}|, |Low_t - Close_{t-1}|)$$

where $High_t$ and Low_t are the high and low prices for the current period, and $Close_{t-1}$ is the closing price of the previous period.

ATR (Average True Range): The Average True Range is a moving average of the True Range, typically calculated over 14 periods:

$$ATR = SMA(TR, 14)$$

DMA (Difference of Moving Averages): The DMA is the difference between two moving averages, such as a 10-day and a 50-day:

$$DMA = MA(10) - MA(50)$$

DMI (Directional Moving Index): The DMI is a set of indicators that measure the strength of a price move in a particular direction.

+DI (Positive Directional Indicator): The +DI indicates the strength of upward moves:

$$+DI = \frac{H - L_m}{TD}$$

-DI (Negative Directional Indicator): The -DI indicates the strength of downward moves:

$$-DI = \frac{L_m - L}{TD}$$

where H is the high for the period, L is the low, L_m is the lowest low for the period, and TD is the True Range.

ADX (Average Directional Movement Index): The ADX is a measure of the strength of a trend, regardless of direction:

$$ADX = \frac{14 \times ADX_{14} + \text{Current ADX}}{15}$$

ADXR (Smoothed Moving Average of ADX):

The ADXR is a smoothed version of the ADX, providing a longer-term view:

$$ADXR = \frac{ADX + \text{Previous ADXR}}{2}$$

TRIX (Triple Exponential Moving Average):

The TRIX is a momentum indicator that uses a triple smoothing of the EMA:

$$TRIX = \frac{\text{Triple EMA}(Price, n) - \text{Previous TRIX}}{\text{Previous TRIX}}$$

TEMA (Triple Exponential Moving Average):

The TEMA is similar to the TRIX but is designed to be less lagging:

$$\begin{aligned} TEMA &= 3 \times EMA(Price, n) \\ &\quad - 3 \times EMA(EMA(Price, n), n) \\ &\quad + EMA(EMA(EMA(Price, n), n), n) \end{aligned}$$

VR (Volume Variation Index): The VR is a volume-based indicator that compares the volume of up days to the volume of down days:

$$VR = \frac{\text{Up Volume} - \text{Down Volume}}{\text{Up Volume} + \text{Down Volume}} \times 100$$

MFI (Money Flow Index): The MFI is a volume-weighted indicator that compares money flow to price change:

$$MFI = \frac{\text{Money Flow}}{\text{Average Money Flow}} \times 100$$

VWMA (Volume Weighted Moving Average):

The VWMA is an average price that gives more weight to volumes:

$$VWMA = \frac{\sum (Price \times Volume)}{\sum Volume}$$

CHOP (Choppiness Index): The CHOP index measures market volatility and is calculated using the standard deviation of price changes.

KER (Kaufman's Efficiency Ratio): The KER is a momentum indicator that compares the difference between the high and low of the period to the high of the period:

$$KER = \frac{\text{High} - \text{Low}}{\text{High}}$$

KAMA (Kaufman's Adaptive Moving Average): The KAMA is a moving average that adapts to market conditions:

$$KAMA = \frac{\text{Previous KAMA} \times (1 + ER)}{1 + ER + \text{Smoothing Factor}}$$

where ER is the efficiency ratio.

PPO (Percentage Price Oscillator): The PPO is a momentum oscillator that compares two moving averages:

$$\text{PPO} = \left(\frac{\text{EMA}(\text{Short Period}) - \text{EMA}(\text{Long Period})}{\text{EMA}(\text{Long Period})} \right) \times 100$$

StochRSI (Stochastic RSI): The Stochastic RSI applies the stochastics formula to the RSI indicator, resulting in two lines: %K and %D. It is calculated as:

$$\begin{aligned} \%K &= \frac{\text{RSI} - \text{Min RSI}}{\text{Max RSI} - \text{Min RSI}} \times 100 \\ \%D &= \text{SMA}(\%K, 3) \end{aligned}$$

WT (LazyBear's Wave Trend): LazyBear's Wave Trend is a trend-following indicator that uses a combination of moving averages and price action to identify the trend direction.

Supertrend: The Supertrend indicator, which consists of an Upper Band and a Lower Band, is a volatility-based band that changes direction when the price touches it:

$$\text{Upper Band} = \text{Previous Close} + \text{ATR} \times \text{Multiplier}$$

$$\text{Lower Band} = \text{Previous Close} - \text{ATR} \times \text{Multiplier}$$

Aroon: Aroon Oscillator The Aroon Oscillator is the difference between the Aroon Up and Aroon Down lines:

$$\text{Aroon Oscillator} = \text{Aroon Up} - \text{Aroon Down}$$

Z: Z-Score The Z-Score is a statistical measurement that describes a score's relationship to the mean of a group of scores:

$$Z = \frac{(X - \mu)}{\sigma}$$

where X is the value, μ is the mean, and σ is the standard deviation.

AO (Awesome Oscillator): The Awesome Oscillator is a momentum indicator that compares the 5-period and 34-period SMAs:

$$\text{AO} = \text{SMA}(5) - \text{SMA}(34)$$

BOP (Balance of Power): The Balance of Power is a candlestick-based indicator that compares the opening and closing price to the high and low of the period:

$$\text{BOP} = \left(\frac{\text{Close} - \text{Open}}{\text{High} - \text{Low}} \right) \times \text{Volume}$$

MAD (Mean Absolute Deviation): The Mean Absolute Deviation is a measure of volatility that averages the absolute deviations from a data set's mean:

$$\text{MAD} = \frac{1}{n} \sum_{i=1}^n |X_i - \mu|$$

ROC (Rate of Change): The Rate of Change is a momentum indicator that measures the percentage change in price over a specific period:

$$\text{ROC} = \left(\frac{\text{Price}_t - \text{Price}_{t-n}}{\text{Price}_{t-n}} \right) \times 100$$

Coppock: Coppock Curve The Coppock Curve is a combination of a 14-month rate of change and an 11-month weighted rate of change, smoothed by a 10-month average:

$$\text{Coppock Curve} = \frac{\text{ROC}(14) + 0.15 \times \text{ROC}(11)}{1 + 0.15}$$

Ichimoku: Ichimoku Cloud The Ichimoku Cloud is a comprehensive charting system that includes five lines:

$$\text{Tenkan-sen} = \text{SMA}(\text{High}, 9) + \text{SMA}(\text{Low}, 9)$$

$$\text{Kijun-sen} = \text{SMA}(\text{High}, 26) + \text{SMA}(\text{Low}, 26)$$

$$\text{Senkou Span A} = \frac{\text{Tenkan-sen} + \text{Kijun-sen}}{2}$$

$$\begin{aligned} \text{Senkou Span B} &= \frac{\text{SMA}(\text{High}, 52)}{2} + \\ &\frac{\text{SMA}(\text{Low}, 52)}{2} \end{aligned}$$

CTI (Correlation Trend Indicator): The Correlation Trend Indicator measures the correlation between two moving averages to identify trend strength:

$$\text{CTI} = \frac{\text{SMA}(\text{Price}, n) - \text{SMA}(\text{Price}, m)}{\text{SMA}(\text{Price}, n) + \text{SMA}(\text{Price}, m)}$$

LRMA (Linear Regression Moving Average): The Linear Regression Moving Average is a trend-based indicator that uses the least squares method to fit a line to the data:

$$\text{LRMA} = b_0 + b_1 \times \text{Time}$$

where b_0 and b_1 are the intercept and slope coefficients from the linear regression.

ERI (Elder-Ray Index): The Elder-Ray Index consists of two lines, the %B (bull power) and %S (bear power), which are calculated as follows:

$$\%B = \frac{\text{High} + \text{Low} + \text{Close}}{3}$$

$$\%S = \frac{\text{High} + \text{Low} - \text{Close}}{3}$$

FTR (Gaussian Fisher Transform Price Reversals Indicator): The Fisher Transform is a statistical tool that converts price data into a Gaussian normal distribution to identify potential reversals:

$$\text{FTR} = \ln \left(\frac{\text{High} + \text{Low}}{2} \right)$$

RVGI (Relative Vigor Index): The Relative Vigor Index is a momentum indicator that uses the difference between two moving averages to assess market vigor:

$$\text{RVGI} = \frac{\text{MA}(\text{Price}, n) - \text{MA}(\text{Price}, m)}{\text{MA}(\text{Price}, m)} \times 100$$

Inertia (Inertia Indicator): The Inertia Indicator is a trend-following indicator that measures the rate of change in price momentum:

$$\text{Inertia} = \frac{\text{Price}_t - \text{Price}_{t-1}}{\text{Price}_{t-1}} \times 100$$

KST (Know Sure Thing): The KST is a complex indicator that combines various components, including moving averages and rate of change, to identify trends:

$$\text{KST} = \text{RS} + \text{ROC} + \text{ST} + \text{M}$$

where RS is the raw score, ROC is the rate of change, ST is the signal, and M is the percentage of the smoothed data.

PGO (Pretty Good Oscillator): The Pretty Good Oscillator is a momentum indicator that compares the current price to a moving average:

$$\text{PGO} = \text{Price}_t - \text{MA}(\text{Price}, n)$$

PSL (Psychological Line): The Psychological Line is a trend-following indicator that uses the percentage of bullish and bearish days:

$$\text{PSL} = \frac{\text{Number of Bullish Days}}{\text{Total Number of Days}} \times 100$$

PVO (Percentage Volume Oscillator): The Percentage Volume Oscillator compares the volume of up days to the volume of down days as a percentage:

$$\text{PVO} = \left(\frac{\text{Up Volume} - \text{Down Volume}}{\text{Up Volume} + \text{Down Volume}} \right) \times 100$$

QQE (Quantitative Qualitative Estimation): The Quantitative Qualitative Estimation is a method that combines quantitative data with qualitative analysis to provide a comprehensive assessment:

$$\text{QQE} = \text{Quantitative Score} + \text{Qualitative Score}$$

H Details of Evaluation Metrics

Profit Metrics:

- **Total Return (TR):** The percentage change of net value over a time horizon h . It is defined as:

$$\text{TR} = \left(\frac{n_{t+h} - n_t}{n_t} \right) \times 100\%$$

- **Annual Return Rate (ARR):** The average annual profit of a strategy, calculated as the compound annual growth rate of the net value. It is given by:

$$\text{ARR} = \left(\left(\frac{n_{t+h}}{n_t} - 1 \right)^{\frac{1}{h}} \right) \times 100\%$$

Risk-Adjusted Profit Metrics:

- **Sharpe Ratio (SR):** The return per unit of deviation. It is calculated as:

$$\text{SR} = \frac{\mathbb{E}[\mathbf{r}] - r_f}{\sigma[\mathbf{r}]}$$

- **Sortino Ratio (SoR):** A variation that considers only the downside risk. It is given by:

$$\text{SoR} = \frac{\mathbb{E}[\mathbf{r}] - r_f}{\sigma_{\text{down}}[\mathbf{r}]}$$

- **Calmar Ratio (CR):** The annualized return per unit of maximum drawdown. It is defined as:

$$\text{CR} = \frac{\text{ARR}}{\text{MDD}}$$

Risk Metrics: