

A. Description of technical indicators

Technical Indicator	Description
volume_adi	Accumulation/Distribution Index, a volume-based indicator designed to measure the cumulative flow of money into and out of a security.
volume_obv	On-Balance Volume, tracks cumulative buying and selling pressure by adding the volume on "up" days and subtracting volume on "down" days.
volume_cmf	Chaikin Money Flow, measures the amount of Money Flow Volume over a specific period.
volume_fi	Force Index, uses price and volume to assess the power behind a move or identify possible turning points.
volume_em	Ease of Movement, a price and volume based indicator designed to measure the 'ease' of price movement.
volume_sma_em	Simple Moving Average of the Ease of Movement.
volume_vpt	Volume Price Trend, a volume-based technical analysis indicator which acts as a leading indicator of price movements.
volume_vwap	Volume Weighted Average Price, an intraday indicator that provides the average price an instrument has traded at throughout the day, based on both volume and price.
volume_mfi	Money Flow Index, a technical oscillator that uses price and volume data for identifying overbought or oversold signals in an asset.
volume_nvi	Negative Volume Index, which focuses on days where the volume decreases from the previous day.
volatility_bbm	Bollinger Bands Middle Line, a line in the center of the Bollinger Bands, which are volatility bands placed above and below a moving average.
volatility_bbh	Bollinger Bands High, a line representing the upper band of the Bollinger Bands.

Technical Indicator	Description
volatility_bbl	Bollinger Bands Low, a line representing the lower band of the Bollinger Bands.
volatility_bbw	Bollinger Bands Width, a technical analysis indicator derived from the standard Bollinger Bands.
volatility_bbp	Bollinger Bands Percentage, a related indicator which measures the position of the latest close relative to the range defined by the Bollinger Bands.
volatility_bbhi	Indicator of whether the High price has hit the Bollinger upper band.
volatility_bbli	Indicator of whether the Low price has hit the Bollinger lower band.
volatility_kcc	Keltner Channels Center, a volatility indicator that displays a channel derived from simple moving averages.
volatility_kch	Keltner Channels High, a line that plots the upper band of the Keltner Channels.
volatility_kcl	Keltner Channels Low, a line that plots the lower band of the Keltner Channels.
volatility_kcw	Keltner Channels Width, a line that plots the width of the Keltner Channels.
volatility_kcp	Keltner Channels Percentage, a related indicator which measures the position of the latest close relative to the range defined by the Keltner Channels.
volatility_kchi	Keltner Channels High Indicator, identifies whether the price has hit the high of the Keltner Channel.
volatility_keli	Keltner Channels Low Indicator, identifies whether the price has hit the low of the Keltner Channel.
volatility_dcl	Donchian Channel Low, a line that plots the lowest price for a set period of time.
volatility_dch	Donchian Channel High, a line that plots the highest price for a set period of time.

Technical Indicator	Description
volatility_dcm	Donchian Channel Middle, a line that plots the average of the Donchian Channel High and Donchian Channel Low.
volatility_dcw	Donchian Channel Width, a line that plots the width of the Donchian Channel (high - low).
volatility_dcp	Donchian Channel Percentage, a line that measures the position of the latest close relative to the range defined by the Donchian Channel.
volatility_atr	Average True Range, a measure of market volatility.
volatility_ui	Ulcer Index, a measure of downside risk, in terms of both the depth and duration of price declines.
trend_macd	Moving Average Convergence Divergence, a trend-following momentum indicator that shows the relationship between two moving averages of a security's price.
trend_macd_signal	The signal line for the MACD, which is an EMA of the MACD.
trend_macd_diff	The difference between MACD and its signal line.
trend_sma_fast	Simple Moving Average with a fast lookback period.
trend_sma_slow	Simple Moving Average with a slow lookback period.
trend_ema_fast	Exponential Moving Average with a fast lookback period.
trend_ema_slow	Exponential Moving Average with a slow lookback period.
trend_vortex_ind_pos	Positive Vortex Indicator, an indicator designed to identify start and end of market trends.
trend_vortex_ind_neg	Negative Vortex Indicator.
trend_vortex_ind_diff	The difference between Positive and Negative Vortex Indicator.

Technical Indicator	Description
trend_trix	TRIX, a momentum oscillator that displays the percent rate of change of a triple exponentially smoothed moving average.
trend_mass_index	Mass Index, a volatility indicator developed to identify trend reversals by measuring the narrowing and widening of the range between the high and low prices.
trend_dpo	Detrended Price Oscillator, an indicator designed to remove trend from price and make it easier to identify cycles.
trend_kst	Know Sure Thing, a momentum oscillator based on the smoothed rate-of-change for four different timeframes.
trend_kst_sig	Signal line for the Know Sure Thing.
trend_kst_diff	The difference between Know Sure Thing and its signal line.
trend_ichimoku_conv	Ichimoku Kinko Hyo Conversion line, averages the high and low for the last nine periods.
trend_ichimoku_base	Ichimoku Kinko Hyo Base line, averages the high and low for the past 26 periods.
trend_ichimoku_a	Ichimoku Kinko Hyo 'A' line, also known as the Leading Span A or Senkou Span A, averages the conversion and base lines, and plots it 26 periods ahead.
trend_ichimoku_b	Ichimoku Kinko Hyo 'B' line, also known as the Leading Span B or Senkou Span B, averages the high and low for the past 52 periods, and plots it 26 periods ahead.
trend_stc	Schaff Trend Cycle, a type of oscillator and it is based on the assumption that, regardless of time frame, trends accelerate and decelerate in cyclical patterns.
trend_adx	Average Directional Movement Index, an oscillator that measures trend strength regardless of direction.
trend_adx_pos	The Positive Directional Indicator, part of the Average Directional Index (ADX) system and is used to measure the presence of an uptrend.

Technical Indicator	Description
trend_adx_neg	The Negative Directional Indicator, part of the Average Directional Index (ADX) system and is used to measure the presence of a downtrend.
trend_cci	Commodity Channel Index
trend_visual_ichimoku_a	A visualised Ichimoku Kinko Hyo 'A' line.
trend_visual_ichimoku_b	A visualised Ichimoku Kinko Hyo 'B' line.
trend_aaron_up	Aroon Up, a component of the Aroon Indicator system and is used to measure the strength of an uptrend.
trend_aaron_down	Aroon Down, a component of the Aroon Indicator system and is used to measure the strength of a downtrend.
trend_aaron_ind	Aroon Indicator, identifies when trends are likely to change direction.
trend_psar_up	Parabolic Stop and Reverse Up, a trend-following indicator providing entry and exit points.
trend_psar_down	Parabolic Stop and Reverse Down, another trend-following indicator providing entry and exit points.
trend_psar_up_indicator	Indicator for Parabolic SAR (Stop and Reverse) Up.
trend_psar_down_indicator	Indicator for Parabolic SAR (Stop and Reverse) Down.
momentum_rsi	Relative Strength Index, a momentum oscillator that measures the speed and change of price movements.
momentum_stoch_rsi	Stochastic RSI, an indicator of an indicator useful in identifying overbought and oversold conditions.
momentum_stoch_rsi_k	Stochastic RSI fast line.

Technical Indicator	Description
momentum_stoch_rsi_d	Stochastic RSI slow line.
momentum_tsi	True Strength Index, a momentum oscillator based on a double smoothing of price changes.
momentum_uo	Ultimate Oscillator, a range-bound oscillator that uses three different time periods to reduce the volatility and false transaction signals that are common in many other single-period oscillators.
momentum_stoch	Stochastic Oscillator, a momentum indicator comparing a particular closing price of a security to a range of its prices over a certain period of time.
momentum_stoch_signal	Signal line for the Stochastic Oscillator.
momentum_wr	Williams %R, a momentum indicator that measures overbought/oversold levels.
momentum_ao	Awesome Oscillator, a histogram showing the market momentum of a recent number of periods compared to the momentum of a larger number of previous periods.
momentum_roc	Rate of Change, a momentum oscillator that measures the percent change in price from one period to the next.
momentum_ppo	Percentage Price Oscillator, a momentum oscillator that measures the difference between two moving averages as a percentage of the larger moving average.
momentum_ppo_signal	Signal line for the Percentage Price Oscillator.
momentum_ppo_hist	Histogram for the Percentage Price Oscillator.
momentum_pvo	Percentage Volume Oscillator, measures the difference between two volume-based moving averages as a percentage of the larger moving average.
momentum_pvo_signal	Signal line for the Percentage Volume Oscillator.
momentum_pvo_hist	Histogram for the Percentage Volume Oscillator.

Technical Indicator	Description
momentum_kama	Kaufman's Adaptive Moving Average, a moving average designed to account for market noise or volatility.
others_dr	Daily return, the gain or loss made by the stock compared to the previous day.
others_dlr	Daily log return, the logarithmic return of the stock compared to the previous day.
others_cr	Cumulative return, the aggregate return of the stock over a period.

B. Description of on-chain metrics

On-chain Metric Name	Description
bitcoin-number-of-transfers-between-exchanges-from-all-exchanges-to-all-exchanges	Represents the total number of individual transfers of Bitcoin that have taken place between different cryptocurrency exchanges
bitcoin-total-transfer-volume-within-exchanges-btc-all-exchanges	Represents the total volume of Bitcoin that has been transferred within all exchanges. Includes transfers between wallets controlled by the same exchange
bitcoin-mean-transfer-volume-from-exchanges-btc-all-exchanges	Represents the average volume of Bitcoin transferred out of all exchanges in each individual transaction
bitcoin-mean-transfer-volume-to-exchanges-btc-all-exchanges	Represents the average volume of Bitcoin transferred into all exchanges in each transaction
bitcoin-number-of-transfers-from-exchanges-all-exchanges	Shows the total number of individual Bitcoin transfers that have left all exchanges
bitcoin-number-of-transfers-to-exchanges-all-exchanges	Indicates the total number of individual Bitcoin transfers that have been sent to all exchanges
bitcoin-net-transfer-volume-from-to-exchanges-btc-all-exchanges	Shows the net volume of Bitcoin transferred to and from all exchanges. Calculated by subtracting the volume of Bitcoin sent out of exchanges from the volume of Bitcoin received by exchanges
bitcoin-total-transfer-volume-from-exchanges-btc-all-exchanges	Represents the total volume of Bitcoin that has been transferred out of all exchanges
bitcoin-total-transfer-volume-to-exchanges-btc-all-exchanges	Indicates the total volume of Bitcoin that has been transferred to all exchanges

On-chain Metric Name	Description
bitcoin-exchange-net-position-change-btc-all-exchanges	Shows the net position change for all Bitcoin exchanges. Calculated by subtracting the amount of Bitcoin sent out from the amount received by all exchanges
balance-bitfinex, balance-bitmex, balance-bitstamp, balance-bittrex, balance-coinbase, balance-coincheck, balance-kraken, balance-luno, balance-poloniex	Represent the total Bitcoin balance held by each respective exchange
bitcoin-number-of-addresses-with-a-non-zero-balance	Shows the total number of Bitcoin addresses that currently hold more than zero Bitcoin
bitcoin-number-of-addresses-with-balance-1	Represents the total number of Bitcoin addresses that currently hold exactly one Bitcoin
bitcoin-number-of-utxos-in-loss	Represents the total number of unspent transaction outputs (UTXOs) that are currently in a state of loss, meaning the current price of Bitcoin is lower than the price at the time those UTXOs were created
bitcoin-number-of-utxos-in-profit	Shows the total number of UTXOs that are in a state of profit, meaning the current price of Bitcoin is higher than the price at the time those UTXOs were created
bitcoin-percent-of-utxos-in-profit	Represents the percentage of all existing UTXOs that are currently in a state of profit
1d_1w, 1h, 1h_24h, 1m_3m, 1w_1m, 1y_2y, 2y_3y, 3m_6m, 3y_5y, 5y_7y, 6m_12m, 7y_10y, more_10y	Bitcoin spent output age bands
bitcoin-median-spent-output-lifespan-msol	Median age (in days) of all spent transaction outputs, giving an idea of how long Bitcoin typically remains unspent before being included in a new transaction
bitcoin-average-spent-output-lifespan-asol	Average age of all spent transaction outputs

On-chain Metric Name	Description
bitcoin-percent-supply-in-profit	Percentage of all mined Bitcoin that is currently valued at a price higher than when it was last moved or spent
hodl1d_1w, hodl1m_3m, hodl1w_1m, hodl1y_2y, hodl24h, hodl2y_3y, hodl3m_6m, hodl3y_5y, hodl5y_7y, hodl6m_12m, hodl7y_10y, hodlmore_10y	Metrics related to the 'HODL' behavior, indicating the distribution of Bitcoin holding time periods. For example, hodl1y_2y gives the percentage of Bitcoin that has remained unspent for a duration of 1 to 2 years
bitcoin-inflation-rate	Rate at which the supply of Bitcoin is increasing due to the mining of new blocks
bitcoin-market-cap-to-thermocap-ratio	Ratio of Bitcoin's market capitalization to thermocap can provide insights into market cycles and whether the current price is sustainable
bitcoin-aggregate-security-spend-thermocap-usd	Refers to the total USD value of block rewards and transaction fees paid to miners, which are necessary for securing the Bitcoin network
bitcoin-total-miner-revenue-from-block-rewards-btc-all-miners	Total revenue that miners have earned from block rewards, given in Bitcoin.
bitcoin-percent-miner-revenue-from-fees	Percentage of miner revenue that comes from transaction fees as opposed to block rewards.
bitcoin-total-miner-revenue-btc-all-miners	Total revenue earned by all Bitcoin miners, including both block rewards and transaction fees.
bitcoin-total-numbers-of-utxos-in-the-network	Total number of unspent transaction outputs (UTXOs) that exist in the Bitcoin network.
bitcoin-median-transfer-volume-change-adjusted-btc, bitcoin-mean-transfer-volume-change-adjusted-btc, bitcoin-total-transfer-volume-change-adjusted-btc	Metrics track changes in the volume of Bitcoin transferred. Used to spot sudden shifts in market behaviour.
bitcoin-median-transfer-volume-btc, bitcoin-mean-transfer-volume-btc, bitcoin-total-transfer-volume-btc	Represent the median, mean, and total volume of Bitcoin transferred in transactions, respectively.

On-chain Metric Name	Description
bitcoin-mean-size-of-transfers	Average size (in Bitcoin) of each transaction on the network.
bitcoin-total-size-of-transactions	Total size of all transactions made on the Bitcoin network over a specific period.
bitcoin-number-of-transactions-per-second	Number of transactions being processed on the Bitcoin network every second.
bitcoin-number-of-transactions	Total number of transactions confirmed on the Bitcoin network.
bitcoin-mean-hash-rate	Average computational power used by miners on the Bitcoin network, typically measured in hashes per second.
bitcoin-mining-difficulty	Indicates how difficult it is to solve the mathematical problem required to add a new block to the blockchain.
bitcoin-median-transaction-fees-btc, bitcoin-mean-transaction-fees-btc, bitcoin-total-transaction-fees-btc	Show the median, mean, and total transaction fees (in Bitcoin), respectively, paid by users to have their transactions processed.
bitcoin-adjusted-circulating-supply-btc, bitcoin-circulating-supply-btc	The first metric is the circulating supply of Bitcoin, adjusted for lost coins, while the second is the total number of Bitcoins in circulation, not adjusted for lost coins.
bitcoin-number-of-addresses	Total number of addresses ever used on the Bitcoin network.
bitcoin-number-of-new-addresses	Number of new Bitcoin addresses that were created.
bitcoin-number-of-receiving-addresses, bitcoin-number-of-sending-addresses, bitcoin-number-of-active-addresses	Total number of addresses receiving Bitcoin, sending Bitcoin, and active in the network (either receiving or sending), respectively.
bitcoin-reserve-risk	Metric used to assess the confidence of long-term Bitcoin holders relative to the price. It's calculated as the price divided by the HODL Bank.
bitcoin-cumulative-value-days-destroyed-cvdd	Measure of the economic activity on the Bitcoin network that also takes into account the age of coins moved.

On-chain Metric Name	Description
bitcoin-balanced-price-usd	Theoretical price level based on various on-chain metrics. Aims to provide a more balanced and holistic view of the Bitcoin price, removing short term price fluctuations and speculative noise.
bitcoin-puell-multiple	Ratio of the daily issuance value of bitcoins to the 365-day moving average of daily issuance values. Used to identify if the coin is overbought or oversold.
bitcoin-realized-hodl-ratio	Ratio between the Realised Cap HODL Waves for 1 week and 1-2 years. Can be used to examine the market cycles from a holder's perspective.
bitcoin-investor-capitalization	Variant of market cap. Values each UTXO by the price when it was last moved rather than the current market price.
bitcoin-mvrv-z-score, bitcoin-market-value-to-realized-value-ratio-mvrv	Help to identify market tops and bottoms by examining the ratio of market value to realised value (MVRV).
bitcoin-velocity	Measures how fast units of a cryptocurrency are being traded. Calculated as the ratio of the on-chain transaction volume to the network value.
bitcoin-network-value-to-transactions-signal, bitcoin-network-value-to-transactions-ratio-nvt	Assess Bitcoin's valuation relative to the transaction volume on its network.
ma111, ma350x2	Pi cycle top.
ma128, ma14, ma200, ma25, ma40, ma60, ma9, ma90	Different moving averages for Bitcoin. A moving average smooths out price data to identify trends over specific periods. The numbers represent the periods used for the averages.
bitcoin-realized-profits-to-value-rpv-ratio, bitcoin-realized-profit-loss-ratio, bitcoin-net-realized-profit-loss-usd, bitcoin-realized-loss-usd, bitcoin-realized-profit-usd	Track the profits and losses realised by Bitcoin holders, providing insight into trader behaviour and market sentiment.
hash-ribbon-buy, hash-ribbon-capitulation, hash-ribbon-crossed, hash-ma30, hash-ma60	Different indicators related to Bitcoin's hash rate and mining difficulty. They can signal miner capitulation or buying opportunities.

On-chain Metric Name	Description
bitcoin-difficulty-ribbon-compression	Metric used to assess the impact of Bitcoin mining difficulty adjustments on the market.
bitcoin-seller-exhaustion-constant	Metric that assesses the level of selling activity in the Bitcoin market. High values may suggest an oversold condition, which could indicate a price reversal.
bitcoin-relative-unrealized-loss, bitcoin-relative-unrealized-profit, bitcoin-net-unrealized-profit-loss-nupl	Provide insight into the level of profit or loss held by Bitcoin investors that has yet to be realised. The NUPL in particular is the net between unrealized profits and losses.
bitcoin-accumulation-trend-score-score	Metric can provide a measure of the accumulation (buying and holding) behaviour in the Bitcoin market. Often used to identify market cycles and periods of strong accumulation.
bitcoin-stock-to-flow-deflection, daysTillHalving, bitcoin-stock-to-flow-ratio-usd	Metrics related to the Bitcoin halving events and the stock-to-flow model. The stock-to-flow model relates Bitcoin's value to its scarcity, defined as the ratio of the total stock of Bitcoin to the flow of new production (new bitcoins entering circulation).
bitcoin-adjusted-sopr-a-sopr, bitcoin-spent-output-profit-ratio-sopr	Profitability ratios calculated by dividing the price sold by the price paid. SOPR is reset-adjusted, meaning that all outputs that are at a loss (price sold < price paid) are set to 1, which can be beneficial during bull markets.