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A Study on Forecasting the Prices of Bitcoin Through Technical Analysis

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Abstract

Cryptocurrency has gained significant traction among Indian investors since 2013. These digital currencies utilize cryptography to secure the generation of units, facilitate transactions, and verify ownership. Bitcoin (BTC), a prominent cryptocurrency, operates as a virtual currency to serve as a decentralized form of money and payment method. It is designed to function independently such that no individual, group, or entity is involved in financial transactions.
The process of cryptocurrency involves rewarding blockchain miners for their role in verifying transactions. In exchange for their efforts, miners receive cryptocurrency, which can also be acquired through purchases on various cryptocurrency exchanges. This decentralized and cryptographic approach to currency has contributed to the widespread adoption of cryptocurrencies like Bitcoin, reflecting the evolving landscape of financial transactions in India and globally.
In this study, trend analysis of bitcoin has been done on the past 5 years' closing price data ranging from 2018 to 2022 through technical analysis. The key indicators used for this study are the Relative Strength Index, Moving Average Convergence and Divergence, and on balance volume, (most common indicators as given by Trend Spider) the results showed that the Crypto market is underperforming showing a bearish trend thus providing a buying opportunity for long-term investors.
Keywords: Cryptocurrency, Bitcoin, Relative strength Index, On balance volume, Moving Average Convergence and Divergence

INTRODUCTION

Cryptocurrencies represent digital assets characterized by cryptographic security measures. In essence, they function as units of account utilized for the exchange of goods and services. Operating as a form of virtual currency, cryptocurrencies are safeguarded by advanced cryptographic techniques, rendering them highly resistant to counterfeiting and double-spending attempts. The widespread appeal of cryptocurrencies can be attributed to their decentralized, peer-to-peer nature, which eliminates the need for traditional financial institutions such as governments or central banks to oversee transactions. Consequently, this absence of centralized control ensures a level of autonomy and privacy in financial dealings among individuals engaged in cryptocurrency transactions.

Cryptocurrency functions as a digital currency, offering an alternative mode of payment established through encryption algorithms. Cryptocurrency can act as currency as well as a cybernetic accounting system by integrating encryption technology. Individuals must possess a cloud-based software dedicated cryptocurrency wallet or saved locally on a mobile device or computer. These wallets play a crucial role in securely storing encryption keys, thereby validating the user's identity and linking them to their cryptocurrency holdings.

The inception of cryptocurrency can be traced back to 2008 when an enigmatic figure operating under the pseudonym Satoshi Nakamoto introduced Bitcoin. The first transaction that bestowed monetary value upon Bitcoin unfolded in October 2009, featuring Finnish computer science student Martti Malmi, known as Sirius Online. In this historic event, Malmi successfully sold 5,050 coins for approximately INR 414.65, thereby establishing a value of $0.0009 per Bitcoin, as reported by Forbes.

Fast forward to February 2023, and the cryptocurrency landscape has undergone a remarkable transformation. The market capitalization of cryptocurrencies has surged to a staggering $445 billion, as documented by Coin Market Cap. This exponential growth underscores the increasing significance and widespread adoption of cryptocurrencies within the global financial ecosystem.

The concept of anonymous cryptocurrency e-commerce has long been a subject of speculation, with decentralized cryptocurrencies making their debut in 2009. By the close of 2013, the cryptocurrency landscape boasted over 50 different variants, a number that skyrocketed to over 500 by the conclusion of 2014. Fast-forward to 2022, and the proliferation of cryptocurrencies has surpassed 20,000, as evidenced by data on emerging trends. This remarkable growth highlights the evolving nature of the cryptocurrency landscape and its increasing significance in the global financial ecosystem.

In the Wali district of Mumbai, India, a renowned pizza establishment named Colonial has made history by becoming the first restaurant service in the country to accept Bitcoin payments. This pioneering move sparked a rapid increase in domestic cryptocurrency exchanges. Key players such as Btcx India, Uno Coin, and Coin Secure have entered the scene, providing cryptocurrency exchange and trading services in India.

As of January 2023, the cryptocurrency landscape boasts a total of 22,669 cryptocurrencies, with an aggregate market capitalization of $1.056 trillion, according to Coin Market Cap. Notably, four of the top 20 cryptocurrencies are directly pegged to the value of the USD. Asia emerged as a significant hub for cryptocurrency activity, hosting over four times more cryptocurrency users than any other continent.

On a global scale, the cryptocurrency market exhibited substantial growth, with a valuation of $1.49 billion in 2020. Projections from Allied Market Research anticipate further expansion, with the market expected to reach $4.94 billion by 2030. This underscores the increasing significance and potential of cryptocurrencies in shaping the future of financial transactions worldwide.

PURPOSES OF THE STUDY

1. To study technical analysis tools used in price forecasting of Bitcoin.
2. To know the fluctuations in Bitcoin prices through technical analysis.

LITERATURE REVIEW

(Figà-Talamanca et al., 2021) examined the multivariate relationship between the cryptocurrencies basket consisting of Bitcoin, Ethereum, Litecoin, and Monero by applying dynamic factor analysis. The studies covered from 2016 to 2019. The authors find out that the basket price is suitably demonstrated by a model with two dynamic factors. One is integrated and the other is stationary until the end of August 2019. They introduced a trading strategy that turns profitable only when the second factor is stationary in the light of evidence.

(De Angelis et al., 2021) introduced groundbreaking profit-oriented trading strategies for investors who are willing to take risks in the context of Bitcoins. The proposed strategies revolve around the utilization of Contracts for Difference (CFDs), involving buying or selling these financial instruments. Notably, the authors employed a sophisticated machine/deep learning model to enhance predictive capabilities. They utilized a long short-term memory (LSTM) persistent neural network, which allowed for the forecasting of possible investment scenarios inside a well-defined theoretical model framework. This integration of advanced machine learning techniques contributes to more informed decision-making and strategic planning in the dynamic landscape of Bitcoin trading.

(Antulov-Fantulin et al., 2021) investigated the challenges in forecasting the intraday short-term volume and its uncertainty in exchange markets for cryptocurrencies. Specifically, order book and transaction data from various markets are used to build the predictions, and a temporal mixture ensemble model is suggested to determine, at each time step, the set of data that is most useful locally for forecasting. The authors found empirical evidence of the outperformance of their model over the time series model in terms of trading volume point and interval predictions. They additionally demonstrate comparable outcomes when conditioning to the volume quartile.

(Blundell-Wignall, 2014) investigates the dual nature of Bitcoin by looking at its functions as a trustless transfer technology and a currency. The conversation explores the consequences of the decentralized and transparent structure of Bitcoins posing queries regarding how it might affect established monetary systems and the trust that serves as the foundation for financial transactions. They skilfully navigate the intricacies of this new technology by providing insights into the ongoing discussion about Bitcoin's place in the changing financial landscape.

(Polasik et al., 2015) explored the dynamics of Bitcoin through an empirical investigation of the relationship between price fluctuations and actual usage. The study most likely investigates how Bitcoin's adoption and use in electronic commerce may affect or be influenced by its price volatility. The authors may have aimed to shed light on the usefulness of Bitcoin's price fluctuations and its function in electronic commerce during the study period by using empirical methods.

(Viglione, 2015) explored whether or not governance affects how much Bitcoin costs in different nations. The study probably looks at how governance-related elements, like legal and regulatory frameworks, affect Bitcoin's value in various national contexts. The author may seek to clarify the impact of governance structures on the dynamics of Bitcoin pricing by providing cross-national evidence. To gain a deeper comprehension of the results and methodology, it would be necessary to view the entire article directly.

(Naved & Srivastava, 2015) in their paper investigates the financial viability of oscillators used in financial markets technical analysis. A popular kind of technical indicator among traders is oscillators, which they use to examine patterns and possible turning points in financial instruments. It is likely that the study evaluates these oscillators' performance and looks at how well they can produce trading signals. To assess the historical data and ascertain the efficacy of these technological instruments, the writers may utilize empirical methodologies. A more thorough grasp of the particular oscillators examined, the methodology employed, and the authors' conclusions could be obtained by reading the entire article.

(Venkatesh et al., 2021) in his empirical research explored the use of technical analysis in Indian stock market trading. To make trading decisions, technical analysts use a variety of technical indicators, chart patterns, and historical price data. The author likely examines the effectiveness of technical analysis as a trading strategy in the specific context of the Indian stock market. Analyzing previous market data, testing different technical indicators, and evaluating their capacity to produce profitable trading signals are some of the tasks that may be included in the study. The results may shed light on the usefulness and effectiveness of technical analysis for traders on the Indian stock exchange. Accessing the full study would offer more details on the methodology and specific conclusions drawn by the author.

DATA COLLECTION

Three main tenets apply to cryptocurrency technical analysis:

- Historical closing price data (2018-2022)
- Technical Analysis indicators
- Trend analysis

RESEARCH METHODOLOGY

This study adopts an analytical and technical research methodology, utilizing daily data for the technical analysis of cryptocurrency. The dataset encompasses the period from January 1, 2018, to June 27, 2022. The closing prices of Bitcoin in dollars serve as the focal point of analysis, sourced from the online cryptocurrency market Yahoo! Finance.

The technical analysis incorporates key indicators such as On-Balance Volume (OBV), Relative Strength Index (RSI), and Moving Average Convergence and Divergence (MACD). These indicators play a pivotal role in identifying patterns and trends within the price movements of Bitcoin, providing valuable insights into the cryptocurrency's market behavior over the specified timeframe.

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ANALYSIS

Technical analysis is the process of forecasting future prices using numerical series produced by market activity like price and volume. It assumes that the market is 90% psychological and 10% logical.

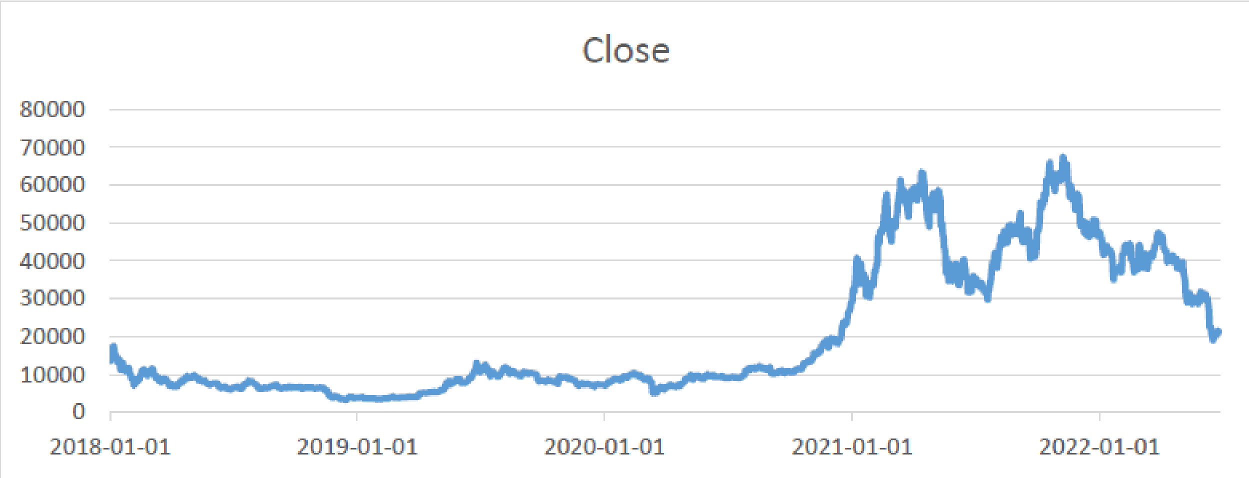


Fig. 5.1

Closing price

Lowest- 14-12-2018, value- 3242.4848

Highest – 8-11-2021, value- 67566.828

INDICATORS OF THE STUDY

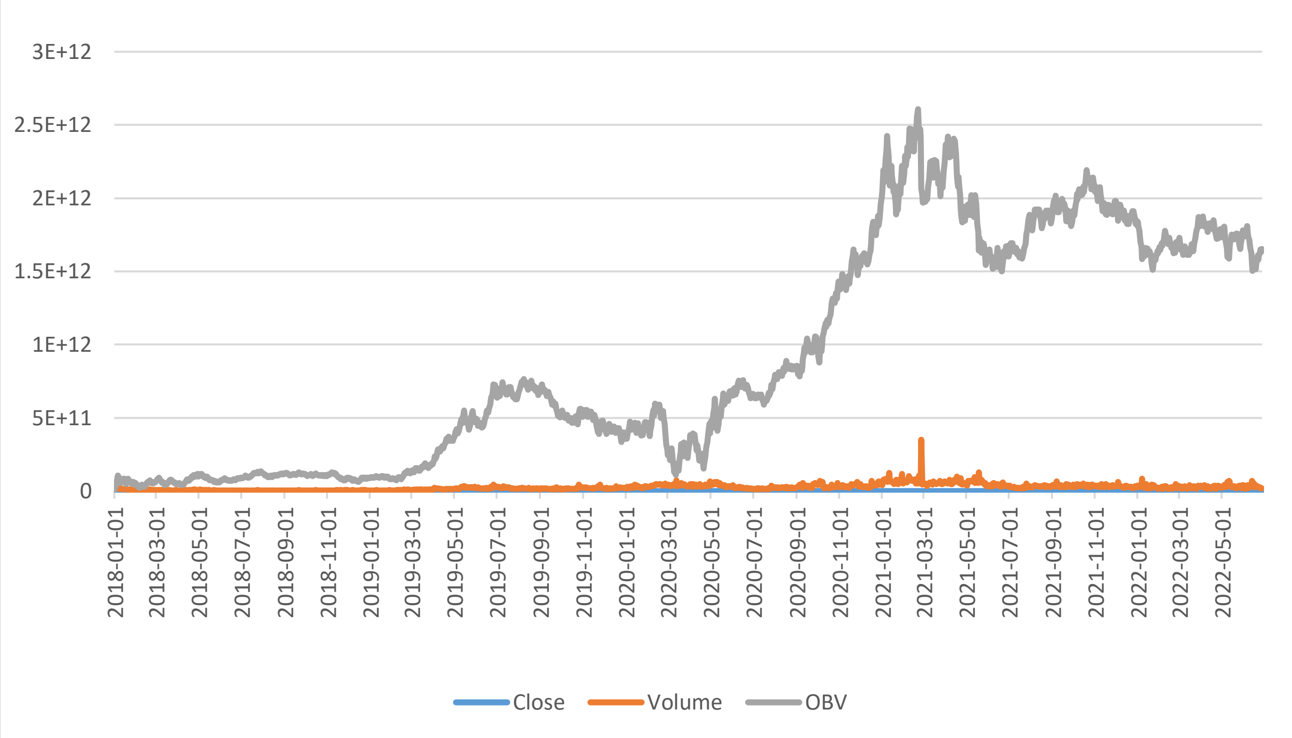
ON- BALANCE VOLUME (OBV)

The OBV indicators are based on concepts that changes in the OBV will precede price changes. An ascending line that indicates bullish OBV signals that trading volume will rise with the rise in the market. When coupled with a rising price, the OBV can act as a confirmation of the upward trend in prices. In this scenario, the increasing price is indicative of a growing demand for security, a fundamental requirement for a robust uptrend. There is a negative divergence when prices are rising and the volume line is falling. This divergence implies that the upward trend lacks strength and serves as a cautionary signal that the trend may not be sustained. It's important to note that the specific numerical value of the OBV is not as significant as the trend direction it represents.

CALCULATION-

OBV is calculated in running cumulative total by adding the volume of the day when the security's price closes up and subtracting the volume if it closes down.

I. If the closing price of today is greater than the closing price of yesterday
   OBV= Yesterday's OBV + Today's Volume
II. If the closing price of today is less than the closing price of yesterday
   New OBV= Yesterday's OBV – Today's Volume
III. If the closing price of today is equal to the closing price of yesterday
   New OBV= Yesterday's OBV



OBV CHART

INTERPRETATION

Through this OBV chart, it can be seen that both the price movement and the OBV are moving in similar directions forming higher highs and higher lows giving an uptrend up to December 2021 and after that, there is the formation of lower highs and lower lows giving a downtrend since the beginning of 2022. It indicates a trend continuation; thus, the market will move in a downtrend as the value recedes and gives a buy signal.

RELATIVE STRENGTH INDEX

The strength of a stock can be interpreted using different instruments. The Relative Strength Index (RSI), which compares the days on which a stock closes lower than its opening price, is one of these which is important tools in momentum trading is this indicator.

The RSI model is a simple model to use and is calculated by using the formula-

RSI= $100-\frac{100}{1+RS}$

RS=$\frac{\text{AVERAGE gain for n number of days}}{\text{average loss for rest days}}$

n days= number of periods (most analyst uses 9 to 15 day)

The range of the RSI is 0 to 100. A stock is deemed overbought around the 70 levels, and you consider about selling. Certain industries' stocks can reach levels of 75–80 before declining, but it can be difficult for some to even rise above 70. To find out what level the historical RSI has traded at and how the stock will respond when it reaches those levels, it is an excellent plan to monitor the RSI over an extended period (one year or more).

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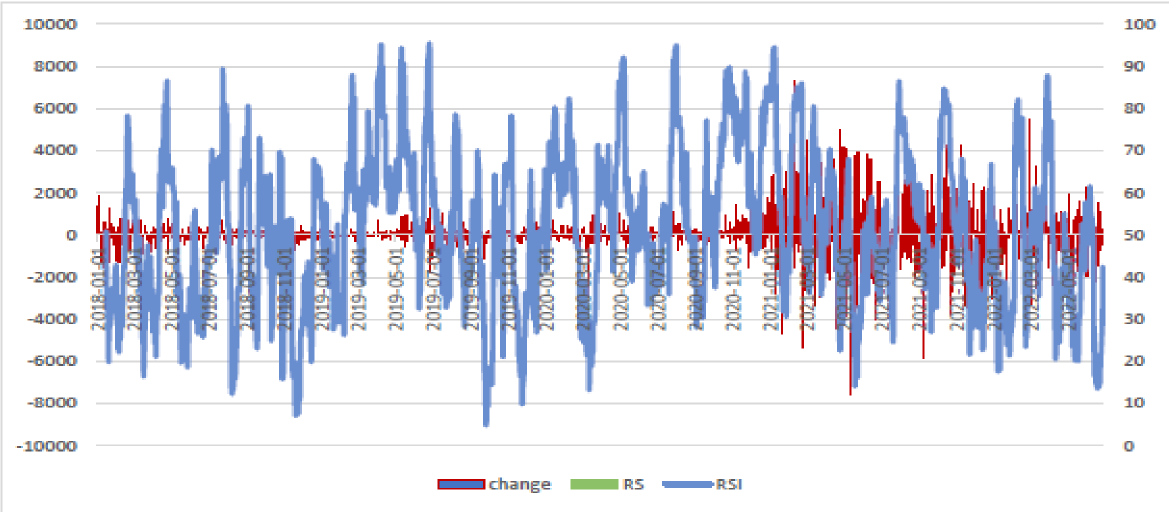

Fig. 5.5 RSI CHART

The **INTERPRETATION** chart indicates Bitcoin's price movements for the period 1 January 2018 to 27 June 2022. It is an opportunity to buy if RSI crosses a level of 30 lines either above or below and it still rising. But it's time to sell if it crosses 70 lines above or below. May & June 2019 and October – December 2021 shows the sell signal (selling opportunity), as the line crosses from above 70. The month of June 2022 shows a buy signal (buying opportunity) as the line crossed below 30. Overall, it is majorly underperforming indicating a bearish market. Even an underperforming market can still perform long-term, so in case of long-term investment, one can hold on to the cryptocurrency market.

MOVING AVERAGE CONVERGENCE AND DIVERGENCE

It is a momentum indicator that is used to show the relationship between two moving averages of prices. It is effective for finding changes in the strength, direction, momentum, and duration of a trend in a stock's price.

The MACD is calculated by the following formula: -

MACD=12-Period EMA minus 26-Period EMA

EMA= Exponential moving average

- The Signal Line in the MACD is typically a 9-day EMA of the MACD line.
- The Signal Line helps identify potential buy or sell signals. When the MACD crosses above the Signal Line, it may be a bullish signal, while a crossover below the Signal Line could be bearish

The MACD Histogram is derived by subtracting the Signal Line from the MACD line.

The Histogram provides a visual representation of the difference between the MACD line and the Signal Line, helping traders identify the strength of a trend.

The computational results which are a crucial element in technical analysis produce the MACD line which is calculated from the formula stated above by using closing prices for both. Following this, a nine-day EMA of the MACD, referred to as the "signal line," is overlaid onto the MACD line, functioning as a trigger for buy and sell signals. This line acts as an indicator to buy or sell if MACD crosses below it or above it respectively.

There are various ways to interpret MACD but prevalent methods are crossovers, divergences, and rapid rises or falls. Additionally, the MACD Histogram which shows the difference between the MACD and its 9-day EMA (the signal line), is positive when the MACD line is above its signal line and negative in the reverse case. This comprehensive analysis of the MACD contributes to a nuanced understanding of market trends and potential trading signals, offering valuable insights for traders and investors alike.

The conventional settings for the MACD involve default values of 12, 26, and 9, although traders can adjust these parameters according to their trading styles and goals.

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Key insights derived from MACD analysis encompass the following:

Technical Signals: The MACD generates signals when it crosses above the signal line, indicating a potential buy, or below the signal line, suggesting a potential sell.

Crossover Speed: The speed at which crossovers occur serves as a signal for determining whether a market is overbought or oversold. This dynamic aspect of the MACD aids traders in gauging the intensity of market conditions.

Price Movement: The MACD is instrumental in helping investors discern the strengthening or weakening of bullish or bearish movements in the price. This insight into price dynamics provides valuable information for making informed trading decisions.

The MACD crossover, symbolizing the intersection of the MACD line and the signal line, often indicates a shift in market momentum or trend. Widely acknowledged for its effectiveness, especially in trending markets, the MACD stands as a valuable tool for traders seeking nuanced insights into potential market movements, contributing to a more comprehensive and informed trading strategy.

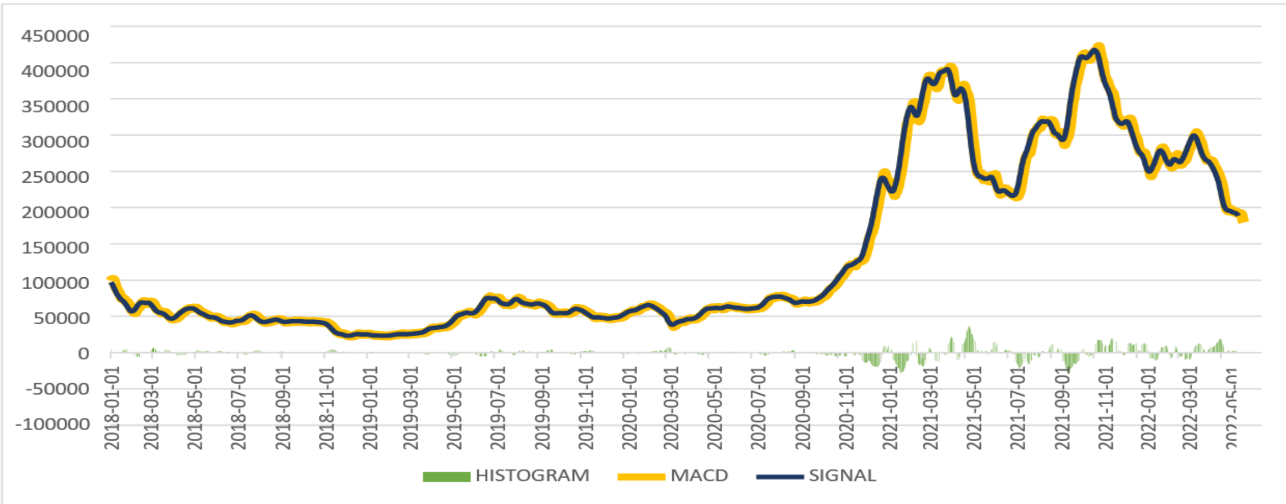

fig. 1.4 MACD CHART   Source- Trading View

The **INTERPRETATION** chart indicates Bitcoin's price movements for the period 1 January 2018 to 27 June 2022. Bitcoin had a bull phase in April 2021 and September 2021. This bull line crosses 0 in April 2021 and September 2021indicates the selling signal to the investors.

TECHNICAL ANALYSIS FINDINGS

Fig. 6.2.1 OBV-RSI-MACD CHART

INTERPRETATION

- The cryptocurrency market has been bullish for a considerable portion of 2021.

- Since the beginning of the year 2022, the price movements have shown a downtrend indicating a bearish market.

- Comparing all these 3 tools of technical analysis, shows that there has been a trend continuation and a positive relation in the trend direction and not much divergence.

- From a period of 2018 to 2020 there is a side-ways trend, which can be viewed as the stock is not able to cross a specific high and a specific low.

- From a period of 2021 to 2022(continued) there has been uptrends and downtrends. Considerably the price movements are continuously going up and down. The stock is going down and trying to come up but is not able to cross a certain high. The moment the price reaches a level high, the bears (sellers) are forced to put it down by selling the cryptocurrency. And again, the bulls (buyers) take charge, take the price to a higher level and again the bears are pushing the price downwards. The price is not able to cross a particular level i.e., the resistance level.

- From the analysis, it has been found that the cryptocurrency market is in a downward trend.

- The cryptocurrency market has continuous price fluctuations, indicating the market to be highly volatile.

- From the technical analysis of a cryptocurrency, using the OBV, RSI, and MACD, it can be concluded that the market is underperforming and providing a bearish market, thus giving a buying opportunity.

CONCLUSION

The findings from the research indicate that cryptocurrency holds the potential to revolutionize the traditional monetary system. It is currently in an evolutionary phase with limited adoption in India. In conclusion, this research paper delved into the intriguing realm of forecasting Bitcoin prices through the lens of technical analysis. Through an exhaustive examination of various technical indicators, we sought to unravel the complexities of predicting the future valuations of this dynamic digital asset. The volatile nature of the cryptocurrency market, particularly Bitcoin, presented both challenges and opportunities for traders and analysts. The research illuminated the nuanced relationship between Bitcoin's historical performance and its potential future movements, acknowledging the unique characteristics of this decentralized digital currency. The findings of this study contribute to the ongoing discourse on the applicability and efficacy of technical analysis in forecasting Bitcoin prices, offering insights that may guide traders and investors in navigating the complexities of this evolving market.

Utilizing technical analysis proves invaluable in guiding investment decisions, particularly evident in our study where we explored its efficacy in predicting potential future fluctuations in cryptocurrency prices. Our findings lead us to the general conclusion that technical indicators play a crucial role in determining optimal entry and exit points in the stock market. The application of these indicators has been shown to yield substantial profits for brokers and investors. However, it is important to note that the effectiveness of technical analysis hinges on its proper use, as it can provide valuable insights when applied correctly or yield false signals when used improperly. While trend lines have gained widespread popularity in technical analysis, it's essential to recognize them as just one tool among many for establishing, analyzing, and confirming trends. Rather than serving as the ultimate decision-maker, trend lines should be regarded as a valuable alert system, indicating that a change in trend might be imminent.

As the cryptocurrency market continues to mature and adapt, future research endeavors may explore additional factors influencing Bitcoin prices, such as market sentiment, regulatory developments, and macroeconomic trends. This study serves as a stepping stone in the broader exploration of forecasting methodologies for digital assets, providing a foundation for further inquiry into the ever-evolving dynamics of the cryptocurrency landscape.

SUGGESTIONS

1. Scalability Concerns: Acknowledge existing scalability issues and transaction speed disparities with the use of an advanced payment system.

2. Address the challenge of price volatility by exploring mechanisms to link cryptocurrency values to tangible and intangible assets.
3. Emphasize that increased adoption and widespread acceptance can foster consumer confidence, potentially reducing volatility.
4. Advocate for smart and informed investment decisions, possibly with professional guidance and individual research.
5. Promote a long-term investment approach over chasing short-term gains in the cryptocurrency market which are aligned with a strategic and sustainable investment mindset for long-term success.
6. Advise against relying on hot tips and emphasize the importance of using personal experience and judgment in cryptocurrency investments.
7. Market Volatility Response: Counsel against panicking during market drops and encourage patience. Suggest consulting knowledgeable professionals and acting based on a rational assessment of market conditions.

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