Global Journal of Machine Learning and Computing

ISSN : 3079-692X
Volume 1, Number 1, January, 2025
https://doi.org/10.70445/gjmlc.1.1.2025.93-112

Exploring the Role of AI-Based Sentiment Detection in Forecasting Crypto currency Market Swings and Its Spillover Effects on Consumer Confidence

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ABSTRACT

In this analysis, with the aid of AI sentiment detectors, it is investigated how it predict market changes in crypto currency and its effect on consumer trust level. Given the digital assets' high market volatility, the capacity of AI models to analyze big data (through processing of investor sentiment) through natural language processing and machine learning algorithms allows it to analyses the financial reports, news and social media of the target or other competitor digital assets. The insights are useful in predicting market trend and in optimizing and managing trading strategies. Crypto currency price changes impact financial stability of earthly markets because changes of crypto currency price will directly affect consumers' willingness to spend and their investment risk strategy. While the increasing chance capabilities of AI technology will offer crypto market evaluation and trading automation, fraud prevention, in addition, create new risks. The research talks about how Artificial intelligence helps in making market forecast and it describes how to resolve the ethical challenges and data precision problems so that financial sector can be made transparent.

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Article History:
Submitted: 23-02-2025
Accepted: 11-03-2025
Published: 16-03-2025

Keywords

AI-based sentiment detection, crypto currency market swings, natural language processing, machine learning, consumer confidence.

INTRODUCTION

Artificial intelligence systems are used by new financial market investors to analyze the trends in the market and take the decision. Natural language processing and machine learning AI tools allow

ISSN : 3079-692X
Volume 1, Number 1, January, 2025
https://doi.org/10.70445/gjmlc.1.1.2025.93-112

information across news outlets, social media platforms as well as financial publications to be combined to detect market sentiment. The shift in the prices of crypto currency from day to day discontinuously [1] makes the prices very difficult to predict or grasp, but AI based sentiment detection is pretty useful to predict price movements and direction in the market. While different from other financial items, a crypto currency has no basic value indicator, hence makes investor sentiments and trading expectations key to its value.

Changes to public mood on regulations and social media conversations on the matter immediately affect market behavior. Elon Musk's tweets, one in particular can cause the Bit coin and Doge coin market prices to go up and down with his public statements. AI systems that track public opinion in the market help to predict future price changes and this is what real time trading Monkey and investing decisions depend on. AI sentiment analysis has other applications than in crypto currencies. The market volatility of crypto prices seeps into other financial sectors and weakens the trust of the customers [2].

Sharp drop in crypto values increases the anxiety among the investors about the market and this reduces both buying and trading activity especially those who are major contributors to the digital currency investment which are mostly individuals. The gaming behavior that is caused by a rising positive crypto sentiment in the [3] market pushes stock prices up and makes the general consumer enthusiastic. Market analysts are now using sentiment detection on AI technology to develop their trading plans and decrease investment risk. AI systems in crypto use by the technology experts and professionals to predict those ones that they cannot predict because they are so complicated [4].

Nowadays, sentiment analysis tools are being utilized by central banks and federal regulators for analyzing crypto market characteristics and their financial impact. In this research, AI technology that identifies market moves of crypto currency and deduces consumer trust and economic decisions is analyzed. In explaining its value for financial data processing, we study economic benefits and technical difficulties of AI sentiment analysis tools [5].

UNDERSTANDING AI-BASED SENTIMENT DETECTION

Artificial intelligence based sentiment analysis tools study language data with a view of recognizing the emotional character of written content. It allows commercial entities automatically distinguish between good and bad feedback in order to track beliefs in the market and the behavior in the market. In [6], they mention that AI systems go through huge amounts of text derived from people's text-

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Volume 1, Number 1, January, 2025
https://doi.org/10.70445/gjmlc.1.1.2025.93-112

based feedback from online platforms and documents and measure what people feel. They analyze textual data using the word embedding methods and transformer systems such as BERT, GPT to spot regularities and assess market sentiment.

The dictionaries in which words are associated with some emotional rating that can be used as a basis for text analysis. It consists of a fetch routine, where the system will scrap the text of a certain page and then scrape it from their text content and check if the text contained certain keyword terms (not standardized on any existing measures of sentiment) and used their overall emotional rating. It can succeed to detect the simple sentiments from the text but fail with contextual understanding and it also cannot handle the sarcastic speech and fresh language trends [7].

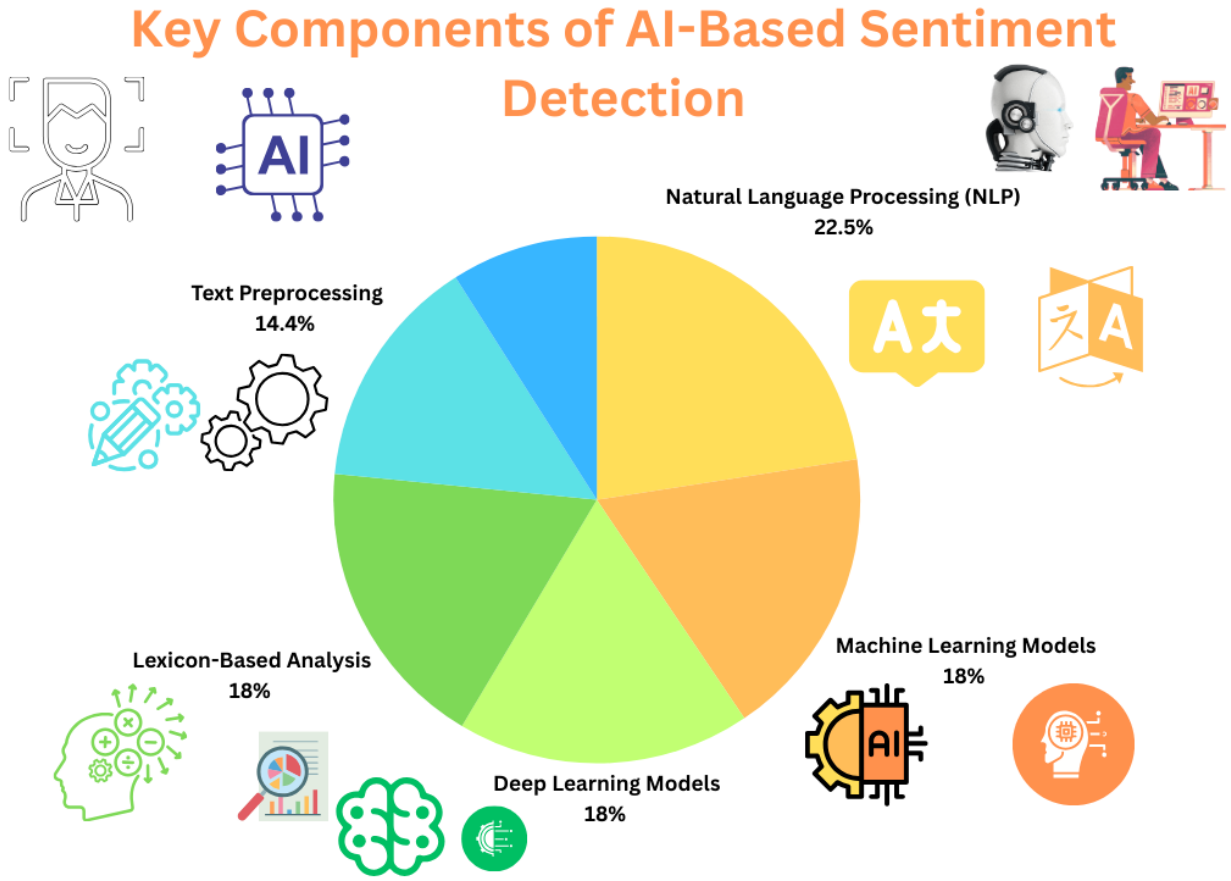

Figure: 1 showing key components of AI based sentiment detection

Using machine learning technology, the system trains the system to learn the sentiment pattern from labeled dataset data. Thus, model is trained with supervised learning so that it can learn the past examples and apply it to new text to classify it as positive, negative or neutral. Advanced support vector machines (SVM), recurrent neural networks (RNN) and convolutional neural networks (CNN)

ISSN : 3079-692X
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aid computers to identify user emotions with more accuracy [8].

Using Sentiment lexicon dictionaries and advanced machine learning methods, such a model while keeping both high precision and flexibility to achieve. It can quickly and process full messages therefore our approach helps specialist's to better track financial market feelings. [9] Sentiment detection systems assist investors to see how individual market reaction and global market change. When someone buys or sells something, they do it either based on their emotions or public opinion influenced by market participants in both crypto currency market as well as traditional stock market. Tools based on artificial intelligence analyze Twitter, Reddit and news media feeds to see what immediately changes opinions [10].

Better appreciation of market trend facilitates outperformance in crypto currency market by traders and investors who understand AI based sentiment detection. Now, since market traders, prior to the changes happening in the market, rely on the sentiment shifts to make necessary changes in their assets. AI sentiment analysis is now included in additional investment funds and large market participants' trading systems in order to detect future market movements [11]. In addition to its standard financial operations this AI sentiment detection tool is useful to market research, political analysts, and it provides better customer support. This tool is depended on by organizations to monitor their brand reputation while public officials use it to assess community views on accepted standards. Several key obstacles such as misunderstanding of sarcastic language and the manipulation of public sentiment via fake news lie in our way of reaching higher detection precision [12]. When used in financial markets, much more accurate predictions of crypto currency price are expected to be the future of the growth development of AI based sentiment detection technologies. Thus, crypto market participants use sentiment detection tools based on deep learning and real-time data analytics to better navigate the ever changing crypto universe [13].

THE ROLE OF SENTIMENT ANALYSIS IN FINANCIAL MARKETS

Sentiment analysis is used by financial market participants for receiving updated information of market direction and changes in investor's moods. Before the arrival of AI, markets employed both fundamental market research as well as chart patterns to predict the future actions of a market. According to public views and online sentiment, it becomes a recent market influence, and the integration into AI powered sentiment analysis contributes to better forecasting along with traditional methods [14]. Decisions are generated from both reason and emotion in the financial markets. There

ISSN : 3079-692X
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are market activities whose ups and downs occur according to the short term investor emotional trends and unexpected price reversals. When investor emotions are positive, they buy more, leading prices ratcheting up, whereas negative emotions make people panicking and sell all which causes the market to crash [15].

Finally the written matter posted from these sources will be analysed to detect emotional undercurrents.

- Financial news articles (e.g., Bloomberg, CNBC, Reuters)
- Social media platforms (e.g., Twitter, Reddit, Telegram)

Company profit announcements are, along with financial records, found by the public and then analyzed.

- Forums and investor discussions
- Government policies and regulatory announcements

APPLICATIONS OF SENTIMENT ANALYSIS IN FINANCIAL MARKETS

Traders use public opinion and market sentiment data to predict future market trends with the help of AI systems that provide public sentiment analysis. The market price of Bit coin and Ethereum positively increases because of the growth of social media's positive Bit coin and Ethereum discussion. Turns negative when public opinion suggests the risk of controls and security failures and might relate to the downward [16]. Sentiment based analysis is run under the algorithmic trading models for both Hedge funds and Institutional investor who places the trading order automatically according to the current market emotions by using the trading software that automatically evaluates and place the dealing order finding the emotional shifts in the market.

Investors use sentiment analysis to monitor markets to be able to predict at the early stages financial downturns, which will minimize risks. Speculative bubble is illustrated with the market sentiment towards an asset above normal levels, which forces the investors to slow down their approach [17]. Furthermore, investor emotions are highly subject to large financial events such as central bank actions, company releases and major conflicts as these alter their decisions to invest or withdraw money. .machine learning systems assess people's response to news events, and the data learned through this response is used to direct future actions. Investor feelings and (unconscious) instincts

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decide which investment to make; this has been shown in research in social psychology and market behavior. Instead of sticking to the value of investors respond to emotional market trends with shared buying or selling habits [18].

CHALLENGES IN SENTIMENT ANALYSIS FOR FINANCIAL MARKETS

However, sentiment analysis as referred to, provides useful insights on the financial markets, but has some key problems affecting its application.

- Because generally, it is quite difficult for AI systems to determine the right meaning of irony and sarcasm when the people are talking about finance.
- When automated machines put out bad information or when someone repeats false stories, the analysis becomes wrong.
- News updates are both processed on the stock exchanges and in crypto currencies very quickly so it is very difficult to collect the data of sentiment at exactly the right time.

First point is, because of the global nature of the financial world, the global financial system works in different languages and different cultural frameworks and therefore AI has to learn to deal with dealing with these situations. Financial markets are offered powerful tools for understanding the reaction of investors to the state of the market through sentiment analysis. Crypto currency investors develop better performance with the help of sentiment detection tools that are based on AI and machine learning technologies, given that they can handle market fluctuations [19]. Research in natural language processing, deep learning, and database analysis will help in the better forecast of sentiment based financial markets which further makes it vital in today's business world [20].

CRYPTO CURRENCY MARKET SWINGS: FACTORS AND INFLUENCES

Predominantly, the crypto currency market behaves very volatile because prices can fluctuate very fast over a short time frame. Unlike traditional financial market, the crypto currency market does not have an industry basis with centralized regulatory control to keep a check on speculations. Several market sentiments as well as the tech advances, rules and laws, economy patterns, and Traders investment behavior are the facts behind the crypto currency market movements [21].

The market of crypto currencies is volatile in price as traders decisions are based upon current market feeling and emotion. The trade prices of crypto currencies are mainly influenced as such currencies

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don't to have underlying income or dividend. Having stories in the news about users of social media platforms, influencers and other crypto currency players, can also create quick price changes of the crypto currency. Public excitement to buy before missing out on opportunity causes buying spikes and panic selling due to investors' uncertainty about risks [22].

Crypto currencies are still without the proper regulation in many areas, and the national governments are still establishing policies regarding how to interact with them. When the governments make a new policy decision, or introduce new crypto rules and taking legal action against crypto companies, market volatility arises [23]. The market usually exhibits optimism in the community and an increase in price when governments allow usage of Bit coin or promote crypto based ETF products. However, when governments take all action against digital currencies that involve bans and restrictions, this generates heavy selling pressure on the market and it has to reverse its trajectory [24].

The crypto trading space follows worldwide economic patterns even though cryptocurrency management happens without central oversight. Market actions based on inflation rates and interest rates plus changes in stock market performance shape crypto currency trading patterns. When investors worry about rising inflation they view Bit coin and other crypto currencies as protection against currency devaluation. Economic hardship makes investors move into crypto currency during tough times while they take profits from regular investments and affect trading values [25].

Technological Advancements and Network Upgrades

Network updates and improved block chain technology determine how investors change their crypto behavior and directly affect crypto currency market value. Ethereum's Move to Proof-of-Stake impacted product prices positively because investors expect improved performance and business growth prospects. Security flaws along with cyber hijackers destroy trust in a digital asset causing its market value to plummet.

The crypto market reacts quickly to big money transactions performed by whales because of fast inflows. Because crypto currencies have low market accessibility they are more likely to experience fraud and drastic price swings. Market activity shifts when large Bit coin or althorn holders known as whales execute substantial transactions [26]. Big market players trap small investors through quick stock selling and deceptive market boosting strategies. Crypto markets fully connect with traditional financial markets because of tighter market connections. Every financial market around the world directly connects to crypto currency trading. People save money in Bit coin during market instability

ISSN : 3079-692X
Volume 1, Number 1, January, 2025
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because they use it as an electronic security blanket.

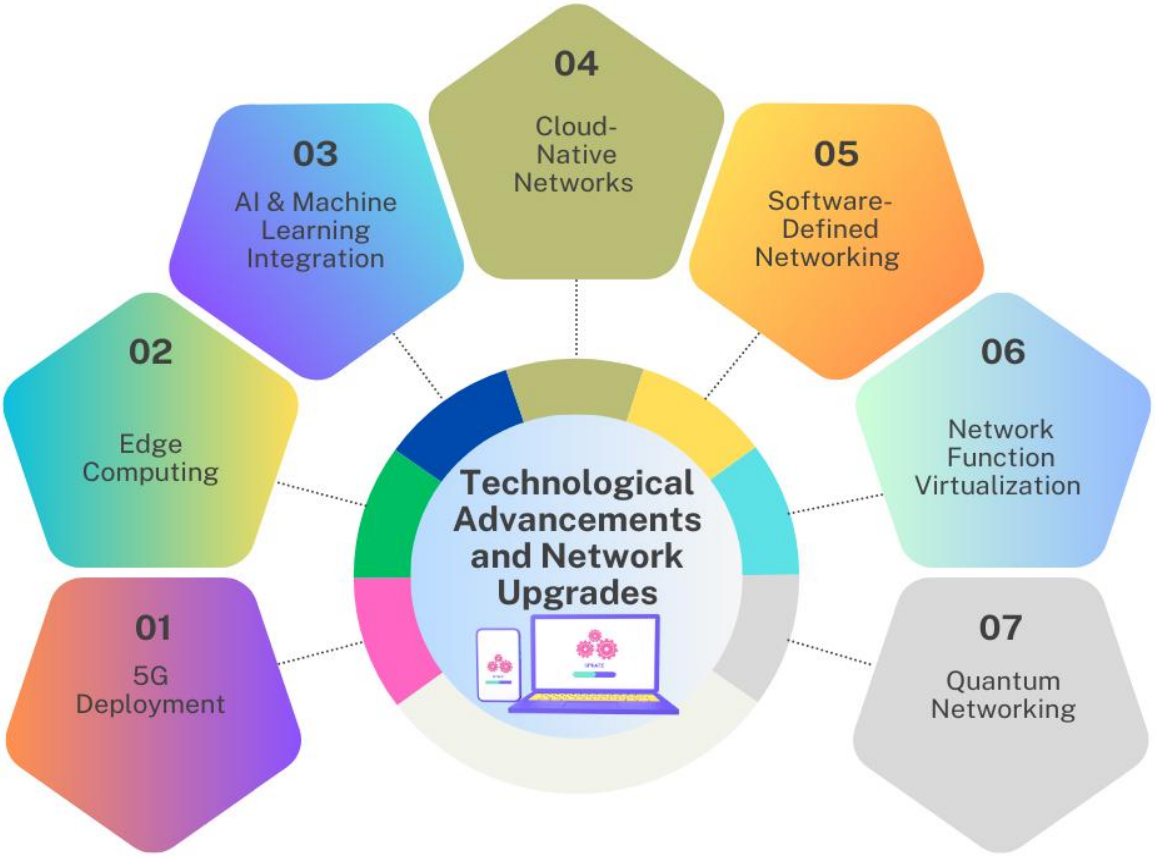

Figure: 2 showing technological advancements and Network Upgrades

Tech stock market losses impact the crypto market through their connection to investors who hold crypto and tech securities. Traders and investors need AI systems that track emotional market movements because crypto currency prices move erratically. AI tools examine today's news feeds and social feeds to find market mood shifts that point towards main future market changes [28]. Crypto market volatility emerges from intersecting influences between social perception of investments, government administration control, economic stability, breakthrough tech arrivals and digital asset transactions. Investors in crypto currencies act on market hype and speculation when they connect with social media networks.

AI-based sentiment analysis development offers investors new ways to track crypto market movements and predict its future direction [29]. AI systems that evaluate internet feedback allow companies to forecast market shifts in the crypto currency sector. The future price direction of digital assets remains hard to predict because basic financial analysis methods fall short in this field. The

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digital asset prices mainly follow what investors discuss online through various platforms. Textual data analysis systems operated by AI find upcoming market trends by processing natural language documents and big data with machine learning models.

HOW AI-BASED SENTIMENT DETECTION WORKS

Our system analyzes every piece of text information that it receives from multiple platforms.

- Social media platforms (Twitter, Reddit, Telegram, and Discord).
- Financial news websites and blogs.
- Crypto currency discussion forums (e.g., BitcoinTalk, CoinMarketCap discussions).
- Regulatory announcements and government reports.
- Company press releases and whitepapers.

Our AI system evaluates text content using technical methods to detect positive or negative emotions in normal and abnormal circumstances.

Matches words and phrases against a predefined sentiment dictionary. The system does supervised and unsupervised learning on pre-tagged datasets to determine sentiment. The advanced AI technology BERT, GPT and LSTMs reads complete texts for better insight into language variation. High-performing AI systems provide price trend updates directly to traders and analysts who can view current market sentiment trends.

AI-based sentiment detection supports computer systems alongside technical market indicators to forecast market behavior more accurately. The program reviews historical price emotions to locate emotions that cause familiar market patterns. Our system allows investors to detect market manipulation before other investors join in false buying techniques that increase prices to sell later. The technique monitors fast user activity growth on social media that AI detects as distinct from genuine growth trends. When AI deletes false online content its tools detect sentiment more precisely [32].

Important investors and hedge funds combine AI sentiment detection tools into their automatic trading platforms. The technical systems watch sentiment changes throughout the day and automatically place trades under given standards. HFT firms exploit artificial intelligence sentiment analysis to seek trading possibilities other traders follow behind them. Market conditions guide AI

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use because traders analyze market attitudes to predict market movements and adjust their risks. Investors offload their assets because they sense an upcoming market decline from the market's strong optimism. Investors can carefully enter trades during market negative emotional periods based on current studies [34].

Case Study: AI-Based Sentiment Analysis in Action: AI-powered sentiment monitoring affected crypto currency markets after Elon Musk shared his Bit coin and Doge coin tweets through social media channels. AI systems found emotional market reactions right after Musk released his tweets which helped investors predict upcoming jumps in prices. Hedge funds depend on real-time social media market emotions to make profit on market responses. The 2022 FTX bankruptcy news first surfaced through AI detection of online platforms becoming more negative which helped traders shift their investments to safe positions.

CHALLENGES IN AI-BASED SENTIMENT DETECTION FOR CRYPTO MARKETS

The system encounters multiple major problems despite its useful aspects. Computer systems often make mistakes by mistaking sarcastic speech and misunderstanding the context. Technology-controlled social networks and coordinated groups regularly share flawed information about market moods. Evaluating consumer feelings across multiple Internet systems creates serious privacy and moral concerns.

AI technology scans crypto currency market data to spot client feelings and purchasing power signals for market analysis and trading direction detection. AI solutions analyze large amounts of unorganized data to forecast market movements create trading platforms and reduce expected losses. Enhanced AI technology using deep learning will provide crypto market traders better future price predictions thanks to sentiment information [35].

SPILLOVER EFFECTS OF CRYPTO MARKET SWINGS ON CONSUMER CONFIDENCE

The major swings of crypto currency prices make clear changes that spread into how consumers feel about their money behavior and believe about the economy at large. More people use crypto assets and institutional investors enter this field to change how people think about their financial stability despite risks with their market sentiment [36].

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ISSN : 3079-692X
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Digital assets have transformed traditional trading platforms by creating new behavioral forces that base trading success on consumer trust levels. When crypto currency prices fluctuate they affect people's daily spending decisions directly and indirectly also influencing how companies feel about their markets and what national projections show [37].

The rise of crypto prices drives investors with big holdings to boost their financial state which lets them buy high-end items and purchase multiple homes plus vacation residences. When Bit coin hit $60,000+ in 2021 many retail investors took their profits and spending them boosted demand across technology, car and luxury product markets. When the crypto market falls investors worry more about their money and this leads them to decrease their spending on luxury items and portfolio investments [38].

Current changes in crypto currency values directly impact how retail and professional investors feel about their portfolios because they split investments between equities and digital currencies. When crypto markets experience deep crashes market confidence suffers heavily and leads to harm for global equity and fintech stocks as well as property investments [39]. The failure of Terra-Luna combined with FTX erased trust in investors and made them hesitate before funding crypto start-ups during 2022 [40].

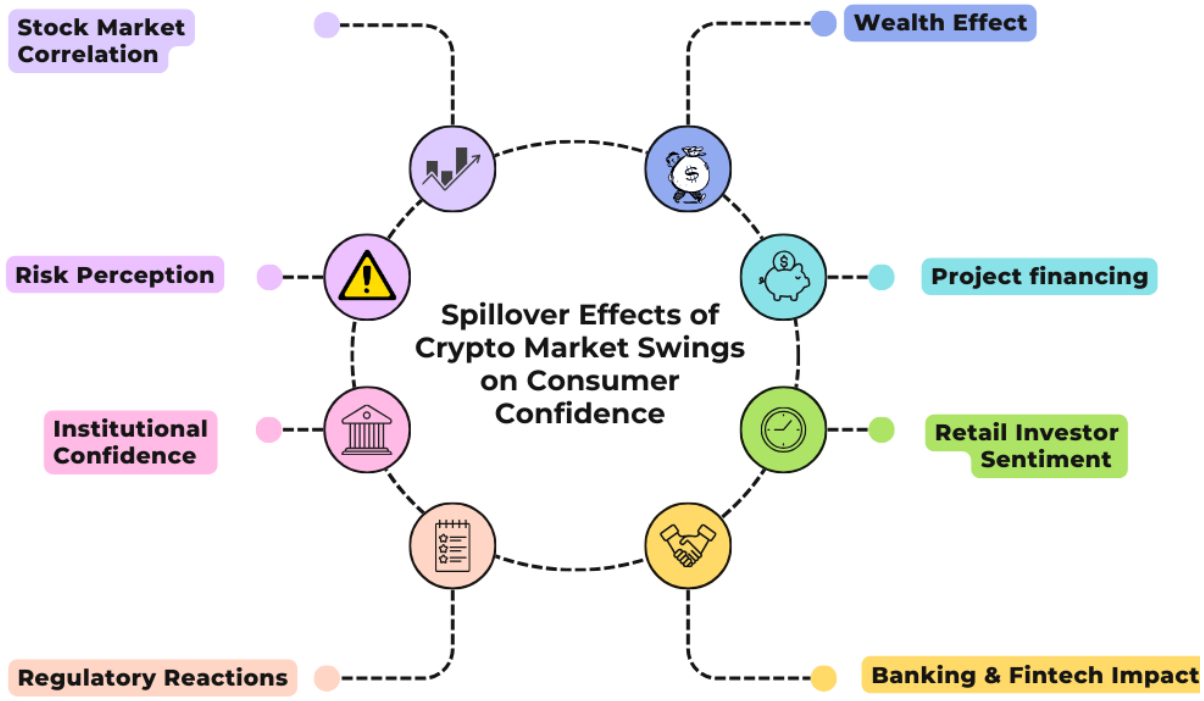

Figure: 3 showing spillover effects of crypto market swings on consumer confidence

ISSN : 3079-692X
Volume 1, Number 1, January, 2025
https://doi.org/10.70445/gjmlc.1.1.2025.93-112

The crypto currency markets thrive on traders who use emotion-based strategies because proving through basics does not guide their success. During months of increasing crypto prices people start taking bigger risks with their investments by adding risky assets such as meme stocks and NFTs to their holdings [41]. Rising market instability in negative periods leads retail traders to reduce their market activity and invest in safe holdings like gold and government bonds.

People lose faith in their banks when top centralized exchanges like FTX go bankrupt or suffer from funding problems. Digital asset financial troubles increase people's worries about the safety of the entire crypto industry whenever banks or finch institutions invest in these assets [42]. When governments control stable coins and lending platforms it alters people's thoughts toward banks plus crypto currency trading.

Some corporations, particularly in the tech and finch sectors, hold crypto currency on their balance sheets (e.g., Tesla, Micro Strategy). Weak crypto market results in business losses and reduces funding for block chain technology improvements while downsizing the crypto workforce. Strong crypto market results make companies more optimistic which leads them to give more resources to Web3 projects and block chain programs.

When the crypto currency market shows positive momentum more companies use digital payments and banks take actions to serve customers with crypto instruments. When crypt markets decline customers fear the future of crypto assets yet still take longer to use crypto technology. Countries that blend crypto into their economy through law or technology find their national mood toward spending linked to crypto market results [45].

Bit coin hit $20,000 by late 2017 but its rapid price drop lowered consumer spending and made investor’s show less risk. When Bit coin and Ethereum set new value records investors started many speculative deals which supported further NFT purchases and increased luxury purchases. The biggest crypto exchange collapse created market chaos and forced users to reduce trust in digital currency as financial markets sank [46].

The ups and downs of the crypto currency market affect how consumers trust its value and how companies plan their actions plus risk stands and economic disposition in the total structure. Crypto markets will keep growing in global economic significance because they link better to traditional financial activities. Crypto markets worldwide demand public organizations and banks to study new risk management and support methods to connect crypto currencies safely with money systems.

Global Journal of Machine Learning and Computing

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https://doi.org/10.70445/gjmlc.1.1.2025.93-112

FUTURE IMPLICATIONS: AI IN CRYPTO MARKET PREDICTION AND ECONOMIC STABILITY

The implementation of Artificial Intelligence technology for crypto currency market prediction has unleashed quick financial processes transformations for decision-making. So AI models develop progressively as predictive tools for markets which strengthen economic stability by managing risks better. Crypto currency volatility makes investor's institutions and policymakers implement AI-driven sentiment analysis and predictive analytics and automatic trading strategies to modify their digital asset market strategies [49]. The reactive capabilities of AI across crypto market prediction and economic impacts are likely to improve but such progress will continue beyond the current period. Standard financial infrastructure penetration by digital assets will lead to modifications affecting worldwide economies and individual investors as well as financial institutions and businesses [50].

How AI Will Shape the Future of Crypto Market Predictions

AI predictive models with machine learning and deep learning techniques alongside big data analytics allow for processing major real-time market data collections. The analysis performed by AI involves combining price movement data from the past with market sentiment data and liquidity measurements in order to detect market adjustments before market price alterations. AI-enhanced market forecasting leads to reduced market instability among users who use AI-based insights which in turn reduces opportunistic investment behavior [51].

Sentiment analysis at runtime depends on Artificial Intelligence models to scan blockchain data and both social media content and news articles to get market sentiment measures and investor pattern information. The detection of sentiment makes it possible for traders to monitor FOMO-driven increases and panic-based selling points so they receive better knowledge regarding the market. The AI-powered analysis of Twitter (X), Reddit and Telegram and Discord platforms becomes essential for achieving market stability because these platforms shape increasing numbers of crypto trends [52].

Real-time artificial intelligence systems monitor for atypical market transactions and detect various marketplace manipulation methods such as pump-and-dump systems. AI-based systems operated by

ISSN : 3079-692X
Volume 1, Number 1, January, 2025
https://doi.org/10.70445/gjmlc.1.1.2025.93-112

DeFi platforms and crypto exchanges will strengthen their ability to detect and prevent fraud attempts as well as insider trading activities and cyber-attacks. AI-based risk tools enable institutional investors to develop regulatory solutions and minimize volatility risks in their portfolios [53].

The efficiency of markets improves through Algorithmic Trading when AI-based high-frequency trading (HFT) strategies minimize price wilderness by boosting market liquidity. Hedge fund and institutional investors implement AI-powered bots into their trading systems to carry out trades at optimum market conditions thus maximizing market performance. The market adaptation capabilities of smart algorithms in trading lead to enhanced regulations for the crypto ecosystem alongside sustainable mechanisms [54].

Foundations together with economic organizations will unite their AI models for crypto currency risk management systems to defend against financial market disturbances. Central Banks which examine digital currency (CBDCs) through AI-driven analytics helped build stable market conditions when they bring crypto payments into traditional financial networks. AI systems provide regulatory development with risk evaluation data to help policymakers make their decisions [55].

CHALLENGES AND ETHICAL CONSIDERATIONS FOR AI IN CRYPTO

Numerous obstacles arise when using AI applications for crypto currency market prediction during the utilization phase.

- The accuracy of AI prediction models depends on reliable data so corrupted information results in unpredictable output values.
- Additional trading restrictions implemented by government authorities create operational challenges to the market whenever AI systems perform crypto currency transactions.
- Operating trading systems based on AI at extreme frequencies increases the possibility of self-generated system failures that parallel established market failures in previous years.

AI developments control crypto currency market prediction futures by establishing better risk assessment systems and stronger economic capabilities. AI growth will transform current investment methods into improved models while establishing government policies for crypto markets which leads to their efficiency development [56]. Complete financial system transformation under AI depends on ethical conduct along with regulatory standards for AI decision systems which must operate in an open manner.

ISSN : 3079-692X
Volume 1, Number 1, January, 2025
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CONCLUSION

Sentiment detection algorithms created by AI completely transformed the trading approaches used by financial institutions along with investors and traders for digital currencies. Price instability at high levels within crypto markets renders traditional market analysis ineffective for generating accurate price forecasts. This system brings together AI sentiment analysis and machine learning algorithms and big data processing to generate prompt market data on user behavior which results in better financial decisions. Crypto currency markets generate widespread effects which both damage consumer trust in the market and make economic conditions unstable. Consumer spending rises due to crypto asset growth whereas market crashes lead investors to reduce their financial risks thus pushing the economy toward slowing down. Crypto markets expanding into traditional financial systems will improve their influence on global economic mood and economic system stability.

The economic stability of crypto currency predictions will get better support through AI-based models which boost risk management functions and facilitate algorithmic trading systems along with better fraud detection mechanisms. Preventing flash crashes caused by misinformation as well as unexpected market movements depends on resolving data accuracy issues with AI systems and market manipulation problems arising from excessive AI system dependence. The implementation of sentiment detection through AI technology serves more purposes than crypto currency prediction since it shapes the ongoing evolution of financial markets. AI will create safer financial frameworks through responsible and ethical application of technology development throughout the future. For crypto currency markets to achieve secure evolution all policymakers and financial institutions and investors should form united efforts using AI while lowering market vulnerabilities.

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