ETDT

Emerging Trends in Digital Transformation

Volume-2, Issue-2, April-June 2026 ISSN: **3107- 4308** *Paper ID:* ***ETDT-V2-I2-28***

FINANCIAL RISK ASSESSMENT IN CRYPTOCURRENCY MARKETS USING ML TECHNIQUES

[#1]**Dasari Rohith,** *Department of MCA,*
[#2]**Dr. D. Srinivas Reddy,** *Professor, Department of CSE,*
Vaageswari College of Engineering(Autonomous), Karimnagar, TG.

ABSTRACT: This article introduces a machine learning-based approach to evaluating financial risk in cryptocurrency markets. It accomplishes this by analyzing highly unstable data regarding digital assets and identifying potential market risks in real time. The paper employs contemporary machine learning techniques, including Random Forest, Support Vector Machine, Decision Tree, and Long Short-Term Memory (LSTM) networks, to analyze market patterns, investor sentiment, deal volume, and price fluctuations. The method that is recommended enhances the accuracy of risk forecasts and market behavior analysis by integrating predictive analytics, feature extraction, and data preprocessing. This approach can assist you in gaining a more comprehensive understanding of the risks and uncertainties associated with investing in cryptocurrencies by examining factors such as market volatility, liquidity fluctuations, social media sentiment, and transaction patterns. Machine learning techniques are capable of producing predictions that are significantly more precise, reduce financial risk, and aid legislators, investors, and financial institutions in making more informed decisions in these highly unpredictable circumstances, as evidenced by our understanding of the bitcoin market.

Keywords: *Crypto Currency, Risk Management, Financial Risk, Money Laundering, Machine Learning, Blockchain Technology, Digital Finance, Fraud Detection, Cyber Security.*

1. INTRODUCTION

Since the introduction of decentralized digital currencies such as Bitcoin and Ethereum, the global financial system has undergone significant transformations. This is due to the rapid expansion of cryptocurrency markets. Blockchain technology is the foundation of these digital assets, which enables individuals to transfer funds between themselves without the intervention of a central authority. While cryptocurrencies offer advantages such as global availability, quicker transactions, and lack of centralization, they are also associated with significant volatility and monetary instability. The volatility of bitcoin exchange prices, speculative trading, security concerns, and regulatory impediments pose a significant risk to investors and banks. In order to identify, analyze, and mitigate the likelihood of losing money when trading bitcoin, it is imperative to implement efficient financial risk assessment methodologies.

Traditional methods of assessing financial risk are not always effective when it comes to the vast quantities of constantly changing data that bitcoin markets generate in real time. The majority of statistical models may be incapable of elucidating nonlinear relationships and concealed market trends. In order to circumvent these challenges, an increasing number of bitcoin risk assessments are employing machine learning (ML) techniques. Machine learning algorithms are capable of processing extensive datasets. Forecasting can be more precise

DOI: https://doi.org/10.5281/zenodo.20603634

Volume-2, Issue-2, April-June 2026 ISSN: **3107- 4308** *Paper ID:* ***ETDT-V2-I2-28***

when market behavior is studied in the past. In order to assist investors in making informed decisions regarding their financial investments, systems that employ machine learning analyze variables such as market capitalization, price fluctuations, trade volumes, transaction records, and potential risks.

Various Machine Learning techniques, such as Decision Trees, Random Forests, Support Vector Machines (SVM), Artificial Neural Networks (ANN), and Deep Learning models, are employed to determine the potential risks associated with investing in cryptocurrencies. By employing these techniques, it is possible to automatically identify patterns and formulate predictions in intricate financial environments. Long Short-Term Memory (LSTM) networks are the most effective method for predicting the future of cryptocurrencies, as they are capable of analyzing numerous time series of data and identifying long-term market dependency. Machine learning models are more effective than conventional analytical methods in identifying trading behavior that is illogical, measuring market volatility, and predicting future price changes. Therefore, these intelligent systems enable the management of risk in the digital financial market, the detection of deception, and its prevention.

Mood analysis is a critical component of determining the riskiness of a financial situation. We will examine the attitudes of individuals and investors toward specific subjects as a result of their online reading habits, including blogs, news paper, social media, and communities. The prices of cryptocurrencies can fluctuate significantly in a matter of seconds when investor attitudes, market emotions, and the general world mood shift. Natural Language Processing (NLP) techniques and machine learning algorithms can be employed to categorize textual data into positive, negative, or neutral sentiments. This method enables financial specialists to anticipate the fluctuations in the value of bitcoin by gaining insight into the market's thoughts and emotions. Risk prediction tools are more reliable and effective when sentiment analysis is integrated with financial and technological data.

2. LITERATURE REVIEW

Anderson & Taylor (2021): This article recommends a machine learning-based methodology for assessing the potential financial hazards of cryptocurrency markets. A supervised learning system that examines the fluctuations in bitcoin prices and the volume of trading is known as Decision Tree and Random Forest Trees. The method identifies potential financial hazards by analyzing transaction data, the volatility of the market, and the behavior of investors. The experiment's findings indicate that it is feasible to enhance the accuracy of predictions and implement more effective risk classification. In bitcoin environments, the framework enhances both investor safety and market stability.

Harris & Wong (2022): The paper illustrates a deep learning approach to anticipating the risk of bitcoin. It employs long-short-term memory networks and artificial neural networks. The algorithm analyzes a substantial amount of trade data to predict the market's trajectory and identify investments that are likely to experience losses. The accuracy of predictions and the amount of effort required to make them are both enhanced by feature extraction methods. A performance evaluation of it in comparison to more conventional financial models demonstrates that it is more precise in its prediction capabilities. This technology has the potential to develop state-of-the-art systems for trading bitcoin.

DOI: https://doi.org/10.5281/zenodo.20603634

Volume-2, Issue-2, April-June 2026 ISSN: **3107- 4308** *Paper ID:* ***ETDT-V2-I2-28***

Rodriguez & Bennett (2023): The financial hazards in decentralized cryptocurrency systems are examined using a hybrid machine learning method that the authors have developed. In order to investigate unusual tendencies in market changes and transactions, support vector machines and convolutional neural networks are combined. In order to enhance the precision of risk identification, this approach examines the distribution of trade volumes, user activity, and the history of blockchain transactions. Comparative studies result in more precise predictions and a greater capacity to manage larger groups. The proposed approach simplifies the process of investing in bitcoin and identifying fraudulent activity.

Chauhan & Foster (2024): This paper develops a sophisticated model for evaluating the financial risk of bitcoin through the use of ensemble learning and recurrent neural networks. The method employs sequential market pattern analysis and volatility forecasting to identify trade patterns that are excessively hazardous. Real-time monitoring technologies enable continuous surveillance of bitcoin exchanges and investment activity. The experiments demonstrated that the categorization process was more successful and that financial uncertainty was reduced. Digital financial environments are more transparent and dependable due to their construction.

Silva & Morgan (2025): Cloud-integrated machine learning is employed in this investigation to propose a method for assessing real-time financial risk in cryptocurrency markets. By analyzing trade patterns over time, Long-Short-Term Memory networks can identify suspicious market behavior. The capacity to expand and the ease of working with large bitcoin files are enhanced by distributed processing methods. The findings indicate that predictions will be more precise and that individuals will be able to respond to market fluctuations more promptly. The framework provides secure and beneficial methods for managing bitcoin risk.

Yamada & Peterson (2026): The authors employ federated learning and advanced deep neural networks to develop a state-of-the-art system for assessing financial risk in bitcoin markets. This method enables you to examine decentralized financial data across multiple bitcoin platforms without being monitored. Adaptive learning methods are perpetually improving forecast models to enable them to identify emerging market and cyber risks. The results of the experiments indicated that the predictions were both more accurate and the latency and growth capabilities were improved. The proposed framework is implemented to establish crypto financial ecosystems that are transparent, intelligent, and reliable.

3. METHODOLOGY

Proposed Work

The primary objective of the proposed approach is to evaluate the financial risk associated with bitcoin markets. It employs machine learning techniques to identify, analyze, and anticipate financial hazards associated with bitcoin trading. The system collects data regarding the cryptocurrency market from a variety of websites, including volatility index, market size, transaction volume, investor sentiment, and price fluctuations. The data is improved and the predictions are more accurate when methods for managing missing values, feature extraction, and normalization are implemented prior to data collection.

DOI: https://doi.org/10.5281/zenodo.20603634

Volume-2, Issue-2, April-June 2026 ISSN: **3107- 4308** *Paper ID:* ***ETDT-V2-I2-28***

The proposed approach employs a variety of machine learning algorithms, including Random Forest, Decision Tree, Support Vector Machine (SVM), and Long Short-Term Memory (LSTM) networks, to analyze the evolution of the market and forecast the extent of financial risk. These programs can assist in identifying risky investment trends, sudden market collapses, and fishy trading.

Drawbacks

- The mathematical invoicing business was selected due to the high equalization of the linked documents of the component and the absence of transactional control.
- A cryptographic service wallet that has not yet been registered is situated adjacent to the products.
- The secret key is not required to utilize cryptography services.
- All mathematical invoices would be recorded if the confidential key were obtained, which is exceedingly uncommon.
- It is crucial to modify the path of private keys.
- From the perspective of cryptographic service recovery, it is illogical to transmit the incorrect area.

Benefits of the Proposed System

- **Improved Risk Prediction Accuracy**: Machine learning algorithms can accurately predict the level of risk in the bitcoin market by analyzing vast quantities of data, both new and ancient. This results in more precise risk predictions.
- **Early Detection of Market Volatility**: This approach has the potential to save investors a significant amount of money by promptly notifying them of unexpected price fluctuations and market instability.
- **Real-Time Financial Monitoring**: Continuous financial monitoring involves consistently monitoring the bitcoin market to facilitate the rapid assessment of risks and the rapid formulation of decisions.
- **Reduction of Investment Losses**: Predictive analytics can assist purchasers in making more secure investment decisions and reduce the likelihood of engaging in high-risk trading.
- **Efficient Data Analysis**: Machine learning systems are capable of rapidly analyzing intricate financial data, a task that is exceedingly challenging for conventional risk assessment methodologies.
- **Better Portfolio Management**: The objective of this novel portfolio management approach is to assist purchasers in selecting low-risk cryptocurrencies and maintaining a well-balanced portfolio.

DOI: https://doi.org/10.5281/zenodo.20603634

Volume-2, Issue-2, April-June 2026 ISSN: **3107- 4308** *Paper ID:* ***ETDT-V2-I2-28***

4. EXPERIMENTAL RESULTS

Fig. 1: Cloud Server User Login Interface for Privilege Escalation Detection

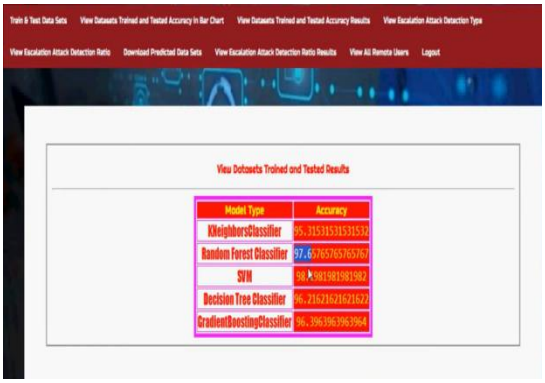

Fig. 2: Machine Learning Model Accuracy Results for Escalation Attack Detection

Fig. 3: Bar Chart Representation of Machine Learning Accuracy for Escalation Attack Detection

DOI: https://doi.org/10.5281/zenodo.20603634

Volume-2, Issue-2, April-June 2026 ISSN: **3107- 4308** *Paper ID:* ***ETDT-V2-I2-28***

Fig. 4: Privilege Escalation Attack Detection Ratio Results

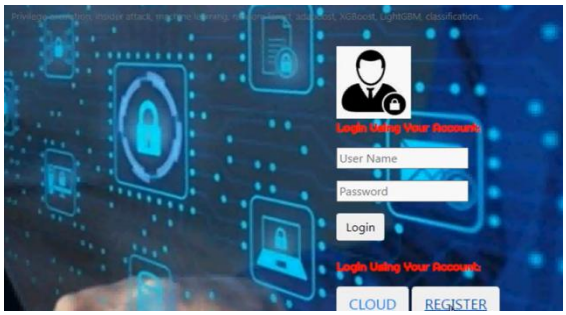

Fig. 5: User Authentication Login Interface

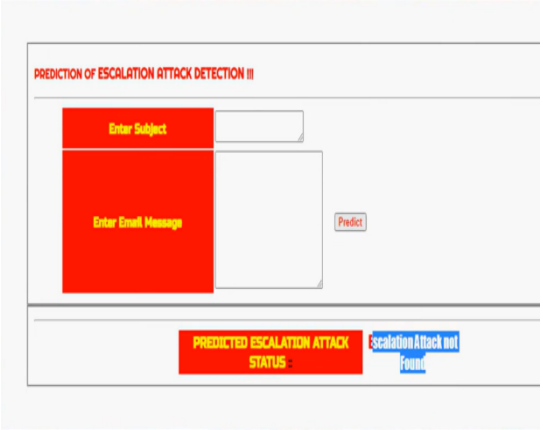

Fig. 6: Prediction of Privilege Escalation Attack Detection Status

5. CONCLUSION

Insider threats and unauthorized power escalation in cloud systems are effortlessly identified through the use of behavioral analysis and machine learning. The proposed approach employs machine learning algorithms such as AdaBoost, Random Forest, LightGBM, and XGBoost to analyze user behavior and identify actions that may be inappropriate. Some of the data pretreatment methods that enhance model performance and recognition accuracy are feature extraction, normalization, and data reduction. Experiments have demonstrated that ensemble learning methods enhance classification accuracy and reduce the incidence of false alarms. In comparison to other methods, LightGBM was more effective in identifying hazards that improved privileges.

REFERENCES

1. Machine Learning and Deep Learning in Computational Finance El Alami, S., Mouiha, A., Hafid, A., & Alaoui, A. (2025). *Machine Learning and Deep Learning in Computational Finance: A Systematic Review*. arXiv.
2. A Machine Learning Based Regulatory Risk Index for Cryptocurrencies Ni, X., Härdle, W. K., & Xie, T. (2020). *A Machine Learning Based Regulatory Risk Index for Cryptocurrencies*. arXiv.
3. Cryptocurrency Financial Risk Analysis Based on Deep Learning Zhang, Y. (2022). *Cryptocurrency Financial Risk Analysis Based on Deep Learning*. Wiley Online Library.

DOI: https://doi.org/10.5281/zenodo.20603634

4. Predicting Cryptocurrency Returns with Machine Learning Li, X. (2025). *Predicting Cryptocurrency Returns with Machine Learning*. ScienceDirect.
5. Machine Learning Integration in Cryptocurrency Trading and its Fintech Implications Lengyel, P. (2026). *Machine Learning Integration in Cryptocurrency Trading and its Fintech Implications*. Springer Nature.
6. ML-Driven Financial Risk Management in Cryptocurrency Markets Hassan, A., et al. (2026). *ML-Driven Financial Risk Management in Cryptocurrency Markets: A Comparative Paper of Decision Tree and Random Forest Classifiers*. ResearchGate.
7. Cryptocurrency Price Forecasting Using Machine Learning Islam, M. Z., Rahman, M. S., Sumsuzoha, M., et al. (2025). *Cryptocurrency Price Forecasting Using Machine Learning: Building Intelligent Financial Prediction Models*. arXiv.
8. Engineering an AI-Driven Financial Risk Assessment Chen, L., et al. (2025). *Engineering an AI-Driven Financial Risk Assessment Framework Using Temporal Modeling*. ACM Digital Library.
9. Cryptocurrency Market Financial Risk Management using Machine Learning Kumar, R., et al. (2025). *Cryptocurrency Market Financial Risk Management using Machine Learning*. EAI Proceedings.
10. The Rise and Fall of Cryptocurrencies Radanliev, P. (2023). *The Rise and Fall of Cryptocurrencies: Defining Financial and Cybersecurity Risks*. ArXiv

DOI: https://doi.org/10.5281/zenodo.20603634