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# Economic Risk Control in the Cryptocurrency Market Using Machine Learning

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**ABSTRACT:** Cryptocurrency has gained widespread popularity as a financial asset globally, but it comes with several inherent risks that impact the assessment of risk auditors. One major risk associated with the rapid growth of cryptocurrency is its potential use for money laundering. Financial institutions, including banks and their compliance officers, face challenges in dealing with transactions involving cryptocurrencies, as these can be used to hide illegal funds.

This study explores the use of Hierarchical Risk Parity and unsupervised machine learning in the context of the cryptocurrency framework. The aim is to analyze the inherent risks associated with cryptocurrencies, considering factors such as the likelihood of their occurrence and their potential financial impact. Two significant risks identified are the unauthorized access to private keys and the relatively high likelihood of occurrence.

Professional experience in cryptocurrency transactions appears to reduce the overall risk when compared to less experienced individuals. Utilizing Hierarchical Risk Parity provides better risk management results by tailoring the adjusted risk levels.

The results of the study demonstrate that the proposed model is robust across various intervals and re-balanced scenarios, enhancing the estimation of covariance window and overall risk management.

**KEYWORDS:** Cryptocurrency, Economic Risk, Machine Learning, Risk Management.

## I. INTRODUCTION

The digital currency's significance is growing fast as a result of its relevance in the field of electronic trading, which is crucial in the new financial system. Even though the notion of digital currency is not new, utilizing this kind of cash has expanded significantly. Money is not kept in banks or safes, but it is available in cyber world processors and storage, and it is sold in the form of information. The primary goal of such technology is to improve payment efficiency. Until now, the rules for digital currency No mechanisms have been set up, and thus its There are no restrictions. established, thus customers communicate in the absence of authorities.

Prespecified range of supply should be guaranteed for virtual currency, and Bitcoin is an obvious example for this limitation (21 million of Bitcoins is the whole amount issued) [6]. Virtual currency and cryptocurrency are sorts of the digital currency. Bitcoin is now leading the new form of currency (virtual currency), and it forms about 93% of the market of cryptocurrency [7]. There was an extreme fluctuation of Bitcoin exchange rate; on January 1<sup>st</sup>, 2013, the rate was 13.30\$ for each one Bitcoin, but This price was raised dramatically to be \$1.147.25 in December 4<sup>th</sup>, 2013; however, on March 1<sup>st</sup>, 2015, the price went down to be \$258.97. The strong fluctuation in Bitcoin exchange rate made big opportunity and high risk in the same manner to the investors [8]. In addition to the huge fluctuation, there are other issues in the risk field. Theft risk exists; in 2014 this type of risk was highlighted by Mt. Gox Bitcoin exchange. Bitcoin dealers, especially buyers, also face risks of fraud from some fraudulent sellers, which was confirmed by the US Securities and Exchange Commission. Digital currency pricing is founded on traditional pricing principles. The key risk in dealing with digital money, however, is the systematic and fluctuation risk in the pricing process; consequently, this In this research, we'll analyze these two categories of risks, while ignoring theft and fraud concerns. Nonprofessional investors may view the high volatility in digital currency prices as a dangerous investment, while professionals in the financial area would not put all of their eggs in one basket. As a effect, they will want to

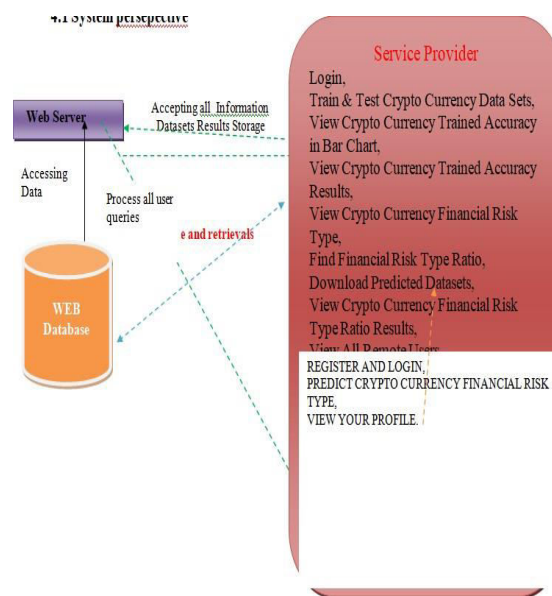
diversify their purse as much as possible in order to avoid or at least minimise risk; they prefer to Deal with the resources that not impacted by market fluctuations in order to prevent the asset risk known as volatility.

## II. LITERATURE SURVEY

The financial market is a complex system, but its definition of complexity has not been universally accepted by universities, leading to disagreements about how its elements interact. Modeling complex systems is a challenging task, especially when considering their hierarchical organization with interconnected subsystems [1]\_[3], commonly referred to as hierarchical models. One significant challenge in portfolio construction is the absence of a correlation matrix in hierarchical structures, which exacerbates issues with large covariance matrices.

Over the past few decades, the cryptocurrency market has seen the emergence of approximately 2500 different cryptocurrencies, with a combined trading value of around 252.5 trillion dollars [4][6]. *This market operates in a somewhat chaotic environment* [7][10], and news publishers have shown keen interest in tracking price changes and market activities closely. Rules and regulations have been established to protect investors and prevent money laundering and market manipulation.

Despite these efforts, the cryptocurrency market experiences significant price fluctuations. Lahre et al. [11] proposed a strategy called Hierarchical Risk Parity (HRP) for multi-asset multi-factor allocation, which has shown promising results in managing tail risk.



Fig[1] System Architecture

### EXISTING SYSTEM:

Hierarchical Risk Parity (HRP) technique for multi-asset multi-factor allocation that provides good tail risk outcomes. Furthermore, the same method was used for individual equities to match the NIFTY 50 indices. analyses and assesses the performance of several HRP variants (HERC and HCCA). utilises the mean-variance framework to analyse bitcoin portfolios based on the Markowitz optimisation with a high ratio. To decrease processing complexity, localised spectral graph convolution is used. It is recommended that and polynomial approximate expansion be used. Yu et al. developed the ST-block, which consists of graph and sequence layers of convolution. By using a convolution method, it may capture spatiotemporal correlation Non- spectral approaches do the adjacent matrix convolution directly, and the pooling step is substituted by sparsening the neighbouring matrix Later, the graph attention neural network (GAT) is developed to update node information using the attention mechanism Graph models are furthermore created in conjunction with other frameworks. presented a link between cryptocurrencies



founded on the highest frequency. The offered system generates important marketing information and allows the agent to enhance the system's stability. Rather than the naively diversified (1/N) method, it displays the estimate mistake in terms of return estimation.

Similarly, they employed the Black Litterman model based on variance constraints to enable the advanced portfolio methodology for estimating control of the simple cryptocurrency management techniques. To count the traders' and investors' diverse behaviour, the wavelet-based methodology for cryptocurrency multi-scale dynamic interdependence amongst liquid cryptocurrencies was used. To break down the spectrum of trading strategies, compare the different trading rules in relation to average-oscillator.

#### PROPOSED SYSTEM:

- Using Hierarchical Risk Parity for the bitcoin portfolio employing artificial intelligence approaches.
- The suggested approach may assess professional accounting based on the related risk of cryptocurrencies and the impact that financial statements are projected to have.
- Identifying the fundamental risks that are adversely associated in cryptocurrencies.
- Using the likelihood evaluation, rank the exchange level control risk.
- Identifying the cryptocurrency with the highest potential of danger.
- The proposed system implements a graph-based theory and using the machine learning techniques, the proposed system is processing in the following way.

#### III. CONCLUSION

In this study, the risk management of crypto currency network analysed using the Reinforcement Learning (RL) technique and asset allocation method named as Hierarchical Risk Parity (HRP) that applied in crypto currencies portfolio. Reinforcement learning gives a high performance evaluation results as compare to other machine learning techniques have been used in this area. The main reason of applying RL in this process is the learning-based aspect of this approach which gives the opportunity to system structure to get the high accuracy in term of giving the right information to system. Moreover, the HRP has the highest properties and desirable diversification. The results analyzed using various estimation windows and methodologies and similarly re-balancing the selected period. The applied HRP gives the transitional asset allocations meaningful alternative and improve the risk management process. In future research, the proposed technique will extended by applying out-of-sample testing performance in more assets and classes and using techniques of optimization to get better performance in term of risk management.

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