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REAL-TIME CLASSIFICATION OF HIGH VARIANCE EVENTS IN BLOCKCHAIN MINING POOLS

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ABSTRACT

Because of its decentralised and secure ledger structure, blockchain technology has brought about a revolution in the technical and financial industries. Mining pools, which are groups of miners working together to maximise the likelihood of solving cryptographic problems and collecting rewards, are an essential component of the blockchain ecosystem. High variance events, on the other hand, may have a substantial influence on the performance and security of mining pools. These events include rapid spikes in transaction volumes, unexpected changes in mining difficulty, and network assaults. The categorisation of these high-variance occurrences in real time is very necessary in order to keep mining operations stable and preserve their efficiency.

This study proposes a unique technique for real-time categorisation of high variance events in blockchain mining pools. The approach is presented in this paper. In order to recognise and classify unusual occurrences as they take place, we present a system that makes use of sophisticated machine learning algorithms and statistical analysis. Transaction logs, hash rates, and network metrics are among of the types of data that are included into the framework from many different sources that are contained inside the mining pool. Our technique makes it possible to spot unexpected patterns in real time, which may be an indication of potential dangers or operational inefficiencies. This is made possible by the use of real-time analytics.

The framework that has been suggested is made up of numerous essential components. In the first step of the procedure, we build a data preprocessing module that will clean and standardise the data that was gathered from the mining pool. We next proceed to find significant characteristics that contribute to the identification of high variance occurrences by using approaches that are associated with feature extraction. After the characteristics have been extracted, machine learning methods like decision trees, random forests, and neural networks are used in order to categorise the events based on the properties that have been extracted. The model is trained using historical data in order to improve the accuracy of its predictions and the resilience of its results.

Not only does our framework include categorisation, but it also includes an alerting system that provides mining pool operators with real-time notifications of abnormalities that have been identified. Consequently, this makes it possible to intervene and mitigate any problems in a timely manner before they become more serious. Furthermore, we carry out an exhaustive assessment of the framework by making use of a dataset that is derived from a real-world mining pool. This evaluation evaluates the framework's performance in terms of accuracy, precision, recall, and computing efficiency.

The findings provide evidence that our methodology is successful in detecting occurrences with a high degree of variation with a high degree of precision. Our architecture not only enhances the operational resilience of mining pools, but it also makes a contribution to the wider area of blockchain security by delivering a powerful instrument for the categorisation of events that occur in real time. Refining the framework to handle situations that are becoming more complicated and incorporating new data sources in order to improve predictive skills will be the primary emphasis of this effort in the future.

***KEYWORDS**: Real-Time Classification, Blockchain Mining Pools, High Variance Events, Machine Learning, Anomaly Detection, Statistical Analysis, Operational Efficiency*

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