CryptoTrace - AI Powered Cryptocurrency Transaction Tracing Platform

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Abstract:

The decentralized and pseudonymous nature of cryptocurrencies presents considerable obstacles in monitoring financial activities, thereby increasing their vulnerability to misuse in activities such as money laundering, terrorist financing, and other illegal operations. This study proposes a two-pronged strategy to enhance the transparency and security of blockchain networks. The first component involves monitoring cryptocurrency transactions, specifically Bitcoin and Ethereum, through an integration of blockchain technology with advanced data analytics and machine learning methodologies. Leveraging blockchain's inherent properties-immutability, decentralization, and security-the approach analyses transaction data to uncover patterns and detect anomalous behaviour, while maintaining user privacy. Demonstrated on live blockchain networks, this methodology has shown promise in identifying suspicious transactions and supporting financial regulators in mitigating fraudulent exchanges and high-risk activities. This work emphasizes blockchain's role as a pivotal tool for risk mitigation and secure cryptocurrency adoption.

The second component of the study addresses a critical gap in blockchain research: the lack of robust, publicly accessible datasets for intrusion detection system (IDS) evaluation. Current datasets often exhibit deficiencies, including inadequate transaction representations and limited feature sets, leading to elevated false alarm rates in real-world applications. Additionally, privacy and copyright concerns restrict dataset availability, further hindering research progress. To overcome these challenges, this study presents a curated dataset derived from authentic Ethereum transactions, optimized for benchmarking IDS performance. This resource provides a diverse and feature-rich representation of blockchain activity, enabling researchers to design and evaluate more reliable and effective detection systems. Collectively, these efforts aim to bolster the security infrastructure of blockchain ecosystems and support their adoption across financial and technological sectors.

Keywords:

VR, AR, Blockchain, NFT, Web 3.0, Metaverse.