CERIAS
The Center for Education and Research in Information Assurance and Security

UMIT²
Ubiquitous and Mobile Investigative Techniques and Technologies Lab

Weighted Anomaly Detection and Arbitrage Analysis: A Blockchain Forensics Framework Leveraging Bitcoin and Dogecoin Transactions
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OVERVIEW

This project developed a blockchain forensics framework focused on anomaly detection and arbitrage analysis using Bitcoin and Dogecoin. The framework utilizes the Isolation Forest model to dynamically detect trading anomalies and explore bilateral arbitrage opportunities between these cryptocurrencies. By leveraging advanced statistical models and real-world transaction datasets, the framework aims to enhance the efficiency and effectiveness of blockchain investigations.*(Under review of DFRWS USA 2025)*

Contribution

1. Identify Trading Anomalies: Use dynamic anomaly detection techniques to identify irregular transaction patterns that may indicate fraud or market manipulation.

2. Explore Arbitrage Opportunities: Analyze potential arbitrage between Bitcoin and Dogecoin, focusing on cross-chain price discrepancies and transaction timing.

3. Enhance Forensic Tools: Provide an open-source implementation of the framework to facilitate broader application and reproducibility in blockchain forensics.
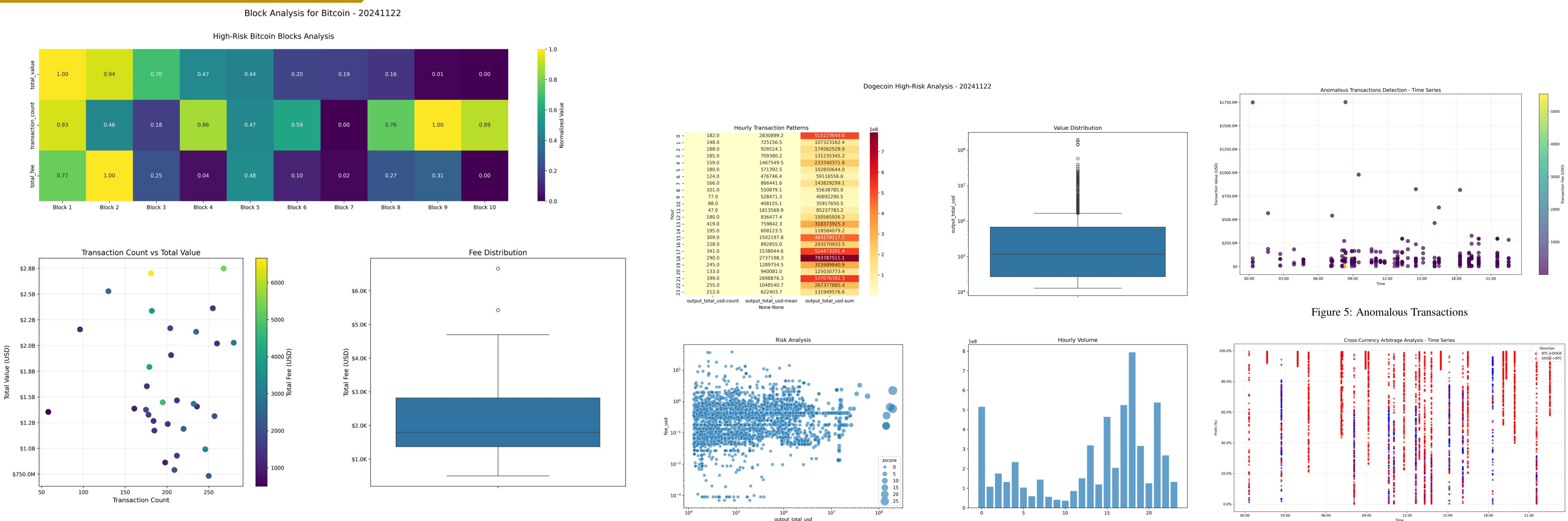
METHODOLOGY
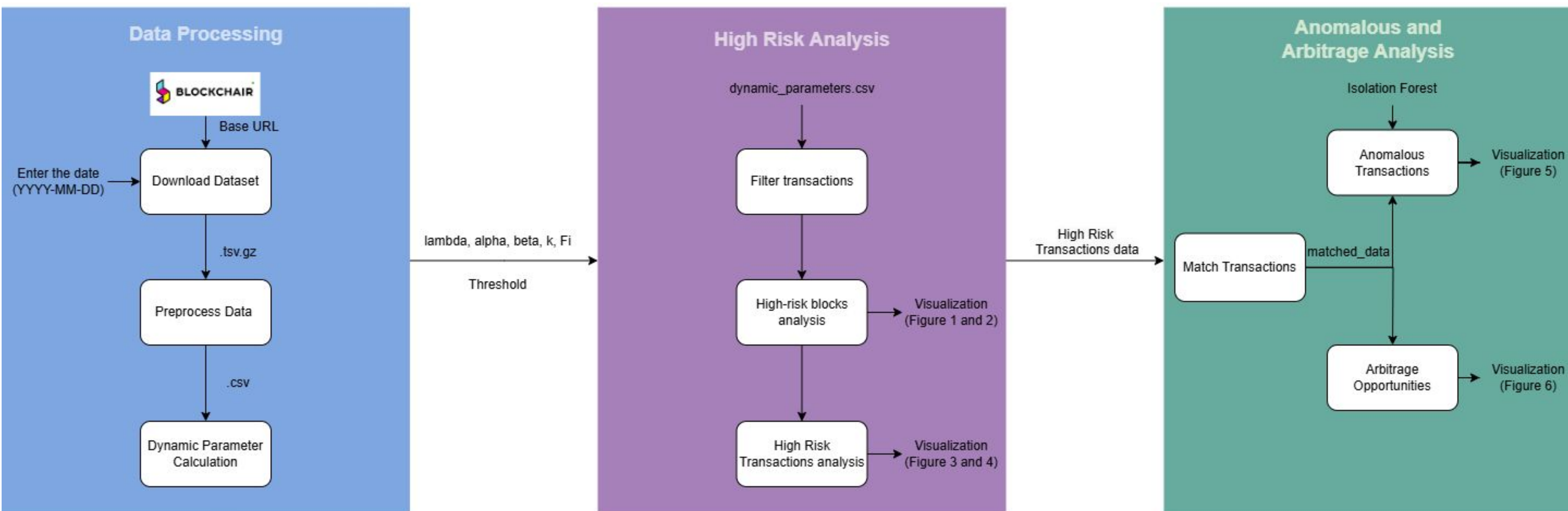
CASE STUDY

Figure 1: High Risk Bitcoin Blocks

Figure 4: High Risk Dogecoin Transactions

Figure 5: Anomalous Transactions

Figure 6: Arbitrage Opportunities

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