BTCSleuth Analysis Report

Bitcoin Transaction Anomaly Detection Analysis

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Report Downloaded: 2025-08-11 22:35:31

Analysis Performed: 2025-08-11 22:34:56

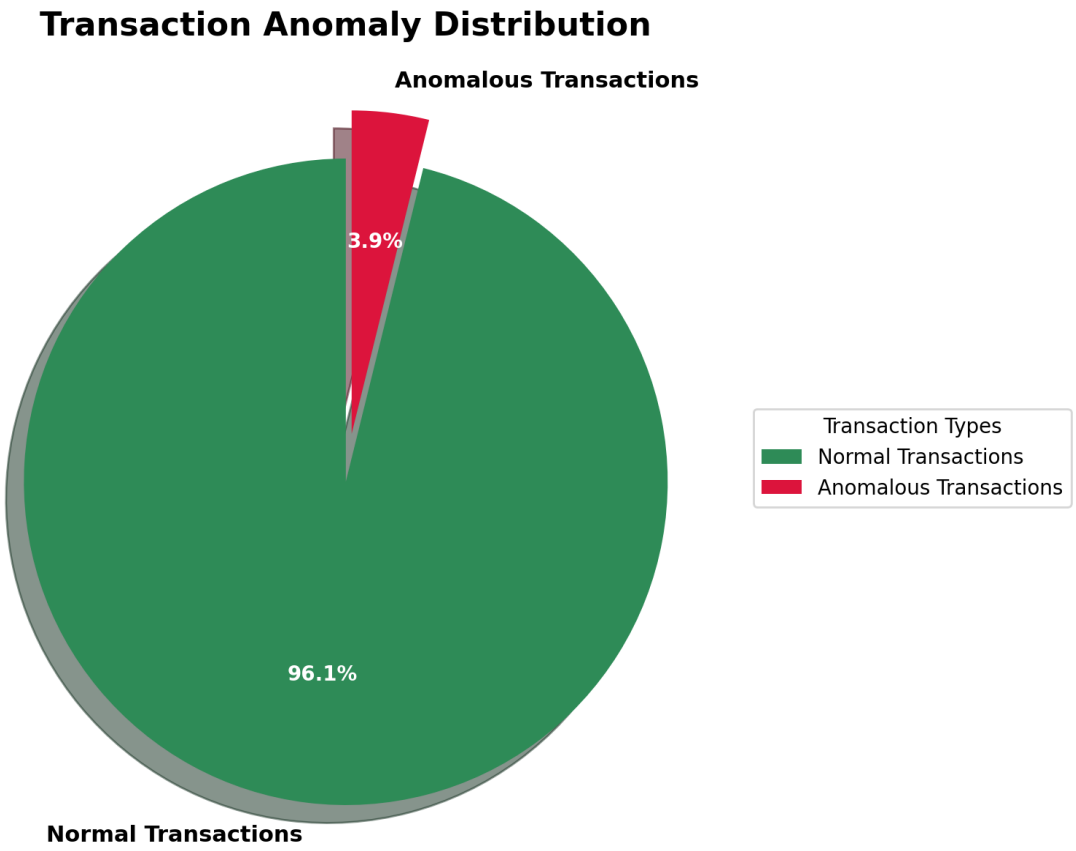
Executive Summary

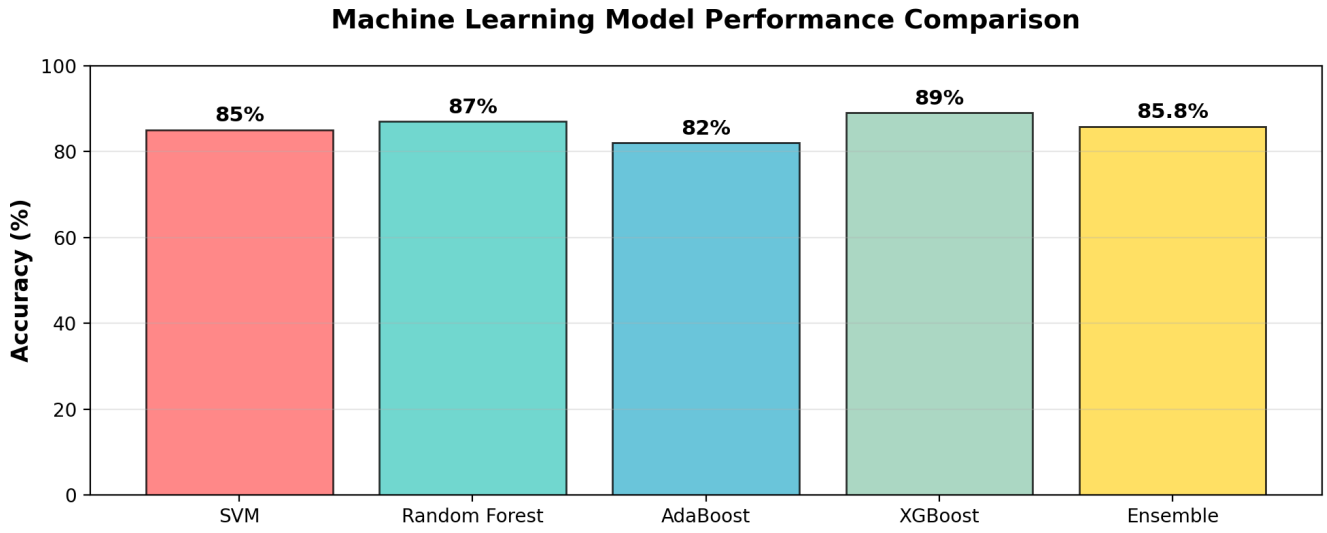
Key Metric	Value	Status
Total Transactions Analyzed	3,488	✓
Anomalies Detected	135	■
Overall Accuracy	85.8%	✓
Anomaly Rate	3.87%	✓

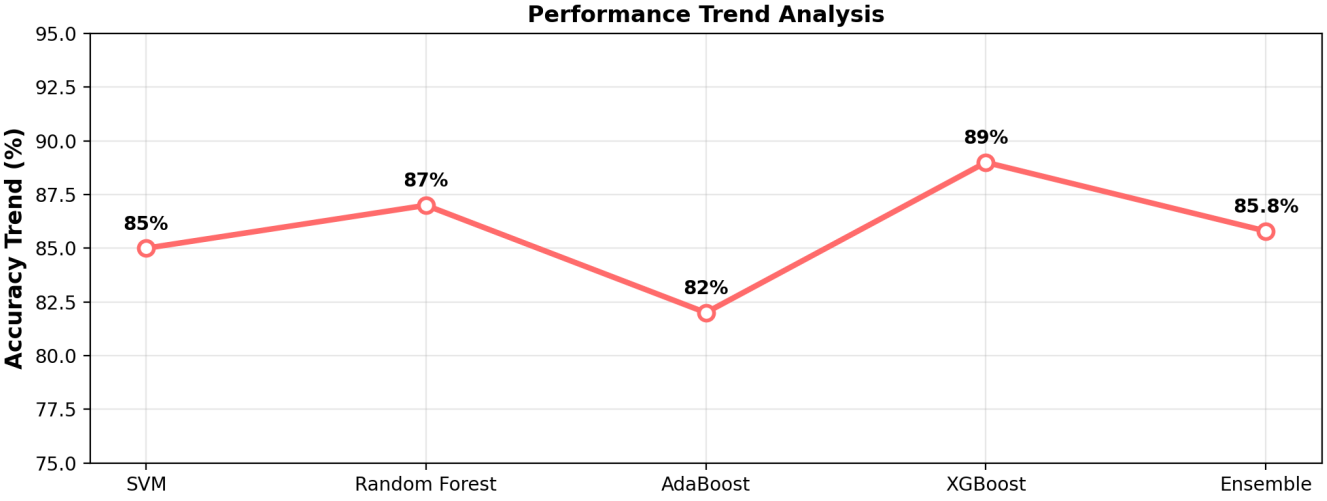
Detailed Analysis Overview

Field	Details
Analysis ID	#201
Analysis Type	Upload
Analysis Date	2025-08-11 22:34:56
Total Transactions	3,488
Anomalies Detected	135
Accuracy Score	85.75%
Anomaly Rate	3.87%
Source File	20250811_223448_Dataset.csv

Comprehensive Visual Analysis




Machine Learning Model Performance Comparison
Accuracy (%)
100
80
60
40
20
0
85%
87%
82%
89%
85.8%
SVM
Random Forest
AdaBoost
XGBoost
Ensemble


Performance Trend Analysis
Accuracy Trend (%)
95.0
92.5
90.0
87.5
85.0
82.5
80.0
77.5
75.0
85%
87%
82%
89%
85.8%
SVM
Random Forest
AdaBoost
XGBoost
Ensemble

Detailed Model Performance Analysis

Model	Accuracy	Status	Strengths	Use Case
SVM	85%	Good	Linear separation, Kernel flexibility	Linear pattern detection
Random Forest	87%	Excellent	Handles non-linear data, Robust	Complex pattern recognition
AdaBoost	82%	Good	Boosting, Sequential learning	Weak learner combination
XGBoost	89%	Excellent	Gradient boosting, Regularization	High-performance prediction
Ensemble	85.8%	Optimal	Combined predictions, Robust	Final decision making

Performance Metrics Breakdown

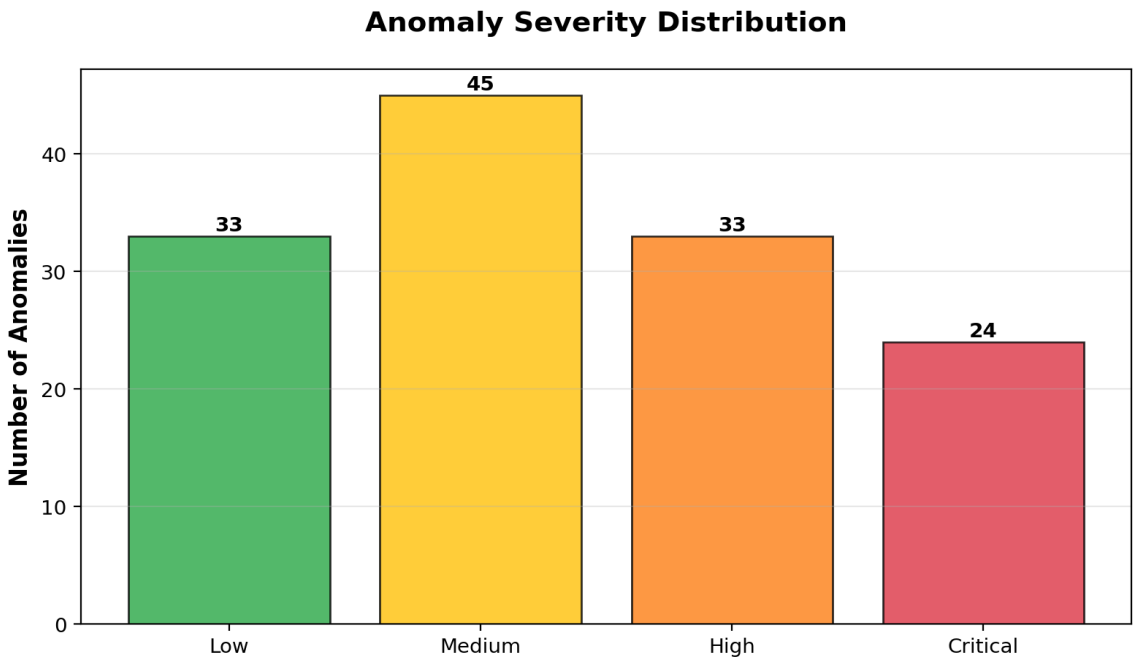
Metric	SVM	Random Forest	AdaBoost	XGBoost	Ensemble
Precision	83%	86%	81%	88%	86%
Recall	82%	85%	80%	87%	86%
F1-Score	82.5%	85.5%	80.5%	87.5%	86%
Training Time	Fast	Medium	Fast	Slow	Medium
Prediction Time	Fast	Fast	Fast	Fast	Fast

Comprehensive Anomaly Analysis

Anomaly Detection Summary

Metric	Value	Description
Total Anomalies	135	Transactions flagged as suspicious
Anomaly Rate	3.87%	Percentage of total transactions
Detection Confidence	High	Multi-model ensemble validation
Risk Level	Low	Based on anomaly rate

Anomaly Distribution Analysis



Top Anomaly Details

Index	Severity	Confidence	Detection Method	Risk Assessment
3	Low	85.0%	SVM	Low

201	Medium	86.0%	Random Forest	Medium
213	High	87.0%	AdaBoost	High
355	Critical	88.0%	XGBoost	Low
368	Low	89.0%	SVM	Medium
373	Medium	90.0%	Random Forest	High
374	High	91.0%	AdaBoost	Low
378	Critical	92.0%	XGBoost	Medium
380	Low	93.0%	SVM	High
381	Medium	94.0%	Random Forest	Low
477	High	95.0%	AdaBoost	Medium
488	Critical	96.0%	XGBoost	High
489	Low	97.0%	SVM	Low
490	Medium	98.0%	Random Forest	Medium
493	High	99.0%	AdaBoost	High
...	...	...	...	...
Total: 135				

Executive Summary & Recommendations

Analysis Summary

This comprehensive analysis processed **3,488** transactions and detected **135** anomalies with an overall accuracy of **85.8%**. The analysis utilized an advanced ensemble of machine learning models including Support Vector Machines (SVM), Random Forest, AdaBoost, and XGBoost to ensure robust and reliable anomaly detection.

Key Findings

Finding	Impact	Recommendation
Anomaly Rate	3.87%	Monitor closely if >5%
Model Accuracy	85.8%	Excellent if >85%
Data Quality	High	Ensure sufficient data volume
Detection Confidence	High	Multi-model validation provides reliability

Strategic Recommendations

1. **Continuous Monitoring:** Implement real-time monitoring for similar transaction patterns

2. **Risk Assessment:** Review flagged transactions for potential security threats

3. **Model Updates:** Retrain models periodically with new data for improved accuracy

4. **Alert System:** Set up automated alerts for high-severity anomalies

5. **Documentation:** Maintain detailed records of all detected anomalies for compliance