

Process-Based Corruption Detection

Pattern-Oriented Approaches for Practice

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Introduction

Conventional anti-corruption efforts focus primarily on downstream policy controls and audits. However, these reactive methods fail to detect subtle manipulations that develop over extended periods in a timely manner. Modern process mining technologies fundamentally change this paradigm: they transform digital event traces into meaningful detection patterns that make suspicious activities visible during their formation phase. The decisive advantage lies in the ability to extract systematic deviations from millions of transaction data that would remain invisible to human analysts. Event logs automatically document every process step with precise timestamps, handler IDs, and contextual information. These digital footprints create seamless transparency that corrupt actors could traditionally circumvent through skillful concealment.

Four Dimensions of Process-Based Corruption

Activity Manipulation: Strategic Process Modifications

Corrupt actors strategically manipulate the sequence and selection of process activities. Activity Suppression describes the deliberate omission of mandatory control steps, such as bypassing credit checks in loan approvals or skipping compliance checks in contract awards. These patterns are systematically identifiable through conformance analyses as they violate target processes. Activity Pork Barrelling, on the other hand, adds unnecessary but advantageous activities – such as additional „consulting services“ without recognizable added value or fictitious review steps that provide certain suppliers with advantages. Devious Deviation manipulates the temporal sequence of activities to circumvent controls, while Partisan Caretaking introduces special treatments for certain cases that favor regular business partners.



Time Manipulation: Temporal Concealment Strategies

The manipulation of timestamps offers corrupt actors significant advantages in concealing their activities. Dubious Duration creates unusually long or short processing times that divert attention from critical decision moments. Examples include extremely accelerated approval processes for preferred applicants or artificially extended processing times for unwanted competitors. Shifty Start moves activities to favorable times – such as processing critical applications during vacation periods or staff changes when control density is reduced. Iffy Idling builds in artificial waiting times to hinder parallel controls or to obstruct time-critical competitive processes. These temporal manipulations are systematically recognizable through statistical time series analyses.

Resource Abuse: Strategic Responsibility Distribution

Corrupt actors use their organizational position to systematically circumvent control mechanisms. Accomplice Assignment strategically delegates critical decisions to cooperative employees who are willing to support questionable decisions. These patterns show through unusual accumulations of certain handler combinations in sensitive cases. Accomplice Hand-over strategically forwards cases to other processors who are either less experienced or already compromised. Big Boss Intervention describes the direct influence of higher hierarchical levels to circumvent regular processes, recognizable through unusual escalation patterns and hierarchical interventions in normal routine decisions.



Information Manipulation: Data-Based Corruption

Sneaky Peeking enables unauthorized access to confidential information that is used for personal advantages or for passing on to external interests. These activities leave characteristic access traces in system logs, especially when accessing information that is not required for regular work. Data Tampering undermines the integrity of decision making by altering the very foundation on which those decisions are based, creating false facts that misguides downstream processes. Modern systems log all data changes with timestamps and user IDs, making subsequent manipulations systematically traceable.

Detection Strategies for Practice

Conformance Analysis as Standard Tool

Standardized conformance techniques identify deviations from defined target processes by comparing actual event sequences with mo-

deleted reference processes. These methods recognize missing mandatory activities as well as unexpected additional steps. Compliance teams should establish regular conformance analyses as routine measures, ideally with automated notifications for critical deviations.

Outlier Detection for Subtle Anomalies

Statistical outlier detection identifies unusual patterns that do not necessarily represent explicit rule violations but may still indicate corrupt behavior. These methods are particularly valuable for detecting Activity Pork Barrelling and temporal manipulations that operate within formal rule boundaries but are still statistically conspicuous. Machine learning procedures can be particularly effective here, as they recognize complex multivariate patterns that remain invisible to traditional rule-based systems. Clustering algorithms group similar behaviors and automatically identify outlier clusters that deserve further investigation.

Time Series Analysis for Temporal Patterns

Systematic analysis of timestamps reveals suspicious temporal patterns through the application of specialized statistical methods. Unusual processing times are identified by comparison with historical average values and seasonal patterns. Strategic schedule shifts and conspicuous accumulations of certain activities at specific times become recognizable through frequency analyses and correlation studies.

Resource Allocation Monitoring

Systematic tracking of responsibility changes and delegation patterns identifies strategic resource manipulations through Soci-

al Network Analysis and workflow mining. Frequent case handovers between specific employees, unusual interventions by higher hierarchical levels, and anomalous work distributions that deviate from statistical expected values deserve special attention.

Implementation and Future Perspectives

The integration of artificial intelligence and machine learning procedures will dramatically expand detection capabilities. However, data has to be identified and adaptive algorithms should be used as described. Real-time analyses enable immediate detection of suspicious activities during their execution, making preventive interventions possible. Organizations that systematically implement process-based corruption detection develop sustainable competitive advantage through increased integrity, reduced compliance risks, and strengthened stakeholder trust. The shift from reactive to proactive anti-corruption efforts becomes a strategic success factor in an increasingly regulated and transparent business world.

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