



Title

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AI-Based Real-Time Fraud Detection in Digital Service Requests” How can organization activate AI to mitigate fraud

Organizations can activate AI to mitigate fraud through integrated real-time systems that combine advanced machine learning techniques with data pipelines for precise detection and scalable performance.

Abstract

Organizations can mitigate fraud in digital service requests by integrating AI into real-time systems. In the reviewed studies across insurance, banking, and payment processing, fraud detection systems use advanced machine learning and deep learning techniques—such as Extreme Gradient Boosting, Isolation Forest, Deep

Neural Networks, Autoencoders, and Long Short-Term Memory networks—combined with real-time data pipelines (for example, Kafka, Spark, and microservices) and blockchain smart contracts. Quantitative findings include detection accuracies up to 99.9%, false positive rates as low as under 0.1%, processing latencies of less than 50 milliseconds (with one study averaging 78 milliseconds), and throughput capable of handling up to 100,000 transactions per second.

Studies report that strategies including online or adaptive learning, feature engineering, federated and edge computing, and hybrid systems are effective in addressing challenges like data imbalance and evolving fraud patterns. In essence, organizations activate AI to mitigate fraud by deploying these integrated, real-time solutions that combine precise detection with scalable, low-latency performance.

Paper search

Using your research question “AI-Based Real-Time Fraud Detection in Digital Service Requests” How can organization activate AI to mitigate fraud”, we searched across over 126 million academic papers from the Semantic Scholar corpus. We retrieved the 50 papers most relevant to the query.

Screening

We screened in papers that met these criteria:

- **AI/ML Implementation:** Does the study implement AI/ML techniques for fraud detection with a clearly described methodology?
- **Real-time Digital Detection:** Does the study examine real-time fraud detection systems specifically for digital service requests or transactions?
- **Organizational Context:** Was the study conducted in an organizational setting with quantifiable results?
- **Performance Metrics:** Does the study report clear fraud detection performance metrics?
- **Implementation Framework:** Does the study describe concrete implementation methods or frameworks?
- **Evidence Type:** Is the study either (a) primary research with practical implementation or (b) a systematic review/meta-analysis of AI-based fraud detection?
- **Practical Application:** Does the study go beyond purely theoretical models to include actual implementation or empirical testing?

We considered all screening questions together and made a holistic judgement about whether to screen in each paper.

Data extraction

We asked a large language model to extract each data column below from each paper. We gave the model the extraction instructions shown below for each column.

- **Type of AI/Machine Learning Approach:**

Identify and extract the specific type of AI or machine learning technique used in the fraud detection system. Look in the methods or technical description section.

Possible approaches include:

- Deep Neural Networks
- Auto-encoders
- XGBoost
- Attention Mechanisms
- Other Machine Learning Algorithms

If multiple approaches are used, list all. Be precise about the specific algorithm or model architecture. If the exact type is not clearly specified, note "Not clearly specified" and provide any available details.

- **Real-Time Processing Capabilities:**

Determine and extract evidence of real-time processing capabilities. Look in the methodology, results, or discussion sections.

Specifically extract:

- Confirmation of real-time processing (Yes/No)
- Description of real-time processing mechanism
- Processing speed or latency (if mentioned)
- Any quantitative metrics demonstrating real-time performance

If real-time capabilities are not explicitly discussed, note "Not specified".

- **Dataset Characteristics:**

Extract details about the dataset used:

- Domain (e.g., credit card transactions, insurance claims)
- Data source (e.g., auto insurance dataset)
- Size of dataset (number of records/transactions)
- Time period of data collection
- Any preprocessing or feature engineering techniques

If any of these details are missing, note "Not reported" for that specific aspect.

- **Performance Metrics:**

Extract quantitative performance metrics for fraud detection:

- Accuracy
- Precision
- Recall
- F1 Score

- False Positive Rate
- Any comparative performance against baseline methods

Ensure to include:

- Exact numerical values
- Comparison method (if applicable)
- Context of performance measurement

If metrics are not clearly reported, note "Performance metrics not specified".

- **Fraud Detection Strategy:**

Describe the specific approach to identifying fraudulent activities:

- Classification method (binary classification, multi-class, etc.)
- Key features or signals used for fraud detection
- Any innovative techniques for fraud pattern recognition
- Approach to handling evolving fraud patterns

If the strategy is not comprehensively described, extract the most detailed information available and note any limitations in the description.

Results

Characteristics of Included Studies

Study	Study Focus	Industry Context	AI/ML Techniques Used	Real-time Capabilities
Dhieb et al., 2020	Secure, automated insurance fraud detection with blockchain and online learning	Insurance (auto)	Extreme Gradient Boosting (XGBoost); online learning	Yes: online learning for real-time updates (we didn't find mention of speed or latency)
Hanae et al., 2023	Real-time fraud detection in digital banking transactions	Banking (digital)	Isolation Forest (unsupervised machine learning); Spark, Kafka, h2o	Yes: real-time architecture with Kafka/Spark (we didn't find mention of speed or latency)

Study	Study Focus	Industry Context	AI/ML Techniques Used	Real-time Capabilities
Bendhi, 2025	Real-time credit card fraud detection, minimizing false positives	Banking (credit cards)	Long Short-Term Memory (LSTM, deep learning), Autoencoders, Random Forest, Isolation Forest	Yes: real-time analysis, detection latency measured (we didn't find mention of values)
Raghu, 2025	Java-based real-time payment fraud detection with deep neural networks and rules	Payment processing	Deep Neural Networks, rule-based heuristics	Yes: microservices, Kafka; 78 milliseconds average processing delay
Faisal et al., 2024	Systematic review of artificial intelligence in banking fraud detection	Banking (general)	Neural networks, decision trees, ensemble models, deep learning, reinforcement learning	Yes: real-time identification and prevention (we didn't find mention of details)
Chopra and Binwal, 2024	Artificial intelligence/machine learning for digital payment fraud detection, stream/edge processing	Digital payments	Random Forest, Extreme Gradient Boosting (XGBoost), Support Vector Machine (SVM), Isolation Forest, supervised/unsupervised machine learning	Yes: stream processing, edge computing; less than 50 milliseconds latency, 100,000 transactions per second
Fallah et al., 2024	Artificial intelligence-powered blockchain for real-time financial fraud detection	Blockchain	Financial services	Gradient Boosting, Recurrent Neural Networks

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Study	Study Focus	Industry Context	AI/ML Techniques Used	Real-time Capabilities
Thennakoon et al., 2019	Real-time credit card fraud detection, data imbalance handling	Banking (credit cards)	Multiple machine learning models (we didn't find mention of which)	Yes: predictive analytics plus application programming interface (API) module (we didn't find mention of speed or latency)
Abakarim et al., 2018	Real-time credit card fraud detection with autoencoders	Banking (credit cards)	Deep Neural Networks, Autoencoders	Yes: live classification (we didn't find mention of speed or latency)
Dharamshi, 2021	Real-time insurance claim fraud detection with attention mechanisms	Insurance (auto)	Deep learning with attention mechanisms	Yes: real-time processing (we didn't find mention of details)

References

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