Fraud Detection with Machine Learning in Marketing

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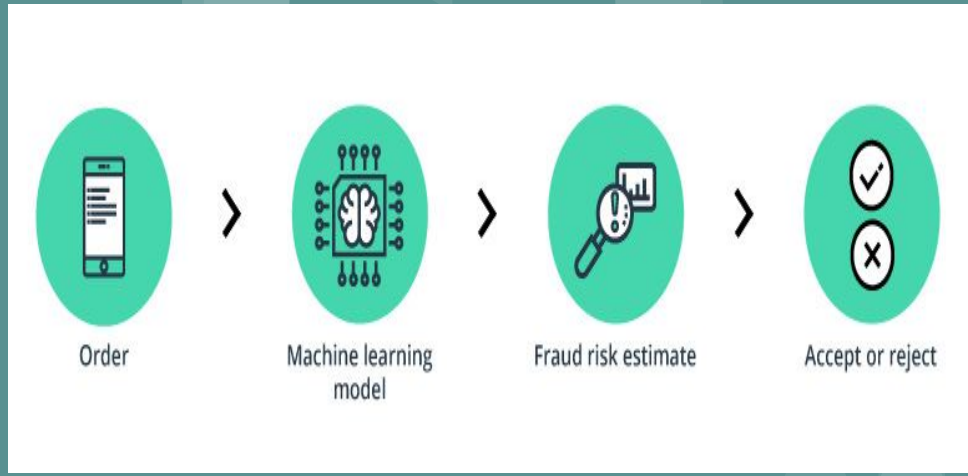

Abstract

-Fraud detection in marketing is crucial for financial protection and client confidence.
-Machine learning can automate the process, improving precision and effectiveness.
-Training ML-based fraud detection algorithms requires large-scale labeled datasets.
-These datasets include both valid and fraudulent transactions labeled as "fraud" or "non-fraud."
-Algorithms use these datasets to discover patterns and relationships for classifying future cases.
-The supervised learning paradigm is most suitable based on important considerations.

Availability of Labeled or Unlabeled Data:

- Availability of labeled or unlabeled data is a critical consideration for selecting a machine learning paradigm.
- Labeled data is typically accessible for fraud detection due to documented historical records of both fraudulent and non-fraudulent activity.
- Abundance of labeled data sets makes supervised learning an excellent choice.
- Supervised learning allows training models to categorize new instances efficiently and effectively in marketing fraud detection.

Nature of the Problem:

- Fraud detection often involves binary categorization.
- A binary classifier assigns one of two labels to input variables.
- Various machine learning techniques can create binary classifiers, including decision trees, logistic regression, and support vector machines (Rul-lan, 2020).
- This aligns with the supervised learning paradigm, where models differentiate between two classes.
- While the primary focus is on classification, regression techniques may be used for continuous risk score prediction.
- The prevalence of binary classification tasks in fraud detection supports the suitability of supervised learning.

Desire for Interpretability or Explainability:

- Model interpretability is crucial in fraud detection for making informed decisions impacting business operations.
- Random Forest is a popular and frequently used algorithm for this purpose.
- Random Forest is commonly applied in classification and regression tasks.
- It constructs decision trees on various samples and uses their averages for classification and majority votes for regression.
- Decision tree-based models, including Random Forest, offer interpretability by indicating feature importance and the decision-making process.
- These models are suitable for situations where transparency and explainability are highly valued.
- More complex models like neural networks may offer higher accuracy but come at the cost of reduced interpretability.

Need for feedback or interaction with environment:

- Low demand for real-time interaction in traditional fraud detection.
- Models can identify fraud autonomously after deployment and training.
- Retraining or periodic model changes may be needed for adapting to changing fraud patterns.
- These operations do not typically require real-time interaction.

- Supervised learning operates in batches and aligns with this characteristic

Conclusion

- Supervised learning is the most appropriate for fraud detection in marketing.
- Consideration of data accessibility, problem nature, interpretability, and interaction with the environment supports this choice.
- Labeled data is effectively utilized for precise classification.
- The binary nature of the problem aligns well with supervised learning.
- Supervised learning provides a balance between accuracy and interpretability.
- The selection of specific algorithms and models should consider the organization's goals and data characteristics for optimal fraud detection results.

References

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