



## Chapter 2

# Predictive Modelling for Financial Fraud Detection Using Data Analytics: A Gradient–Boosting Decision Tree

**Ntebogang Dinah Moroke**

 <https://orcid.org/0000-0001-8545-1860>  
*North West University, South Africa*

**Katleho Makatjane**

 <https://orcid.org/0000-0002-3687-4098>  
*Department of Statistics, University of Botswana, Botswana*

### **ABSTRACT**

*Financial fraud remains one of the most discussed topics in literature. The financial scandals of Enron, WorldCom, Qwest, Global Crossing, and Tyco resulted in approximately 460 billion dollars of loss. The detection of financial fraud, therefore, has become a critical task for financial practitioners. Three factors determine the likelihood of fraud occurrence, including pressure, opportunity, and rationalization. The core of these factors lies in people's beliefs and behaviour. Due to the unpredictability and uncertainty in fraudsters' incentives and techniques, fraud detection requires a skill set that encompasses both diligence and judgment. Big data technologies have had a huge impact on a wide variety of industries because they tend to be ubiquitous, starting in the last decade and continuing today.*

DOI: 10.4018/978-1-7998-9430-8.ch002

## INTRODUCTION

Financial fraud has been a major concern for many organizations across industries and countries because it causes massive business devastation. Millions of money are lost each year as a result of financial fraud; for example, Bank of America has agreed to pay 16.5 billion US dollars to settle a financial fraud case. According to Ecommerce Fraud Statistics (2021), the fraud management profession is shifting to a risk intelligence model, a field that relies even more heavily on e-commerce fraud statistics and defines itself as a business optimization engine rather than a defensive bulwark. New objectives accompany the new approach. Risk intelligence professionals, on the other hand, work to reduce friction throughout the purchasing process while still protecting the enterprise. The goal of proper fraud management is not to avoid losses but, increasing wins and thereby increase revenue. Hence, modern risk professionals now apply their decisioning skills and technology across the entire buying journey. They optimize revenue and have a clear connection to the enterprise's top line. The new approach to risk intelligence is made possible by advances in technology and fraud prevention strategies. Fraud and consumer abuse prevention that harnesses big data and machine learning allow enterprises to more accurately make split-second decisions on whether an order is legitimate or fraudulent.

Nevertheless, machine learning algorithms have previously been employed to analyse all authorised transactions and report suspicious ones. These reports are investigated by professionals who contact the cardholders to confirm if the transaction was genuine or fraudulent.

The investigators will then provide feedback to the automated system which is used to train and update the algorithm to eventually improve the fraud detection performance over time. Thus far, this is traditional way of detecting debit or credit card fraud is tedious and takes quite a time as some cards are stolen; or lost or users threatened. Hence this chapter contributes to the existing methods by building a Chrome extension that flags "*Fraud/suspicious*" transactions that will help both banks and cardholders to know about the fraudulent transactions made and further develop a "*find my card application*". This is a new system that the cardholders will be able to install the "*find my card application*" and have an opportunity to trace the whereabouts of their cards if stolen or lost and be able to stop their usage with the use of their cell phones or computer browsers. Even though detecting financial fraud is considered a high priority for many organisations, recent literature lacks updated and comprehensive in-depth reviews that can help organisations with their decisions for selecting an appropriate data mining method. Therefore, the objective of this chapter is to apply the gradient boosting decision tree (GBDT) under deep learning to extract knowledge about the processing of the credit/debit card data to detect whether a normal transaction of datasets qualified as a novel fraud and finally

19 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage: [www.igi-global.com/chapter/predictive-modelling-for-financial-fraud-detection-using-data-analytics/311370](http://www.igi-global.com/chapter/predictive-modelling-for-financial-fraud-detection-using-data-analytics/311370)

## Related Content

---

### Hybrid Intelligence for DDoS Defense: Combining Generative AI, Resampling, and Ensemble Methods

Lakshmi Prayaga, Chandra Prayaga, Rhys Misstle, Mariah Zuanazzi and Sri Satya Harsha Pola (2025). *International Journal of Artificial Intelligence and Machine Learning* (pp. 1-15).

[www.irma-international.org/article/hybrid-intelligence-for-ddos-defense/370316](http://www.irma-international.org/article/hybrid-intelligence-for-ddos-defense/370316)

### Heart Disease Prediction Using Machine Learning

Shiva Shanta Mani B. and Manikandan V. M. (2021). *Handbook of Research on Disease Prediction Through Data Analytics and Machine Learning* (pp. 373-381).

[www.irma-international.org/chapter/heart-disease-prediction-using-machine-learning/263328](http://www.irma-international.org/chapter/heart-disease-prediction-using-machine-learning/263328)

### Comparison of Brainwave Sensors and Mental State Classifiers

Hironori Hiraishi (2022). *International Journal of Artificial Intelligence and Machine Learning* (pp. 1-13).

[www.irma-international.org/article/comparison-of-brainwave-sensors-and-mental-state-classifiers/310933](http://www.irma-international.org/article/comparison-of-brainwave-sensors-and-mental-state-classifiers/310933)

### Industry Revolution 4.0 and Its Impact on Education

Riccardo Minasi (2023). *Encyclopedia of Data Science and Machine Learning* (pp. 2211-2222).

[www.irma-international.org/chapter/industry-revolution-40-and-its-impact-on-education/317617](http://www.irma-international.org/chapter/industry-revolution-40-and-its-impact-on-education/317617)

### Artificial Intelligence, Big Data, and Machine Learning in Industry 4.0

Georgios Lampropoulos (2023). *Encyclopedia of Data Science and Machine Learning* (pp. 2101-2109).

[www.irma-international.org/chapter/artificial-intelligence-big-data-and-machine-learning-in-industry-40/317610](http://www.irma-international.org/chapter/artificial-intelligence-big-data-and-machine-learning-in-industry-40/317610)