

AI in Insurance Fraud Detection

By Chantelle Schwartz

Member of the Institute of Risk Management and MPhil graduate in Fraud Risk Management (University of Pretoria), currently part of the Unsecured and Transactional Credit Life team at Absa Life.

Introduction

As the insurance industry becomes more digital, so do the people trying to take advantage of it. Fraudsters are constantly finding new ways to exploit gaps, costing insurers millions each year. To stay ahead, many insurers are turning to Artificial Intelligence (AI) and Machine Learning (ML) to help detect fraud faster, more accurately, and at scale.

But using AI in fraud detection isn't straightforward. The technology itself brings a unique set of challenges — from technical complexity and changing fraud patterns to legal and ethical concerns about how decisions are made.

To help insurers better understand the opportunities and risks, I recently completed a Structured Literature Review (SLR) as part of my MPhil in Fraud Risk Management. This involved analysing 102 peer-reviewed studies published between 2021 and 2024. The goal was to identify the biggest barriers and best solutions when using AI/ML for fraud detection in the insurance sector.

Top 5 Challenges in AI-Driven Fraud Detection

1. Fraud is Rare — and That's a Problem for AI

Most insurance claims are honest. Fraudulent ones typically make up less than 2% of cases. While that's good news for insurers, it's a challenge for AI. These systems learn by recognising patterns, but when there are so few examples of fraud, the models struggle to learn how to spot them. This means they may fail to detect the fraud — or worse, incorrectly flag a genuine claim as suspicious.

2. AI Can Be a "Black Box"

Some of the most powerful AI models don't explain how they reach their decisions. This lack of transparency is risky in the regulated world of insurance, where claims decisions must be clear, fair, and explainable — both to customers and to regulators.

3. Fraudsters Keep Changing Tactics

Fraud isn't static. Criminals adapt quickly, and the methods they use today might not be the same tomorrow. This means an AI model trained on last year's fraud data could be less effective if it doesn't keep learning from new patterns.

4. AI Requires Serious Tech Power

Advanced AI needs strong computing power and skilled technical staff. For smaller insurers or those still running with older 'legacy' systems, this can be a major hurdle. The cost and effort of implementation may feel out of reach.

5. Choosing the Right Data is Tricky

AI needs good-quality data to work well. But figuring out which pieces of data are most useful for detecting fraud isn't easy. If the wrong data is used — or if there's no collaboration between data experts and insurance professionals — the model might miss key clues or be too complex to work reliably.

Solutions Emerging from Global Research

Fortunately, researchers and insurers are finding ways to tackle these challenges. Here's what's working:

Tackling the Rarity of Fraud

- **Resampling techniques:** These methods either increase the number of fraudulent examples artificially (oversampling) or reduce the number of legitimate ones (undersampling) to better train AI.
- **Ensemble models:** These use several AI models together, combining their results to catch more fraud and reduce the chance of missing something important.

Making AI Easier to Understand

- **Explainable AI (XAI):** Tools like SHAP show which variables influenced a decision — for example, if a claim was flagged due to unusual patterns in location, timing, or amounts.
- **Hybrid models:** Combining traditional, more interpretable methods with newer ones ensures both accuracy and clarity.

Adapting to New Fraud Tricks

- **Adaptive learning models:** These models keep learning as new data comes in, allowing them to adjust to changes in fraud behaviour.
- **Transfer learning:** This means reusing a model trained on one area (e.g., motor insurance fraud) to work in another (e.g., credit life), saving time and cost.

Reducing Technical Demands

- **Cloud-based tools:** Modern AI platforms can run in the cloud, reducing the need for powerful in-house infrastructure.
- **Optimised models:** New model designs make it possible to process information faster while using fewer resources.

Getting the Right Data

- **Autoencoders:** These are AI tools that help find which data features are most important without manual selection.
- **Hybrid feature selection:** Combining expert judgement with automated tools helps improve reliability while reducing errors or noise.

What This Means for Insurance Companies

The research points to a few key takeaways that are especially relevant for insurers operating in South Africa and similar markets:

1. Get Ready Operationally

Having AI tools is not enough. Insurers need to make sure their systems, people, and policies are ready to use them responsibly. That includes integrating AI into claims processes, IT systems, and fraud units.

2. Build Trust Through Transparency

AI won't work if people don't trust it. Regulators, customers, and employees need to understand how decisions are made — especially when claims are rejected. Using explainable models and documenting decisions carefully helps build that trust.

3. Smaller Players Can Compete Too

You don't need to be a tech giant to benefit from AI. Many modern tools are modular and cloud-based, meaning smaller firms can access them without massive upfront investment. Partnering with the right vendors and platforms is key.

4. AI Is a Team Sport

Fraud detection is not just a data problem — it's a business problem. The most effective results come when data scientists work closely with claims assessors, fraud investigators, and underwriters. Cross-functional collaboration ensures the models are both smart and grounded in real-world expertise.

Conclusion

AI and machine learning are powerful tools in the fight against insurance fraud. But they're not silver bullets. The challenges — from rare data to fast-changing fraud tactics and hard-to-understand models — are real. Yet they're not insurmountable.

By combining strong design, transparent processes, and the ability to learn and adapt, AI can offer insurers the edge they need. Fraud is getting smarter. Our defences must be smarter too.

For the South African insurance industry, the message is clear: it's time to move from cautious curiosity to confident, responsible adoption. AI in fraud detection isn't just a competitive advantage — it's a necessity for the future.