INTELLIGENT FRAUD DETECTOR

Intelligent Security. Uncompromised Trust.
Revolutionizing Fraud Detection with ML.

IFD

Fatemeh Eslani , Founder & CEO
Piotr Surie, Founder & CTO
16 June, 2025

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"Intelligent Security.
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AGENDA

- Our Mission
- Meet The Team
- Global Fraud Market
- Monetary Impact
- Product and Services
- Our Project Overview
  - Workflow and PM
  - Research
  - Model Performance

OUR MISSION

To empower businesses with cutting-edge ML algorithm that proactively detects and prevents fraud, safeguarding assets, minimizing operational costs, and building unwavering customer confidence.

MEET THE TEAM

Fatemeh Eslami
Founder & CEO

A distinguished data scientist and architect with 20+ years in building scalable, high-performance machine learning systems for financial services. Expertise in big data, cloud infrastructure, and operationalizing cutting-edge AI solutions for real-world impact. Responsible for our robust and adaptive technology stack.

Piotr Surie
Founder & CTO

A seasoned entrepreneur with 15+ years of experience in AI, FinTech, and strategic market development. Proven track record of scaling technology companies and driving innovation in complex regulatory environments. Deep understanding of market needs and a vision for a secure financial ecosystem.

GLOBAL FRAUD MARKET

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FDP

The global fraud detection and prevention market is projected to reach over $100 billion by 2028, growing at a CAGR of 20%+ (Source: Market research reports, e.g., Grand View Research, MarketsandMarkets).

CURRENT CAGR

The Compound Annual Growth Rate (CAGR) is 20%, being conservative in out estimates at 5-6% the STEG losses by 2023 are at 7.7M and by 2028 10M.

STEG CHALLANGE

The Tunisian Company of Electricity and Gas (STEG) was grappling with a €6 million annual loss due to energy fraud (tally that represents 3.65% of their revenue). Our solution has successfully recaptured €1.8 million of that loss as net profit (after operational needs were met).

MONETARY IMPACT

Metric	Logistic Regression (Baseline)	Random Forest (Tuned)	LightGBM (Our Selected Model)
Value Saved (True Positives)	€3,539,949	€1,855,941	**€2,220,263**
Value Missed (False Negatives)	€2,461,840	€4,144,059	**€3,779,737**
Operational Cost (False Positives)	€1,205,100	€197,800	**€410,100**
Net Monetary Impact (Profit)	€2,334,849	€1,658,141	**€1,810,163**
F1-score (Fraud)	0.17	0.21	**0.23**
Precision (Fraud)	0.1	0.13	**0.17**
Recall (Fraud)	0.65	0.46	**0.37**

- With our LightGBM model, we project to save a client up to €2.22 million annually in direct fraud losses.
- More critically, our model achieves this with a manageable operational cost of €410,100, leading to a net financial gain of €1.81 million annually.
- While a baseline Logistic Regression could capture more raw fraud (higher recall), its enormous False Positive rate (over 12,000 alerts) makes it operationally crippling, incurring over €1.2 million in wasted costs. Our LightGBM model prioritizes actionable, efficient fraud detection.

PRODUCTS & SERVICES

Fraud detection platform

Leverages state-of-the-art machine learning, specifically a highly optimized LightGBM model, trained on vast datasets to identify subtle, complex, and evolving fraudulent patterns.

High-precision alerts

Provides actionable, high-precision alerts to intercept fraud before it impacts your business before we talk about revenue.

Seamless Integration

Easy API-based integration with existing financial systems and payment gateways.

Adaptive Learning

Our models continuously learn from new data, staying ahead of emerging fraud tactics.

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Join us in revolutionising data-driven fraud detection.

Thank you.

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STEG STORY

The Tunisian Company of Electricity and Gas (STEG) is a public and a non-administrative company, it is responsible for delivering electricity and gas across Tunisia. The company suffered tremendous losses in the order of 200 million Tunisian Dinars due to fraudulent manipulations of meters by consumers. Using the client's billing history, the aim of the challenge is to detect and recognize clients involved in fraudulent activities. The solution will enhance the company's revenues and reduce the losses.

Our WHY became clear: empower STEG against the devastating 200M TND fraud (6M Euro and respective 3.65% of revenue loss). We downloaded a financial footprint of historical data. We knew the meter readings, usage patterns and payments.

How did we do it? So we looked at the data, we did EDA looked at the distributions and patterns then we step into feature engineering, set a baseline model (Log Reg) and developed the models: we settled on Decision Tree, Random Forest, and Lights GBM. We struggled with out of the box solution and first results were horrid (with 0.5 threshold we we capturing a lot but our tradeoff between precision and recall was very bad). We had to tune every single model to reach acceptable results.

PROJECT OVERVIEW

Objective:

To develop a high-performance machine learning model to accurately detect fraudulent customers, thereby minimizing financial loss and optimizing operational efficiency.

Methodology:

An iterative approach was employed, starting with a simple baseline and progressing to advanced ensemble models. Key steps included:

- Extensive Feature Engineering to capture customer behavior.
- Training and evaluation of four distinct classifier models.
- Threshold optimization to balance Precision and Recall for real-world application.
- Comparative analysis using business-centric metrics (AUC-PR, F1-Score, Recall).

PROJECT MANAGEMENT & WORKFLOW

To ensure a disciplined and transparent process, we managed the project using an agile framework on a Kanban board.

Key Milestones:

- M1 - Data Exploration & Cleaning: Focused on initial EDA and data preparation.
- M2 - Baseline Model Development: Dedicated to creating the first functional model for benchmarking.
- M3 - Advanced Modeling & Presentation: Iterating on advanced models and preparing the final analysis and presentation.

RESEARCH AND GLOBAL CONTEXT

Before building any models, we conducted foundational research to understand the broader context of energy fraud.

Key Research Areas:

- Global Fraud Patterns: Studied international methods of energy theft and fraud.
- Existing Technical Solutions: Analyzed existing fraud detection systems from industry reports and academic papers.
- Data & Privacy Considerations: Assessed legal and ethical constraints for using customer data.

Sources:

https://www.frontiersin.org/journals/energy-research/articles/10.3389/fenrg.2024.1383090/full#B25

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Model Performance Comparison

MODEL	AUC-PR SCORE	F1-SCORE (FRAUD)	PRECISION (FRAUD)	RECALL (FRAUD)
Logistic Regression (Baseline)	0.111	0.17	0.10	0.65
Decision Tree	**0.158**	0.13	0.13	0.14
LGBM Classifier	0.136	**0.23**	**0.17**	0.37
Random Forest + SMOTE	0.137	0.21	0.13	**0.46**

*Highest score in each column is highlighted **Bold**.

The Finalist Models: A Strategic Choice

The two top-performing models, LGBM and Random Forest, present a clear trade-off between operational efficiency and maximum fraud capture.

LGBM: The Efficiency Champion

- ✓ **Highest F1-Score (0.23) & Precision (0.17)**
  Delivers the most reliable alerts, reducing wasted effort from false positives.
- ✓ **Best For:** Optimizing the workflow of a fraud review team.

Random Forest + SMOTE: The Coverage Champion

- ✓ **Highest Recall (0.46)**
  Identifies the largest percentage of actual fraudsters (46%), maximizing financial loss prevention.
- ✓ **Best For:** A strategy focused on minimizing total fraud losses, even if it means more alerts to review.

CONCLUSION & RECOMMENDATION

We have successfully developed two high-performing models that significantly surpass the baseline, each offering a distinct strategic advantage. The final choice depends on the primary business objective but out Light GMB is more robust and fitting the purpose as we know.

Things that we could focus with more time would be:

- more in depth Feature Engineering (in a nut shell this is the key this project)
- more tuning of selected models
- different model adoption
- error analysis