



Medius[®]
Custom Software & AI

FrodoAI

Preventing insurance fraud
with artificial intelligence

GOOD PRACTICE EXAMPLE

August 2023, version 1.1

Medius d.o.o.

ARTIFICIAL INTELLIGENCE IN INSURANCE

ARTIFICIAL INTELLIGENCE IS TRANSFORMING THE BUSINESS WORLD

We live in an era where artificial intelligence is influencing our world, helping us to make decisions, and is already a key market advantage for many successful companies. At Medius, we are actively involved in the digitalization of companies across a wide range of industries. Based on many years of experience, we can confidently say that strategic and intelligent processing of data is a factor that significantly impacts companies' long-term performance. So how can Artificial Intelligence (AI) help? When new technologies such as AI are applied thoughtfully and practically, we see incredible business transformations that save time and money and simplify the complex systems that are the backbone of every large organization.

Despite all its advantages, AI is still underutilized, which represents a significant opportunity in the insurance industry, where such tools can be used for marketing purposes, customer segmentation and, last but not least, fraud detection. As can be seen from Chart 1, the trends in the insurance industry are changing, with 80% of the surveyed insurance companies indicating that they will primarily and intensively invest in the implementation of AI in their processes in the coming years. In cases of fraud, it is an ongoing battle between establishing mechanisms to prevent fraud and the ever-new tricks employed by resourceful fraudsters, often utilizing smart technologies as well. When a solution like Frodo AI – an artificial intelligence assistant for fraud detection – enters such an environment the balance tips back in favor of the insurance company, offering benefits for policyholders as well.

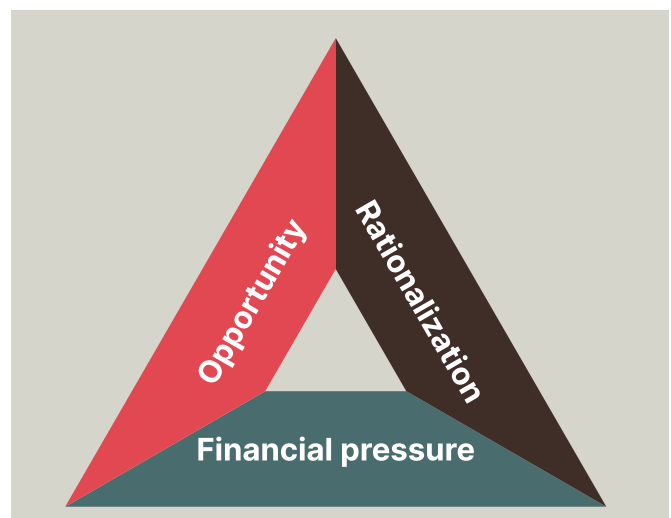
USING ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING TO COMBAT INSURANCE FRAUD

Insurance companies suffer considerable costs each year from fraud attempts, and preventing these attempts is a big challenge as prevention procedures typically involve manually reviewing and verifying a large number of claims each day. With this challenge in mind, Medius developed the Frodo AI solution, which uses artificial intelligence and machine learning to detect fraud and prevent it from happening.

Fraud attempts in the insurance industry are diverse but can be classified into three main groups:

- Claiming more compensation than the actual loss.
- Falsely reporting a loss or event that did not happen.
- Duplicate reporting, in which a person or company reports one event several times and counts on an error made by the insurance company.

The primary function of the Frodo AI solution is to support decision-making by providing investigators with additional insights into previously hidden details based on the data collected. Using AI can speed up the case review process, as the AI does the classification, and the human assessment can help to determine more quickly whether a case is a fraud attempt or if more attention should be paid to a particular case. At the same time, as the detection of fraud becomes more efficient, machine learning algorithms are also improving and becoming even more precise and more powerful.



D. Cressey: The Fraud Triangle

In the 1950s, Donald Ray Cressey hypothesized, based on empirical research, that for fraud to take place, three key preconditions must be met simultaneously and in the right relationship to each other. The task of the insurance company is to disable or weaken at least one of the three corners of the fraud triangle.

FRODO AI SOLUTION: RISK MANAGEMENT TRANSFORMATION

Fraud detection using AI tools

Frodo AI can successfully solve current and future challenges in the insurance industry. Based on the Zeitgeist: 2023 AI Readiness Report results, industry trends actually predict AI implementation across all sectors.

INDUSTRIES THAT WILL INCREASE THEIR AI BUDGETS IN 2024 – 2027

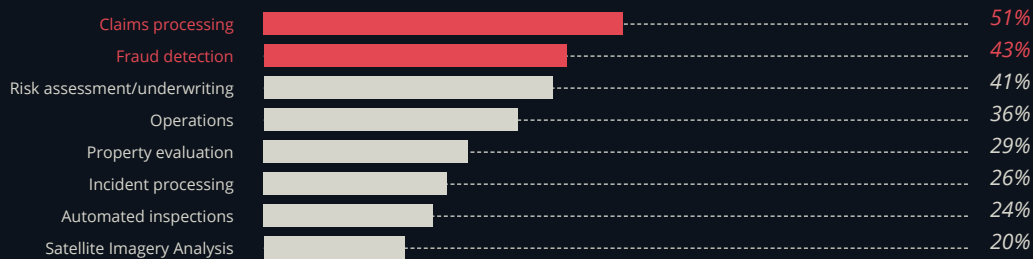
Chart 1



The survey shows that all major industries are planning to increase the amount of resources available for AI, and insurance companies are the ones that will invest the most.

THE INTENDED USE OF AI IN THE INSURANCE SECTOR

Chart 2



Insurance companies need AI to improve the customer experience and employee productivity. AI can be extremely helpful in this regard, particularly when it comes to claims processing and fraud detection, which are also the areas in which Frodo AI excels.

EXPECTED RESULTS AFTER IMPLEMENTATION OF AI IN CLAIMS PROCESSING

Chart 3



The main benefits of implementing a system such as Frodo AI are faster claims processing, fewer claims processing errors, and lower labor costs.

PRESENTING FRODO AI: HOW IT WORKS AND WHAT IT DELIVERS?

Using FrodoAI, we confirmed that 1 in 4 manually checked claims was fraudulent.

SOLUTION DEVELOPMENT

The probability of fraud can be calculated using two different methods of obtaining models with machine learning algorithms. The first approach implements unsupervised learning algorithms, while the second one uses supervised learning algorithms. In unsupervised learning, most algorithms operate on the principle of clustering and identifying outliers. Outlier detection is generally considered a less accurate method for detecting potential fraud compared to an implemented recognizer based on supervised learning.

In the case of supervised learning, we utilize the knowledge of classifiers from previously labeled data — the reviewed claim cases. When categorizing suspicious and regular cases, we employ the knowledge that investigators have gained through processing past claim cases. Consequently, we can say that we are attempting to model the types of fraud discovered up to that point so that the classifier for suspicious and regular cases can classify them accordingly.

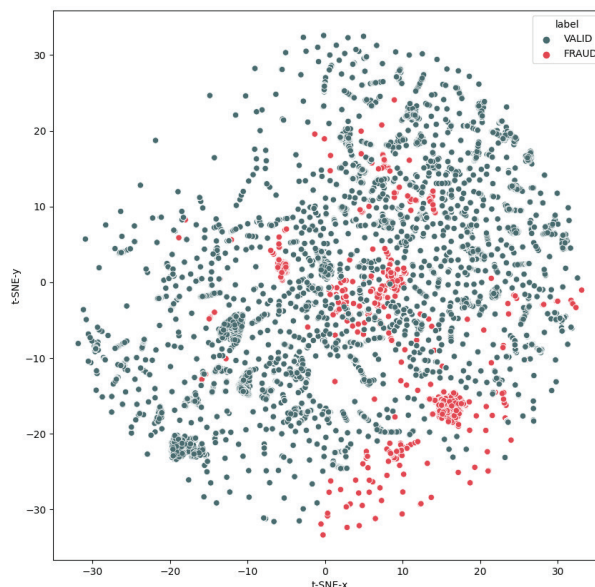
One of the major challenges in developing intelligent decision support systems based on machine learning is the lack of useful data that would contribute to the development of high-quality models. Developers are often confronted with a small number of labeled samples, which are also unevenly distributed. Uneven distribution of labeled samples across individual classes was also encountered in the development of our classifier for suspicious and regular claim events in the insurance claim process.

The Slovenian Insurance Association, GIZ, provided us with a dataset of pseudonymized data regarding claim files from member insurance companies. These data, which were based on descriptions of key events in the claim files, were structured and used for feature modeling. Due to class imbalance, we placed significant emphasis on additional manipulation of labeled samples in the training set. By using techniques like synthetic oversampling of the underrepresented class and sample pruning in the class with a larger number of samples, we achieved optimal recognition results.

FINAL RESULTS AND PERFORMANCE EVALUATION

Our goal was to simplify the decision-making process for individuals dealing with fraud. We have succeeded in this endeavor by using FrodoAI, ensuring that out of 4 manually reviewed claims, 1 is confirmed as fraud.

By combining multiple supervised learning algorithms, we constructed models and evaluated them. The achieved effectiveness of the models allowed us to find the optimal



*Cluster analysis of claims files with FrodoAI
The graph shows suspicious claims calculations using outlier search (red).*

combination of training algorithms. The current results achieve an F1 measure between 0.63 and 0.73 in classifying the suspicious claims category. The metric reflects both the performance of recall and precision, thus we highlight it as the ultimate measure of the solution's success.



The main task of the Frodo AI solution is decision support, as it provides investigators with additional insights into previously hidden details based on collected data.

IMPROVING EFFICIENCY AND PRODUCTIVITY IN THE INSURANCE SECTOR USING ARTIFICIAL INTELLIGENCE

We presented the problem and our solution for preventing insurance fraud. By integrating the Frodo AI system powered by artificial intelligence, transparency over claims is increased. The solution enables continuous fraud detection, which means a smaller chance of direct revenue loss and potential damage to the brand's or company's reputation in cases of mishandled claims.

When we incorporate Frodo AI, developed by Medius, into an insurance company's ecosystem, the company can virtually overnight recognize and prevent frauds that might have previously gone unnoticed. Frodo AI addresses many challenges that seemed unsolvable just a few years ago. Claims processing is no longer a manual and time-consuming task, which means that employees can concentrate on other, more critical tasks that pose greater challenges for them while providing the company with added value. Artificial intelligence can process vastly larger amounts of data than a human, making processes faster, and algorithms capable of examining claims through practically unlimited parameters. The key feature is that they extract and highlight anomalies from this enormous amount of data, and then present the results to investigators in an understandable manner, thus facilitating their decision-making process.

WHY ARE ALGORITHMS SO GOOD AT DETECTING FRAUD?

Before we answer the question, it's necessary to understand how algorithms work. Although algorithms might appear to be magical boxes where miracles happen on their own, that's far from the truth. Before an algorithm takes its final form, a lot of thought and effort go into it by engineers, programmers, and researchers. Developing an algorithm capable of recognizing attempts at insurance fraud starts with research. Alongside defining the problem, programmers need to establish rules by which the algorithm will categorize processed data. One could say that algorithms are a collection of predefined truths that computers use to process data. How will the algorithm know which word or sentence could indicate a higher likelihood of fraud? How can we ensure that the algorithm won't label a claim as fraud when it isn't? What are the signs of fraud that humans pay attention to? More quality parameters lead to better algorithm performance. An insurance claim contains a vast number of parameters, and considering that, on average, a human can remember and compare up to 5 parameters at once, algorithms have a clear advantage here. They can process larger amounts of data in real-time and sort and prepare claims for further processing.

In the case of recognizing insurance fraud, historical cases are immensely helpful to algorithms as they can learn from them. Since algorithms are capable of handling vast amounts of data, the learning process happens relatively quickly, and most importantly, learning never stops. With each new successful fraud detection, Frodo AI becomes even more effective.

COLLABORATE WITH MEDIUS

THE OPPORTUNITIES AND BENEFITS OF WORKING WITH US

Frodo AI is evidence that technology is mature and suitable for solving the problem of detecting insurance fraud. Moreover, in the modern business world, artificial intelligence represents a significant opportunity and a driver of change in many fields, even those that might not seem compatible at first glance. Alongside this, there remains ample room for improving algorithm performance through machine learning and the utilization of higher-quality input data. We also emphasize the fact that possibilities for expanding our solution to other types of insurance are available. Additionally, it's worth highlighting that in the future, algorithms could be customized to individual insurance companies and their needs, as each insurer has its own set of rules and approaches to fraud investigation and fraud prevention.

The performance of AI-powered solutions depends on the actual content or data available. Frodo AI is just one of many examples where it is evident that achieving good results with AI models requires developing them entirely customized based on real data. It is not realistic to expect that generic solutions will address the specific problems of individual companies. The advantage of tailor-made solutions also brings an exceptionally high level of reliability and customized implementation into the existing system. At Medius, with our exceptional integration experience and broad technological expertise, we strive to fully adapt to the client's needs, even in the face of incredibly complex challenges we tackle.

At the beginning of our collaboration, we dedicate significant attention to understanding the challenges of the client and gaining a detailed understanding of the operations of the company (client or partner). This allows the final solution to be tailored to the specific environment, thereby enabling greater adaptability and scalability for future challenges that may arise. We strongly recommend to our partners, both existing and prospective, to invest in process digitization and the collection and centralization of data today. Data is gold, and when utilized appropriately and combined with artificial intelligence, it can deliver excellent results.

Collaborating with Medius is a professional process, as we function as an innovative technological partner that brings the utilization and benefits of the latest technologies to both small and large companies. Through rapid Proof of Concept (PoC) execution, we enable clients to make swift leaps onto the technology path, enhancing their competitiveness in the market.

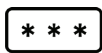
Consider how artificial intelligence can transform your sector and your business. Medius is here to help address any concerns or questions you might have while guiding you securely and seamlessly into a world where artificial intelligence drives your progress. With Medius, you get a partner who will explore how AI can improve your business, help you optimize your processes, and create more value for your customers.

We invite you to join us in the exciting challenge of shaping the future. Our role is to guide you through the process, provide expert support, and adapt to your specific needs. Together, we can shape a future that is already here.





AI USE CASES IN MISSION-CRITICAL SYSTEMS IN OTHER INDUSTRIES DEVELOPED BY MEDIUS:



Pseudonymization and anonymization of sensitive information in documents and search for related persons using natural language processing.



Detection of water leaks in pipeline networks using sensor data processing and satellite images of vegetation.



Preventive maintenance of a heterogeneous IT ecosystem to prevent system and application failures.



Detection of gambling addiction.



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MEDIUS D.O.O.
Tehnološki park 21
1000 Ljubljana

Phone
[+386 51 304 364](tel:+38651304364)

Email
sales@medius.si

Website
www.medius.si

LinkedIn
<https://si.linkedin.com/company/medius-si>