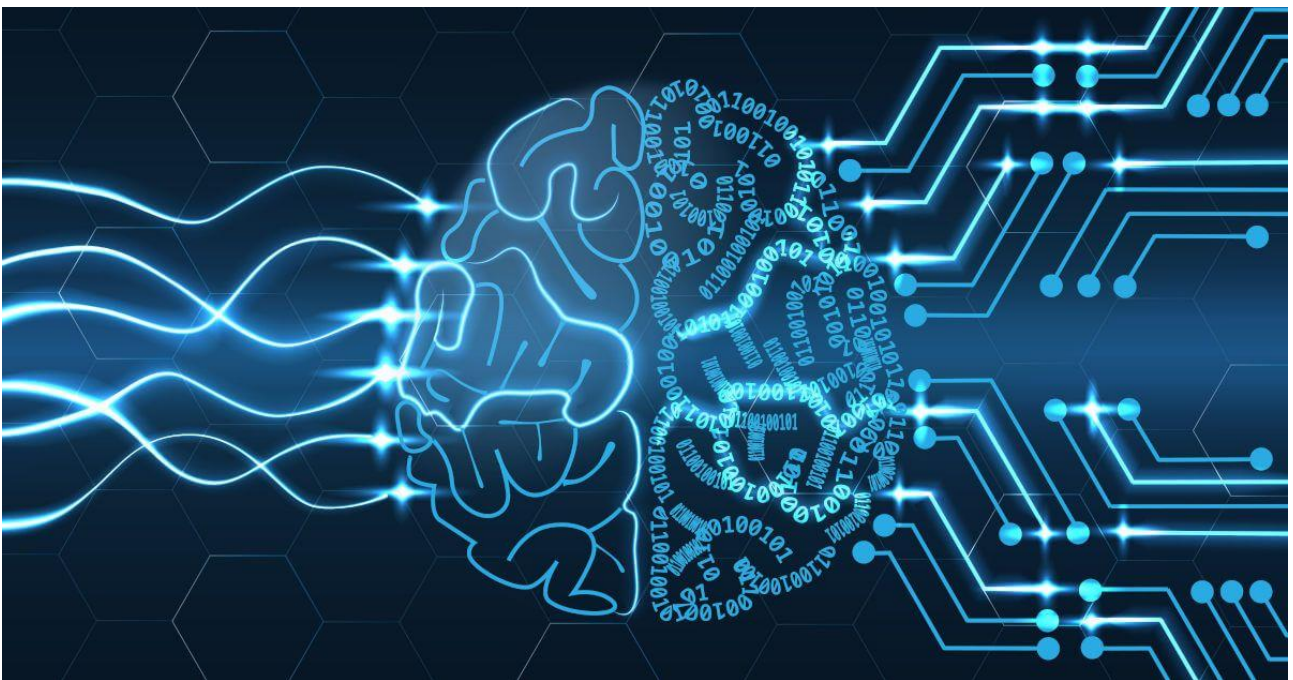


Survey on the use of Machine Learning algorithms by insurance companies in their relations with policyholders



February 2023

Market Conduct Supervision Directorate
by Claudio Vergati, Mariagrazia Rositano ed Eleonora Laurenza

1. Contents

In late 2022, IVASS conducted a survey on the use of Machine Learning (ML) algorithms by insurance companies in processes impacting customers. The survey supports IVASS' strategic goal of analysing the evolution and impact of InsurTech issues, promoting digital development in a modern consumer protection system.

Insurance companies report that they are at an early knowledge-gathering stage regarding the use of ML algorithms, adopted mainly for the optimization of internal processes and, only in limited cases, in the relations with policyholders. Further developments may emerge following experimentation and evaluations of the added value of ML to business and with the full definition of the relevant regulatory framework, particularly at the European level¹.

27% of companies use at least one ML algorithm in processes with direct impact on customers, for a market share of 78% in non-life and 25% in life business. The main areas of use of ML algorithms relate to fraud prevention and claims management, mainly in motor liability, and to the identification of customer intention to churn (churn patterns), including for pricing purposes at policy renewal.

As regards the governance of new ML tools - crucial for their informed and responsible use - only one company indicates that it has defined a specific policy; other 19 companies are defining it; 5 state that they have not yet addressed this issue. It should be noted, however, that 56% of undertakings using ML algorithms say they have internal mechanisms in place to assess fairness to policyholders and detect unwanted exclusions or discrimination of customers.

2. Scope of survey

The use of new technologies is accelerating change in the insurance industry, leading to the development of products and services to intercept the demand from increasingly digital consumers and implement new ways of dealing with customers.

Among the various technologies investigated by IVASS, an in-depth study was carried out on insurance companies' use of ML algorithms, with particular reference to those uses with

¹ Reference is made to the EU Commission Proposal for a "Regulation of the European Parliament and of the Council laying down harmonised rules on artificial intelligence and amending certain Union legislative acts" ([AI Act](#)) and to the Directive on a civil liability regime for artificial intelligence ([AILD](#)).

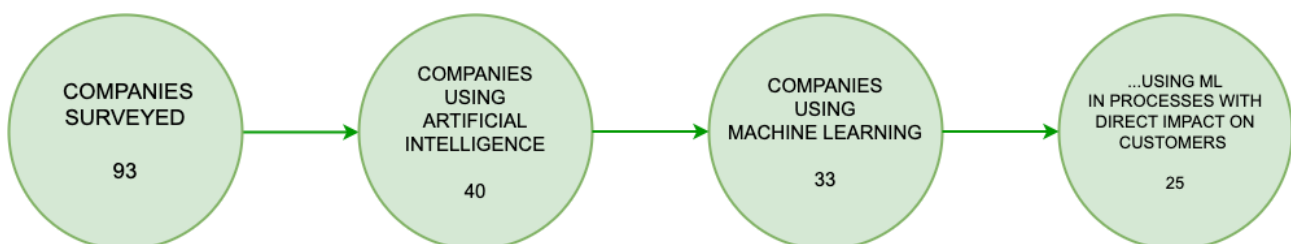
direct effects on policyholders, such as customer profiling, policy pricing and claims management.

The survey involved 93 insurance companies (all the Italian companies and 4 non-EU companies), and was conducted between June² and September 2022. The questionnaire included a general section on the use of Artificial Intelligence (AI), ML and other technologies and specific sections on the following aspects, related to ML algorithms³:

- *Governance*
- *Security*
- *Explainability*
- *Fairness*
- *Outsourcing*
- Main ML algorithms used by undertakings

3. Results of the survey

43%⁴ of surveyed undertakings use some form of AI; 27% use at least one ML algorithm in processes with direct impact on customer, for a market share of 78% in non-life and 25% in life business;



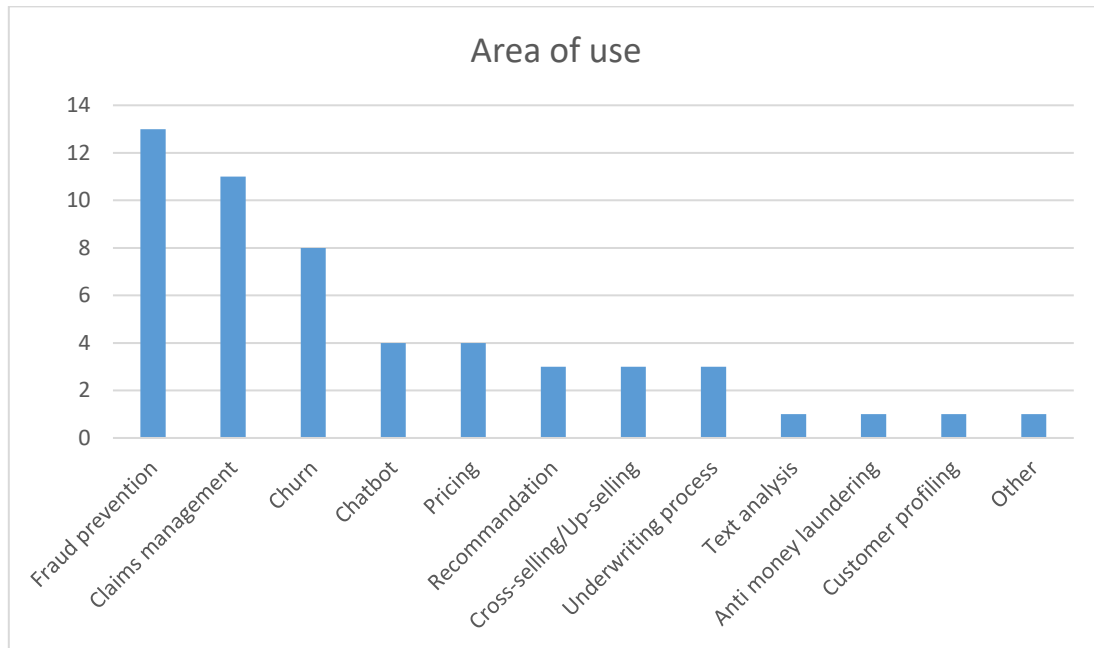
- The main **areas of use** of ML algorithms⁵ in retail processes relate to fraud prevention and claims management, mainly in motor liability, and the identification of customer intention to churn (churn patterns);

² <https://www.ivass.it/normativa/nazionale/secondaria-ivass/lettere/2022/lm-06-06/index.html>

³ The questionnaire ranged from a minimum of 46 questions to a maximum of 74, depending on the answers provided by the company.

⁴ In a Europe-wide sample survey conducted by EIOPA in 2019, it was found that 31% of European insurance companies were using ML algorithms and 24% had ongoing trials.

⁵ Some undertakings use the same algorithm for multiple areas of use.



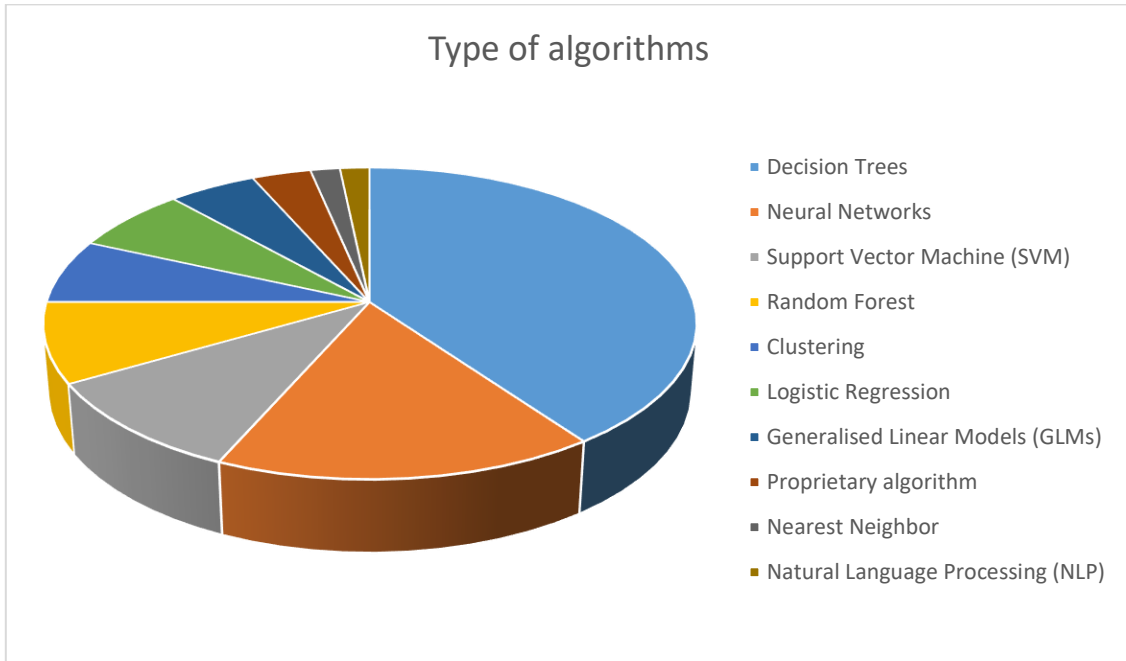
- in the **prevention of MTPL fraud**, algorithms are mostly used to support predictive models, consisting of rules generated on the basis of the analysis of a sample of claims, aimed at drawing the human operator's attention to potential fraud indicators and to assess the relationships between the parties involved in claims, e.g. drivers, witnesses, and loss adjusters;
- ML is used to optimize the times for **handling motor liability claims**, for example, through the assessment of the damage by means of photos taken and sent by the injured party, compared with a database of photos of similar damages already settled; in other cases, it provides a priority assessment for claims handling, identifies cases where the client might have an advantage in bearing the cost so as not to incur the malus, and, in general, even in areas other than MTPL, ML is used to make the handling of non-complex claims more efficient through the analysis of documentation;
- in **underwriting processes**, we note the use of ML algorithms for facial recognition of the customer in the case of remote contact and, in health policies, for the prediction of diseases that are most likely to affect the customer, to be brought to the attention of underwriters, based on the customers' biographical and medical history;
- in the area of **pricing**, the following algorithms are used in motor insurance:
 - to optimize the predictive accuracy of estimates of the probability of customer churn at renewal. The probability calculated with ML is compared with that determined through traditional Generalised Linear Models (GLMs) and, together with an

estimate of the expected profitability of the policy, helps to define a possible discount at contract renewal;

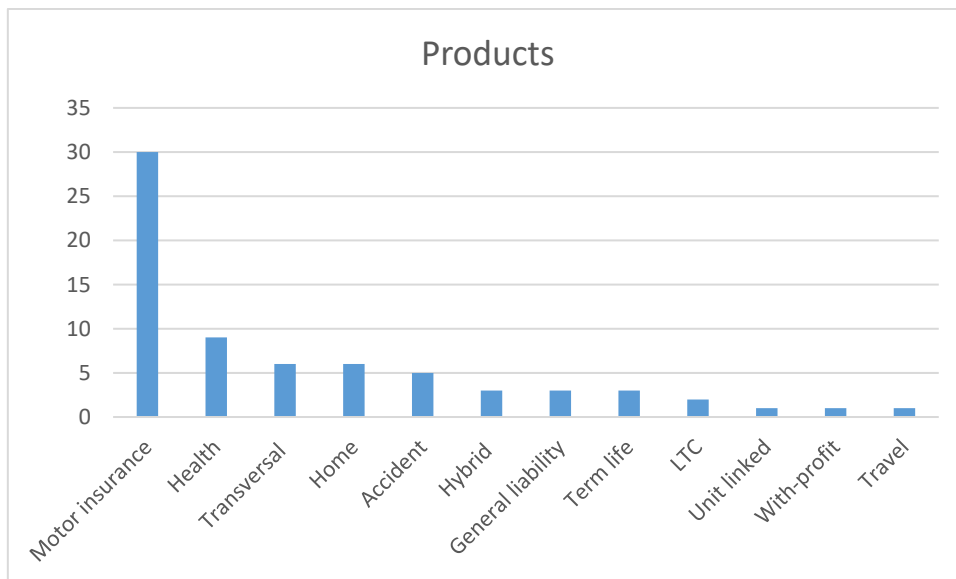
- to construct risk clusters into which to classify vehicles and geographical areas, to determine rate coefficients in premium calculation;
- with respect to the **governance** of algorithms, one company has indicated that it has defined a specific policy while 19 companies stated that they have one in the process of being defined and 5 that they have not yet planned anything in this regard;
- no major impacts on other corporate **policies**, e.g., risk management, compliance, internal auditing or IT, are found as a result of the use of ML algorithms; most undertakings (19) have not changed these policies and 7 indicate that they are "in the process of adjusting them", 5 of these companies are engaged in data governance review;
- 56% of undertakings using ML algorithms say they have internal mechanisms in place to assess **fairness to policyholders** and detect unwanted exclusions or discrimination of customers. Companies that have not equipped themselves with these tools say they do not need them due to the nature of the algorithms and data, which would not impact the policyholder fair treatment.

Furthermore:

- among **other technologies** used by undertakings **in conjunction with AI models**, 1% of undertakings indicate that they employ blockchain-related technologies, 37% use cloud computing, 16% adopt IoT - Internet of Things, and 27% exploit information from big data;
- **decision trees** emerge as the most widely used type of ML algorithm, followed by **neural networks**.
- 20% of algorithms are managed in outsourcing, while the remainder are developed in-house or in collaboration with technology partners;



- with regard to **insurance products**, the motor insurance segment is the one in which ML algorithms⁶ are currently most widely used in retail processes:



- all the companies that make use of ML algorithms use a **human-in-the-loop** approach, with human oversight to verify the results and make the final decision on the process;

⁶ The same algorithm can be used for multiple insurance products.

- ML algorithms have undergone **specific validation processes or auditing** (internal or external) in 18 out of 25 cases;
- among the companies using ML, 70% of those pursuing business in the non-life sector and 22% in the life sector say they use specific **KPIs/KRIs** (key performance indicator/key risk indicator) in relation to the algorithms, to evaluate the performance of the models; the indicators are not yet applied to the business functions involved;
- some models are characterized as a **black-box** that is not accessible or modifiable by undertakings (e.g., neural networks in computer vision or natural-language processing). Undertakings have stated that they use such closed models together with tools that help explain their logic and internal functioning.