POSSIBILITY OF USE OF ARTIFICIAL INTELLIGENCE IN THE WHOLE CLAIM SETTLEMENT PROCESS ON INSURANCE COMPANIES' VEHICLE CLAIMS

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Abstract: The paper introduces the possibility of use of Artificial Intelligence in the whole claim settlement process on insurance companies' vehicle claims. A fully automated vehicle claim settlement needs to develop the automatic liability check of the accident, which is now only made by human experts. The main points of this article are the main directions of the possible future development, such as to recognize the traffic situation, and to make a proper accident reconstruction.

Keywords: *Artificial Intelligence, AI, methodology, vehicle claims, insurtech*

1. INTRODUCTION

It is possible to use artificial intelligence to handle the whole claim settlement process on insurance companies' vehicle claims. The claim settlement is made up of three main steps:

1. check if the insurance is covered by fee at the date of the accident.
2. calculate the real cost of the vehicle claim.
3. check if the insured person is liable for the accident.

The fee coverage check has been automatism for decades. The vehicle damage recognition can now be made automatically also with the use of artificial intelligence, based on photographs, and the result of the whole process is the real value of the claim cost. We can see a very good solution from Solera, called Qapter Intelligent Estimating, or Visual Intelligence. This is done by image processing and deep-learning algorithms. The image classification uses a multi-model approach, where a machine learning model is trained to identify most of the vehicle's outer parts and identify and classify different types of damages in photos taken of vehicles. This kind of technology is now publicly available, and a large dataset has been used to train the model to a high accuracy. The vehicle claim cost is not an estimation, but a real value, because it is calculated in the Audatex/Qapter program, which uses car manufacturers' data. Furthermore, Qapter Intelligent Triage is an early warning system in the claim settlement process, in the event that the damage causes total loss of the vehicle.
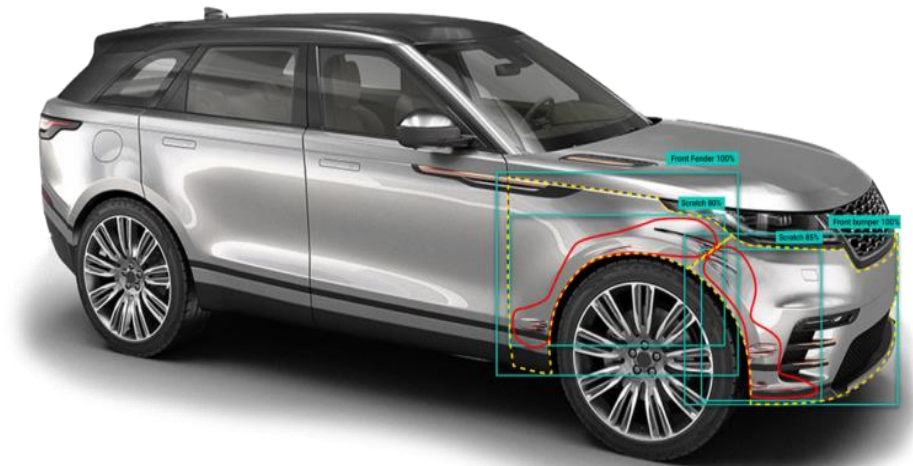
Figure 1. *AI identified parts and damages*

The next step to a fully automated vehicle claim settlement could be to develop the automatic liability check of the accident, which is now only made by human experts, but can also be done with the use of Artificial Intelligence.

A further aim of the computer-based analysis and evaluation of the accidents could also lead to improved road safety (Takacs, 2023).

Artificial Intelligence (AI) is a branch of computer science that aims to create machines and systems that can perform tasks that would typically require human intelligence, such as recognizing speech, making decisions, and solving problems. The theoretical background of AI is based on several fields of study, including:

- Cognitive psychology: This field studies human mental processes such as perception, memory, and problem-solving. AI researchers use principles from cognitive psychology to design intelligent systems that can mimic human thought processes (Matijošius, 2022).
- Logic: AI systems often use logic to represent and reason about knowledge. Researchers in the field of logic, specifically in the area of automated reasoning, have developed techniques for representing and manipulating knowledge using formal languages such as first-order logic.
- Computer science: The field of AI heavily relies on computer science to develop efficient algorithms and architectures for implementing intelligent systems. Techniques from areas such as machine learning, natural language processing, and computer vision are used to create AI systems that can learn from data, understand human language, and perceive the world.
- Philosophy: The field of AI raises many philosophical questions about the nature of intelligence, consciousness, and the relationship between machines and

humans. The study of philosophy of mind and metaphysics is important for understanding the goals and limitations of AI research.
- Neuroscience: AI researchers also draw inspiration from neuroscience to understand the neural mechanisms underlying human intelligence. The study of neural networks and the brain's structure and function can inform the design of AI systems that can adapt and learn like humans.

All these fields work together to create the theoretical background of AI, which allows the development of intelligent systems that can perform tasks that would typically require human intelligence.

Nowadays, artificial intelligence is increasingly used to evaluate images. One of the most well-known areas is medical imaging. CT scans can be evaluated by both human radiologists and artificial intelligence (AI) systems. Human radiologists have the advantage of being able to use their experience and intuition when interpreting CT scans, while AI systems can quickly analyse large amounts of data and can be programmed to recognize specific patterns or abnormalities. Both human radiologists and AI systems can make mistakes, but research has shown that the combination of human and AI evaluations can lead to more accurate and efficient diagnoses. These methods are used for the implant design also (Győri & Ficzere, 2016), (Ficzere, 2018), (Ficzere, 2022).

2. METHODOLOGY

Determination of accident liability for road vehicles based on photographs using artificial intelligence, a few steps need to be followed:
1. Data collection:
   A large dataset of images of vehicles with different types of
   - damages such as dents, scratches, and broken parts need to be collected.
   - Accidents. The dataset should also include information about the accident type, such as frontal accident, overtaking, hitting a pedestrian, crossroad accident, ...
   - This dataset of images of vehicles should also contain a so-called 'EES catalogue'. EES means Energy Equivalent Speed, which is the speed of a car hitting a rigid wall. This type of catalogue has a large dataset of crash tests made under controlled conditions, and each car in the photo has specific deformation energy. So, the later calculations will have exact comparative data.
   - The weather conditions by places and by timeline (web solutions available).
   - The environmental conditions (e.g., adhesion coefficient) by the type of each weather condition for each road type (e.g., concrete, asphalt…).
   - Images of sketches or drawings of the accident. The person involved in the accident (drivers, and witnesses also) draw the traffic situation of the accident, for the request of the insurance company.
   - A large dataset of written reports of the parties involved in the accident.
   - The severity of the injury of the person involved in the accident.

− Dataset of the accident sites with GPS coordinates, maps, and if available, with photos of the place, such as satellite- or aerial photos, and photos or videos from the viewpoints of the parties involved. The onboard videos can be good data as well.


Figure 2. *Crash test made by Euro NCAP*

The place of the accident and the type of accident can be gathered from a great post-accident cloud-based mobile app, called 'e-Kárbejelentő', which is a great solution to the first notice of loss. This solution was made by the Association of Hungarian Insurance Companies.

Figure 3. *Post-accident cloud-based mobile app, called 'e-Kárbejelentő'*

Thanks to the use of this app, we now have a map of the most dangerous places in Hungary, which can be used by authorities also to avoid further accidents.
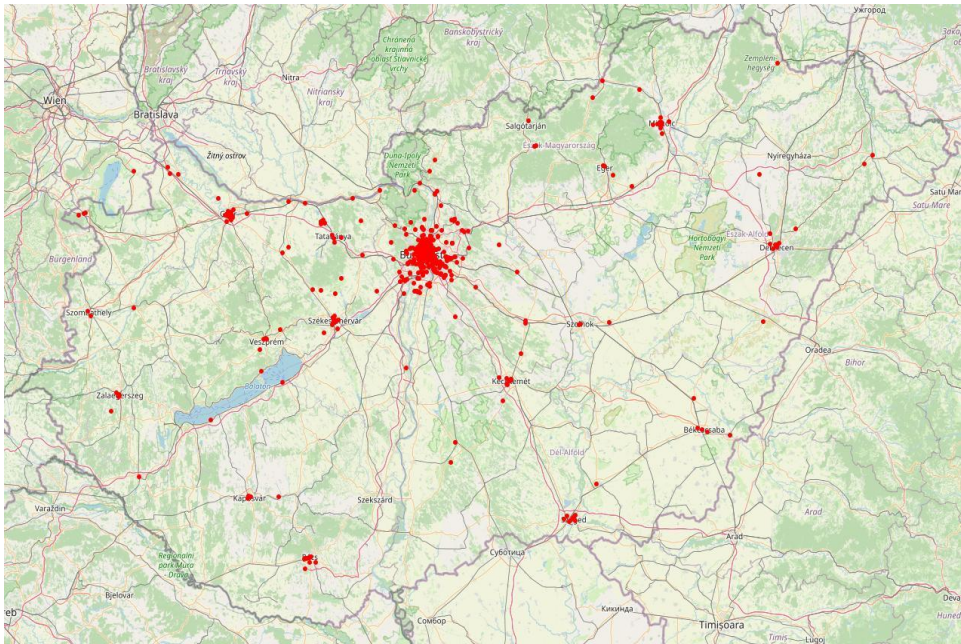
Figure 4. The most dangerous transport places in Hungary

2. Image classification: A machine learning model, such as a convolutional neural network (CNN), is trained on the dataset to identify and classify different types of accidents.
3. Image segmentation: The CNN model can be further fine-tuned for image segmentation to prepare a detailed accident analysis to calculate the different pre-accident vehicle speeds, and to calculate the pre-accident reaction points.

3. SUMMARY

In summary, the use of artificial intelligence (AI) to calculate the claim cost of road vehicles based on photographs is already a public application of AI. The liability check and accident reconstruction could be also automated with the use of AI. This can be done using techniques such as image classification and image segmentation, which are powered by machine learning models such as convolutional neural networks (CNNs). However, this technology is still in its early stages and requires a large dataset to train the model accurately. The theoretical background of AI is based on several fields of study, including cognitive psychology, logic, computer science, philosophy, and neuroscience. These fields work together to create intelligent systems that can perform tasks that would typically require human intelligence.

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SOURCE OF FIGURES

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