Intelligent Vehicle Damage Assessment and Cost Estimator for Insurance Companies

ABSTRACT:

At present, under the guidance of the new generation of information technology, the rapid accumulation of data, the continuous improvement of computing power, the continuous optimization of algorithm models, and the rapid rise of multi-scene applications have made profound changes in the development environment of artificial intelligence. In this paper, based on the demand of automobile insurance claims and intelligent transportation, combined with abundant basic data and advanced machine vision algorithm, an intelligent damage determination system of 'Artificial Intelligence + Vehicle Insurance' is constructed. This paper first introduces the functions of the intelligent damage assessment system. Secondly, it discusses the realization path of each functional module in detail, and finally puts forward the vision for the future.

INRODUCTION:

With technological advancements in the automotive industry in recent times, modern vehicles are no longer made up of only mechanical devices but are also an assemblage of complex electronic devices called electronic control units which provide advanced vehicle functionality and facilitate independent decision making. ECUs receive input from sensors and runs computations for their required tasks . These vehicles are also fitted with an increasing number of sensing and communication technologies to facilitate driving decisions and to be self aware . However, the proliferation of these technologies have been found to facilitate the remote exploitation of the vehicle. Malicious entities could inject malware in ECUs to compromise the internal network of the vehicle . The internal network of a vehicle refers to the communications between the multiple ECUs in the vehicle over on-board buses such as the controller area network. The authors demonstrated the possibility of such remote exploitation on a connected and autonomous vehicle , which allowed the malicious entity to gain full control of the driving system and bring the vehicle to a halt. To comprehend the extent to which smart vehicles are vulnerable, we conducted a risk analysis for connected vehicles in and identified likely threats and their sources. Furthermore, using the Threat Vulnerability Risk Assessment methodology, we classified identified threats based on their impact on the vehicles and found that compromising one or more of the myriad of ECUs installed in the vehicles poses a considerable threat to the security of smart vehicles and the vehicular network. Vehicular network here refers to communication between smart vehicles and roadside units which are installed and managed by the transport authority. These entities exchange routine and safety messages according to the IEEE802.11p standard. By compromising ECUs fitted in a vehicle, a malicious entity could for example, broadcast false information in the network to affect the driving decisions of other vehicles. Therefore, in this paper, we focus on monitoring the state of the in-vehicle network to enable the detection of an ECU compromise. Previous efforts that focus on the security of in-vehicle networks have focused on intrusion and anomaly detection which enables the detection of unauthorized access to in-vehicle network and the identification of deviation from acceptable vehicle behavior. Several challenges however persist. First, proposed security solutions are based on a centralized design which relies on a Master ECU that is responsible for ensuring valid communications between in-vehicle ECUs . However,

these solutions are vulnerable to a single point of failure attack where an attacker's aim is to compromise the centralized security design. Furthermore, if the Master ECU is either compromised or faulty, the attacker could easily execute actions that undermine the security of the in-vehicle network. In-addition, efforts that focus on intrusion detection by comparing ECU firmware versions are also vulnerable to a single point of exploitation whereby the previous version which is centrally stored could be altered. These works also rely on the vehicle manufacturer to ultimately verify the state of ECUs. However, vehicle manufacturers could be motivated to execute malicious actions for their benefits such as to evade liability. Therefore, decentralization of the ECU state verification among entities in the vehicular ecosystem is desirable for the security of smart vehicles. Finally, the solution proposed in which focuses on observing deviations from acceptable behavior utilized data generated from a subset of ECUs. However, this present a data reliability challenge when an ECU not included in the ECU subset is compromised.

LITERATURE REVIEW:

Li Ying & Dorai Chitra, presented the CNN Model for the auto insurance claims process, improvements in the First Notice of Loss and rapidity in the investigation and evaluation of claims could drive significant values by reducing loss adjustment expense. This paper proposed a novel application where advanced technologies in image analysis and pattern recognition are applied to automatically identify and characterize automobile damage. Success in this will allow some cases to proceed without human adjusters, while others to proceed more efficiently, thus ultimately shortening the time between the first Notice of Loss and the final pay-out. To investigate its feasibility, they built a prototype system which automatically identifies the damaged area(s) based on the comparison of ages. Performance of the before- and after-accident automobile in of the prototype system has been evaluated on images taken from forty scaled model cars under reasonably controlled environments, and encouraging results were obtained. It is a belief that, with the advancement of image analysis and pattern recognition technologies, their proposed idea could evolve into a very promising application www.ijcrt.org © 2022 IJCRT | Volume 10, Issue 4 April 2022 | ISSN: 2320-2882 IJCRT2204483 International Journal of Creative Research Thoughts (IJCRT) www.ijcrt.org e198 area where the auto insurance industry could significantly benefit. The main drawback in this model was that the automobile damaged can be analyzed only having white background otherwise it will be not able to give the desired results and the study also indicates that there may be an error in the result, it may not give that accurate result like 85-90% affective. U. Waqas, N. Akram, S. Kim, D. Lee and J. Jeon, they presented the Image-based vehicle insurance processing and loan management has large scope for automation in automotive industry. In this paper consideration of the problem of car damage classification, where categories include medium damage, huge damage and no damage. Based on deep learning techniques, Mobile Net model is proposed with transfer learning for classification. Moreover, moving towards automation also comes with diverse hurdles; users can upload fake images like screenshots or taking pictures from computer screens, etc. To tackle this problem a hybrid approach is proposed to provide only authentic images to algorithm for damage classification as input. In this regard, moiré effect detection and metadata analysis are performed to detect fraudulent images. For damage classification 95% and for moiré effect detection 99% accuracy is achieved. The main drawback was that

Images in bad lighting, awkward angles, variety in vehicle models, images taken in rain or snow, minor scratches on vehicles, etc. Even though it used several angles and vehicle models in a small dataset to achieve automation but still the range is broad.

Conclusion:

In the future, we will continue to explore the innovation of insurance technology of 'AI + Vehicle Insurance'. We hope that we can use the power of intelligent damage determination system. On the one hand, the owner can take photos by one click to achieve rapid loss determination, price estimation and immediate compensation. On the other hand, it assists insurance companies to achieve rapid and accurate pricing in the process of fixing losses and claims. Finally, by combining the rapid compensation of accident vehicles to relieve traffic pressure, to avoid more serious personal and property losses caused by secondary accidents.

References:

[1] LeCun, Y., Boser, B., Denker, J.S., Henderson, D., Howard, R.E., Hubbard, W., Jackel, L.D. Backpropagation applied to handwritten zip code recognition. Neural computation, 1989, pp.
541-551.
[2] Krizhevsky, A., Sutskever, I., Hinton, G. Imagenet classification with deep convolutional neural
networks. In NIPS, 2012, pp. 1097-1105.
[3] Zeiler, M. D., Fergus, R. Visualizing and understanding convolutional neural networks. In
ECCV, 2014, pp. 818-833.
[4] LeCun, Y., Bengio, Y., Hinton, G. Deep learning. Nature, 2015(521), pp. 436-444.
[5] Simonyan, K., Zisserman, A. Very deep convolutional networks for large-scale image
recognition. In ICLR, 2015, pp. 1409.1556.
[6] Shaoqing Ren, Kaiming He, Ross Girshick, Jian Sun. Faster R-CNN: Towards real-time object
detection with region proposal networks. In NIPS, 2015, pp. 91-99.
[7] Kaiming He, Georgia Gkioxari, Piotr Dollar, Ross Girshick. Mask R-CNN. In ICCV, 2017, pp. 2980-2988