INTELLIGENT VEHICLE DAMAGE ASSESSMENT & COST ESTIMATOR FOR INSURANCE COMPANIES

- Date : 28 September 2022
- Team ID : PNT2022TMID38414
- Project Name : **Intelligent Vehicle Damage Assessment & Cost Estimator for Insurance Companies**
- Team Members : LOGESH E (TL)

  DEEPAK P

  NAGARAJ V

  KISHOREKUMAR B

INTRODUCTION

In today's world, Vehicles are increasing heavily. Because of increasing the vehicles, accidents are very common because the peoples are driving a car very fastly on the road. The people claim the money for repair the car through vehicle insurance when the accident happens. Because of incorrect claims, the company behaves badly and doesn't make payments currently. This happens due to claims leakage, the claims leakage refers to the difference between the amounts secured by the company to the amount that company should have secured based on the claims. Still the damage to the car is examined clearly and it will take more time to claim the process according to the company policy. Although the company does one's best to speed up the claiming process delay. Differentiate the proposed system that is maybe speed up the car damage that can be check in process. Just by sending the image containing a damaged car and can system performs car damage detection in a minute rather than hours if it is inspected visually. The system can utilizes machine learning approach as well as computer vision to decide the damage analysis, location of the damage as well as severity of the damage.

LITERATURE SURVEY

In this literature survey several methods have been proposed for detection of car damage.Srimal et al. [4] proposed a solution which uses 3D Computer Aided Design for the discernment of car damage from the picture, the system only detect damage at edge portion only. Detection of the car damage through CAD software requires some

knowledge about the software.S Gontscharov et al [5] ,the proposed system designed by using YOLO(you only look once) algorithm to detect tha car damage, Here the multi sensor data fusion technique is allows to locate the portion of damage more accurately and performs detection faster compared to other algorithms which is fully automatic and doesn't require much human intervention. Phyu Mar Kyu et al [3], the proposed system uses deep learning based algorithm are VGG16 and VGG19 damaged car detection in the real world. This algorithm notice the severity of the damaged car based on the location. Finally the author concludes that L2 regularization work greater. Girish N et al [2], the proposed system uses vehicle damage detection technique depends on transfer learning and mask RCNN, The mask regional convolution neural network determines a damaged car by its position and estimate the depth of the damage.A Neela Madheswari et al [1], the proposed system uses convolution neural network is use to accept that image contains a car damage or not. It take as great opportunities to attempt by classifying the car damage into different classes.

The rapidly expanding automobile industry highly backs the equally fast-growing auto insurance market. Although until now this industry has been solely based on traditional ways to make repair claims. In case of an unfortunate accident, the claims for the car damage needs to be filed manually. An inspector is required to physically analyze the vehicles to assess the damage and obtain a cost estimate. In such situation, there is also the possibility of inaccurate settlements due to human errors. Automating such a process with the help of machine learning and remote usage would make the process a lot more convenient for both sides of the damage, increasing productivity of the insurance carrier and satisfaction of the customer.
While the technology is yet to achieve the highest possible levels of accuracy, above is a proof of concept of the application of Deep Learning and Transfer learning into automating the damage assessments by building and training VGG Models. The following is the list of papers that were referred and analyzed; each having its corresponding summary and take-away ideas.

1. Research on Intelligent Vehicle Damage Assessment System Based on Computer Vision
2. *Zhu Qianqian, Guo Weiming, Shen Ying and Zhao Zihao*
   2020
3. This paper gives us an insight of four stages of our project:

4. Accident investigation: Photographs of target vehicles and multiple trio vehicles were taken and uploaded, intelligent recognition, information input, intelligent recognition and event finalization are completed in accident investigation.

5. Intelligent image damage assessment: image damage assessment is achieved by intelligent component recognition and intelligent damage recognition.

6. Damage result output: Damage results including maintenance scheme recommendation and maintenance price recommendation are automatically given according to damage recognition results.

7. Vehicle insurance anti-fraud: In the process of fixing the damage, the anti-fraud screening of vehicle insurance is completed by means of image fraud recognition and logical detection.

1 . Car Damage Detection and Classification
Phyu Mar Kyu, Kuntpong Woraratpanya
2020

This paper discovers the effect of pre-trained CNN models, which are trained on an ImageNet dataset, and followed by fine-tuning, because some of the categories can be fine-granular to get our specific tasks. Achieving an accuracy of 95.22% of VGG19 and 94.56% of VGG16 in the damaged detection, the accuracy of 76.48% of VGG19 and 74.39% of VGG16 in damage localization, The paper concludes that the performance of VGG19 is better than VGG16 and also suggests the idea of L2 Regularization seemed better than hyper parameter tuning. The main drawback of this model was a reduction of model training time is also the most challenge. Typically, a traditional CNN model can be very time-consuming to perform image classification tasks and identify the correct weights for the network by multiple forward and backward iterations. This process may take days or even weeks to complete it using GPUs

1. Vehicle Damage Classification and Fraudulent Image Detection
Umer Waqas, Nimra Akram, Soohwa Kim, Donghun Lee, Jihoon Jeon
2020

The paper shifts towards the same automation with diverse hurdles such as users can upload fake images like screenshots or taking pictures from computer screens, etc. To tackle the problem, a hybrid approach was proposed to provide only authentic images to algorithm for damage classification as input. In this regard, moiré effect detection and metadata analysis was performed to detect fraudulent images. For damage classification 95% and for moiré effect detection 99% accuracy was 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.

REFERENCES

[1] K. Patil, M. Kulkarni, A. Sriraman and S. Karande,"Deep Learning Based Car Damage Classification," 2017 16th IEEE International Conference on Machine Learning and Applications (ICMLA), 2017, pp. 50-54, doi: 10.1109/ICMLA.2017.0179

[2] Rakshata P, Padma H V, Pooja M, Yashaswini H V, Karthik V,"Car Damage Detection and Analysis Using Deep Learning Algorithm For Automotive", Vol 5, Issue 6, International Journal of Scientific Research Engineering Tre nds (IJSRET), Nov-Dec 2019, ISSN (Online): 2395566X

[3] Ren, Shaoqing He, Kaiming Girshick, Ross Sun, Jian. (2015). Faster R-CNN: Towards Real-Time Object Detection with Region Proposal Networks. IEEE Transactions on Pattern Analysis and Machine Intelligence. 39. 10.1109/TPAMI.2016.2577031.

[4] X. Zhu, S. Liu, P. Zhang and Y. Duan, "A Unified Framework of Intelligent Vehicle Damage Assessment based on Computer Vision
Technology," 2019 IEEE 2nd International Conference on Automation, Electronics and Electrical Engineering (AUTEEE), 2019, pp. 124-128, doi: 10.1109/AUTEEE48671.2019.9033150.

[5] Q. Zhang, X. Chang and S. B. Bian, "Vehicle-Damage-Detection Segmentation Algorithm Based on Improved Mask RCNN," in IEEE Access, vol. 8, pp. 6997-7004, 2020, doi: 10.1109/ACCESS.2020.2964055