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CAR DAMAGE DETECTION

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Abstract: ***Vehicle have an impact on people's daily safety, and because there are so many different types and sizes of materials, it can be challenging to distinguish and detect the conditions around the vehicle. In this project, we looked into the matter of car damage classification and detection, which insurance providers can utilize to quickly automates the handling of vehicle insurance disputes. Deep convolutional networks can be used to detect car damage and with recent developments in computer vision, which are largely attributable to the implementation of quick, scalable, and entire trainable CNN. We manually gathered and annotated pictures of numerous online sources that showed various kinds of car damage. By analyzing the deep learning-based YOLO (you only look once) series target detection method, a recognition approach that relies on YOLOS is provided to achieve timely and efficient identification of the damage in the vehicle. The COCO dataset's base weights are used to train the model. 35-90 epochs are used to process the photos. The region of damage is highlighted in the final image using a color splash technique after processing. The approach would increase customer satisfaction while assisting in lowering the cost of processing insurance claims Vendors of automobiles can do away with the labor-intensive manual damage assessment process. Additional vehicles will be priced accurately and transparently, along with any necessary repairs. It is also able to decrease misleading vehicle insurance claims.***

Keywords: CNN, YOLO, COCO

1.INTRODUCTION:

Cars can suffer from damages when they come into contact with sharp objects, road accidents, or any other incidents that harm the car's body, impacting its original shape and form. Automated car damage detection is becoming increasingly common, and many users are turning to these sophisticated systems. This technology is improving as vehicle damage detection using AI becomes more prevalent. Many different types of car damage detection techniques are available at our disposal.

Today's in car industry a lot of money is wasted due to claims leakage and underwriting leakage. Visual inspection and validation have been used to reduce such effects. We employ Convolutional neural network to capture the images and we can detect the classification of car damage types. We consider the common damage types such as bumper dent, door dent, glass shatter, head lamp broken and side mirror broken then the engine damage parts then the scratch and smashes areas. We observe the transfer learning combined with ensemble learning works the best. We also device a method to localize a particular damage type.

Car insurance, car leasing, and rental car companies benefit from vehicle damage detection using AI. Image-based convolutional neural networks can accurately recognize car damage through photos and video. The car damage detection process is crucial to the motor industry and the related stakeholders. It identifies damages and estimates the repair cost. It is often impossible to manually inspect every part of a car, but vehicle inspections are efficient and feasible using machine learning algorithms. Furthermore, AI damage inspections can recognize and analyze multiple types of damage in seconds. This way, users can make more informed decisions regarding the condition of their vehicles.

2. LITERATURE SURVEY:

This study introduces a deep learning-based algorithm for identifying car appeal damage and a way for evaluating the algorithm's model. An approach using computer vision is presented, with an evaluation system. A damage detection approach is developed using the specific target object identification of the four primary types of damage: scraped, deform, crack, and rupture. Mask R-CNN is employed as the fundamental framework. Newly developed bounding box regression to mutually acquire the ambiguity of bounding box regression and this approach is applied. In order to prevent overfitting and understand more basic characteristics, this study proposed models that were pre-trained on a vast and varied dataset. Utilizing CNN models that have been pre-trained on the ImageNet dataset, among other methods. Additionally, a pipeline for recognizing the damage in vehicles is proposed by combining the processes of recognition and classification in order to identify the location of damage using state-of-the-art YOLO object detector. In this study, VGG16 and VGG19, two deep learning-based algorithms, were used for car damage assessment and detection in datasets. The algorithms locate the damaged car component, identify its place, and then analyze its severity. Notice how domain-specific pre-trained CNNs were trained over an ImageNet dataset-perform first, and then fine-tune them. Applying transfer learning to already-trained VGG models after that. According to their findings, VGG19 performs better than VGG16. Observed that the outcomes of using transfer learning and L2 regularization can be more effective than those of fine-tuning after analyzing and putting models into practice. On a smaller Dataset, this study's application of the Mask RCNN technique has also shown useful results. They employ the "detectron2" pre-trained model of Facebook's free and open-source Library.

In the paper, vehicle damaged areas are Detected and segmented using the Mask RCNN approach. Reduced segmentation and slower detection speed are problems that arise as a result of the complication of automated damage recognition and detection. In the context of this study, the Mask RCNN is used, and a model for identifying and segmenting a vehicle's damaged area following an accident is suggested.

This paper suggested a method for producing reliable features by precisely finding the faults and using YOLO to detect the damage zones. By fusing data from many sensors, Gontscharov.al attempts to tackle the issue of vehicle damages. By using a higher resolution vision system with many cameras, Keyence Vision suggested an industrial solution for hail damage to cars.

3. PROPOSED SYSTEM:

The proposed approach was created with the purpose of identify different types damages present in the image of car and classify the damage based on severity of the damage and ensure the insurance firms with accurate damage assessment.

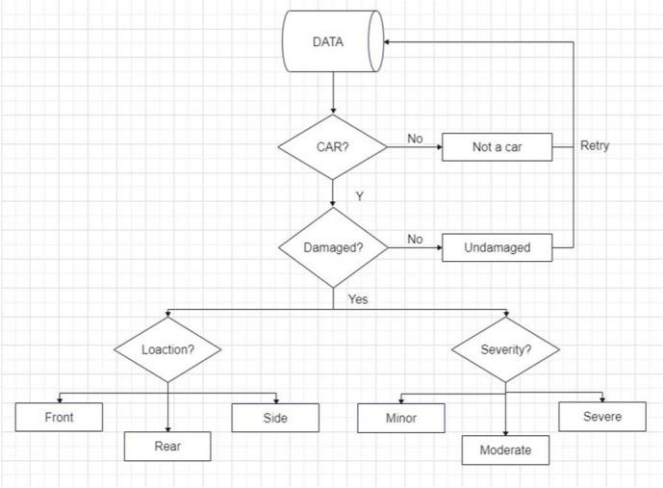

Figure 1 Block Diagram

Vehicle Damage Detection using Deep learning module, reduces human error considerably. Such a model is that it can be utilized by insurance companies for swift processing of claims if users can upload photos and they can evaluate damage from them.

This model can also be used by moneylenders if they are financing a car loan especially for a used car. A good way to think about Mask R-CNN is that it is a combination of a Faster R-CNN that does object detection (class + bounding box) and FCN (Fully Convolutional Network) that does pixel wise boundary. This model includes collecting the data, annotating the data, model building, training the model and validating the model.

4.CONCLUSION:

In order to offer an effective way for automating automobile damage insurance claims, we combine data and AI in this article. In this work, we present a method for classifying and identifying vehicle damage. We employed deep learning techniques for the damage categorization process and manually gathered a variety of Online datasets by web crawling on search engines Such as Google.

We achieved the present state of the art in car damage categorization by ease by blending transfer learning using transformers for feature extraction. Using the YOLO architecture, we are indeed effective in locating the damaged area and identify the type of the damage and severity the of the car. Despite the fact that our dataset is very tiny in comparison to other deep learning datasets, successful results were obtained.

5. FINAL OUTPUT DEMO IMAGE:

Figure 2 Sample Output

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