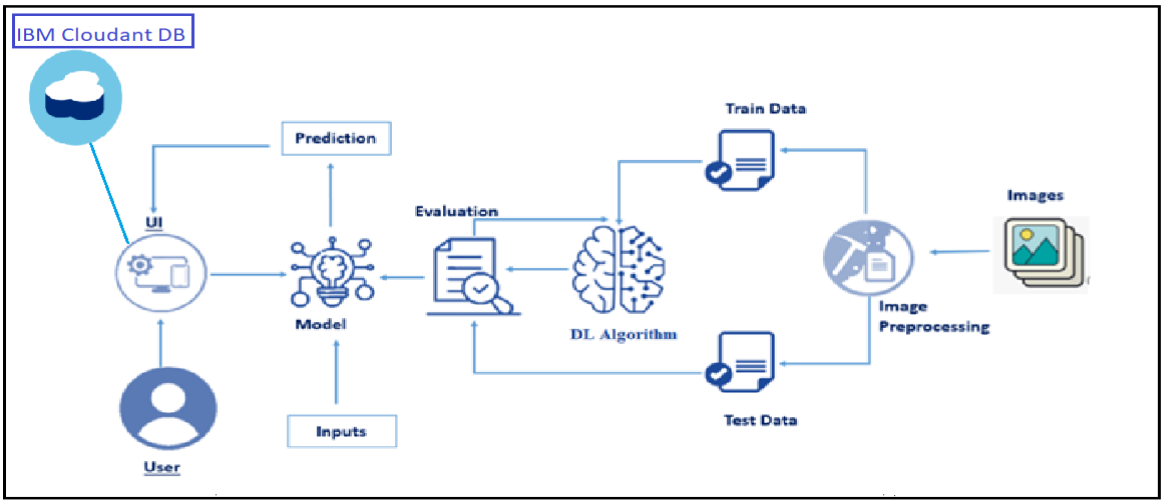
LITERATURE SURVEY

Date	10 October 2022
Team ID	PNT2022TMID51924
Project Name	Intelligent Vehicle Damage Assessment and Cost Estimator for Insurance Companies
Maximum Marks	2 Marks

INTRODUCTION:

Nowadays, a lot of money is being wasted in the car insurance business due to leakage claims. Claims leakage Underwriting leakage is characterized as the discrepancy between the actual payment of claims made and the sum that should have been paid if all of the industry's leading practices were applied. Visual examination and testing have been used to may these results. However, they impose delays in the processing of claims.

The aim of this project is to build a VGG16 model that can detect the area of damage on a car. The rationale for such a model is that it can be used by insurance companies for faster processing of claims if users can upload pics and the model can assess damage (be it dent scratch from and estimates the cost of damage. This model can also be used by lenders if they are underwriting a car loan, especially for a used car.



Paper 1

Car Damage Assessment for Insurance Companies

Authors

Mandara G and Prashant Ankalkoti

Year:2022

Abstract

Analysis of the damaged vehicle that can be automatically claiming insurance that takes human resource, time and effort. Image processing and machine learning techniques are analysing the vehicle damage in the proposed solution. In Advanced solution helps to speed up the claiming process sufficiently. Consider a situation, if a person is driving a car they met an accident the vehicle owner can taken a few photos of the damaged car from a mobile phone that can be send to the insurance company and can just upload the photos to the system. The system can analyse the damage, severity of the damage as well as location of the damage. In this proposed project the insurance company can machine-driven the car damage analysis process without the need for humans to analyse the damage done to the car. Therefore, it is a very challenging task for quality of computer vision techniques and also Machine learning technologies.

Reference

https://ijarsct.co.in/Paper5048.pdf

Paper 2

Intelligent Vehicle Damage Assessment system based on computer vision

Authors:

Zhu Qianqian, Guo Weiming, Shen Ying,and Zhao Zihao

Year:2020

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.

Functions

Intelligent damage determination system can be used to determine the appearance damage of vehicles in small cases. The system completes the whole process of survey and damage determination through four functions. They are:

- 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.
- Intelligent image damage assessment: image damage assessment is achieved by intelligent component recognition and intelligent damage recognition.
- Damage result output: Damage results including maintenance scheme recommendation and maintenance price recommendation are automatically given according to damage recognition results.
- 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. Intelligent damage assessment system can assist the damage locator in the front-end damage detection process.

The operator only needs to take several photos to upload according to the requirements, and the system can automatically identify the damage degree of the damaged parts and components. The system in the back-end nuclear damage link can provide auxiliary nuclear damage and anti-fraud services. It can identify the cases of fixed-loss errors through the logical recognition of vehicle parts, image fraud recognition, fixed-loss logic recognition, etc. At the same time, it can also meet the demands of anti-fraud and leakage prevention.

At present, the intelligent damage assessment system can realize the appearance damage of passenger cars, including CAR, SUV, MPV and VAN. The applicable damage range covers all types of damage of vehicle exterior parts; the applicable environment range covers rain and snow environment, dark environment (vehicle can be seen by human eyes), strong light environment and other scenarios.

Reference

https://iopscience.iop.org/article/10.1088/1742-6596/1518/1/012050/pdf

Paper 3

A Very Deep Transfer Learning Model for Vehicle Damage Detection and Localization

Authors:

Najmeddine Dhieb, Hakim Ghazzai, Hichem Besbes, and Yehia Massoud

Year:2019

Abstract

Claims leakage is a major problem engendering tremendous losses for insurance companies. Those losses are due to the difference between the amount paid by insurance companies and the exact amount that should be spent, which cost millions of dollars yearly. Experts assert that these losses are caused by inefficient claims processing, frauds, and poor decision-making in the company. With the huge advances in Artificial Intelligence (AI), machine and deep learning algorithms, those technologies have started being used in insurance industry to solve such problems and cope with their negative consequences. In this paper, we propose automated and efficient deep learning-based architectures for vehicle damage detection and localization. The proposed solution combines deep learning, instance segmentation, and transfer learning techniques for features extraction and damage identification. Its objective is to automatically detect damages in vehicles, locate them, classify their severity levels, and visualize them by contouring their exact locations. Numerical results reveal that our transfer learning proposed solution, based on Inception-ResnetV2 pre-trained model followed by a fully connected neural network, achieves higher performances in features extraction and damage detection/localization than another pre-trained model, i.e., VGG16.

Reference

https://ieeexplore.ieee.org/document/9021687/authors#authors

Paper 4

Image Based Automatic Vehicle Damage Detection

Author

Srimal Jayawardena

Year : 2013

Abstract

Automatically detecting vehicle damage using photographs taken at the accident scene is very useful as it can greatly reduce the cost of processing insurance claims, as well as provide greater convenience for vehicle users. An ideal scenario would be where the vehicle user can upload a few photographs of the damaged car taken from a mobile phone and have the damage assessment and insurance claim processing done automatically. However, such a solution remains a challenging task due to a number of factors. For a start, the scene of the accident is typically an unknown and uncontrolled outdoor environment with a plethora of factors beyond our control including scene illumination and the presence of surrounding objects which are not known a priori. In addition, since vehicles have very reflective metallic bodies the photographs taken in such an uncontrolled environment can be expected to have a considerable amount of inter object reflection. Therefore, the application of standard computer vision techniques in this context is a very challenging task. Moreover, solving this task opens up a fascinating repertoire of computer vision problems which need to be addressed in the context of a very challenging scenario. This thesis describes research undertaken to address the problem of au- tomatic vehicle damage detection using photographs. A pipeline addressing a vertical slice of the broad problem is considered while focusing on mild vehicle damage detection. We propose to use 3D CAD models of undamaged vehicles which are used to obtain ground truth information in order to infer what the vehicle with mild damage in the photograph should have looked like, if it had not been damaged. To this end, we develop 3D pose estimation algorithms to register an undamaged 3D CAD model over a photograph of the known dam- aged vehicle. We present a 3D pose estimation method using image gradient information of the photograph and the 3D model projection. We show how the 3D model projection at the recovered 3D pose can be used to identify components of a vehicle in the photograph which may have mild damage. In addition, we present a more robust 3D pose estimation method by minimizing a novel illumination invariant distance measure, which is based on a Mahalanobis distance between attributes of the 3D model projection and the pixels in the photograph. In principle, image edges which are not present in the 3D CAD model projection can be considered to be vehicle damage. However, since the vehicle body is very reflective, there is a large amount of inter

object reflection in the photograph which may be misclassified as damage. In order to detect image edges caused by inter object reflection, we propose to apply multi-view geometry techniques on two photographs of the vehicle taken from different view points. To this end, we also develop a robust method to obtain reliable point correspondences across the photographs which are dominated by large reflective and mostly homogeneous regions. The performance of the proposed methods are experimentally evaluated on real photographs using 3D CAD models of varying accuracy. We expect that the research presented in this thesis will provide the groundwork for designing an automatic photograph based vehicle damage detection system. Moreover, we hope that our method will provide the foundation for interesting future research.

Reference

https://www.researchgate.net/publication/263619076_Image_Based_Automatic Vehicle_Damage_Detection