

# Image Processing based Severity and Cost Prediction of Damages in the Vehicle Body: A Computational Intelligence Approach

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**Abstract**— Vehicle damage detection is one of the important prime activities in the insurance and vehicle rental industries. These kinds of systems are widely used to identify the damage of a vehicle once an accident happens by the driver and also by the insurance company to detect and determine a suitable appraisal as per damage and vehicle rental companies to assign the damage of a vehicle to a guilty customer. The core technique of this system is object recognition. However, object recognition and classification being perplexing research ranges, the reliability of a project of this nature lies in the feature selection and extraction mechanisms. This paper presents a novel approach of vehicle body damage severity and cost prediction with using 2D images. Thus once vehicle body damages, the driver does not have to wait until the insurance company calculates the appraisal, he himself can get a brief idea as to how much will it cost to recover the damage. Once an image is uploaded, the system processes the image and identifies the dent. Next, it is classified into the relevant severity class also considering the features of the vehicle like the make, model and the year of manufacture. Afterward, the severity generated as per damage image is mapped with the cost rules, which are constructed based on the properties of the vehicle such as the make, model and the year of manufacture. Finally, the user gets notified with a damage severity class and an average cost from which the damage can be recovered.

**Keywords**—*Vehicle Damage Detection; Cost and Severity Prediction; Rule based expert systems; SIFT*

## I. INTRODUCTION

More than 27000 motor accident takes place in the world per annum [1]. Among them, most of the accidents, the drivers or the insurance policy holders have to spend a massive amount of time to get the damage caused to the vehicle estimated. Even though the modern technology is advanced enough to let the driver detect his own vehicle's damage, the related existing products crave for further advancement regarding features. The approach below tries to address the further enhancements.

At present, as soon as a vehicle meets with an accident and a damage is caused to the vehicle, the driver or the insurance policy holder contacts the insurance company and waits for their arrival to the place of the accident. Once the relevant personnel arrives, a traditional approach is followed and the appraisal is calculated. However, frequently the appraisal

amount provided by the insurance companies are not sufficient enough to recover the damage caused. Though there are ways of appealing the past amount of appraisal, that too is a long procedure. Also sometimes the manual damage detectives can omit some damages or be partial to some parties when the damages are assessed. The damage which is assessed not being presented to the user in an interactive manner too is a very severe problem here. Recognition of minor vehicle body damages in a scenario of frequently changing drivers, such as in the car rental or car sharing businesses is too important. [1]

Once a vehicle faces an accident, the priority of the driver/ insurance policy holder is to contrive the severity of the damage as soon as possible, Then the approximate cost to recover the damage.

## II. VEHICLE DAMAGES AND DAMAGE CLAIMING

A vehicle damage can also be recognised as a deformation in a vehicle, the deformations of interest are dings and dents, where dings are surface deformations which protrude from the surface and dents are depressions into the surface[2].

The number of vehicle damages increases day by day with the increase of the usage of vehicles. There is no universal classification of vehicle damages. A damage can be recognized as a deformation in a vehicle, the deformations of interest are dings and dents, where dings are surface deformations which protrude from the surface and dents are depressions into the surface [2]. According to *Libertymutual.com*, the classification of damages are as follows.

- Minor Damage - scratches, scrapes or dings. For example, a cracked headlight or small dent in your hood.
- Moderate Damage - large dents in the hood, fender or door of your car. If the doors won't open, or if airbags have deployed, you likely have a moderate amount of damage to your car.
- Severe Damage - very heavy damage. These type of damages includes broken axles and bent or twisted frames. In a severe damage situation, air bags have almost always deployed.