19CSE456 - NNDL

CAR DAMAGE DETECTION

GROUP MEMBERS

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Objective:

Use computer vision and deep learning techniques to accurately classify vehicle damage to facilitate claims triage by training convolution neural networks.

Use Case:

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 deep 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 Computer Vision into automating the damage assessments by building and training Convolution Neural Networks.

Solution:

To automate such a system, the easiest method would be to build a Convolution Neural Network model capable of accepting images from the user and determining the location and severity of the damage. The model is required to pass through multiple checks that would first ensure that given image is that of a car and then to ensure that it is in fact damaged. These are the gate checks before the analysis begins. Once all the gate checks have been validated, the damage check will commence. The model will predict the location of the damage as in front, side or rear, and the severity of such a damage as in minor, moderate or severe.

The model accepts an input image from the user and processes it across 4 stages:

1. Validates that given image is of a car.
2. Validates that the car is damaged.
3. Finds location of damage as front, rear or side
4. Determines severity of damage as minor, moderate or severe.

Datasets:

1) http://ai.stanford.edu/~jkrause/cars/car_dataset.html

2) https://www.kaggle.com/hamzamanssor/car-damage-assessment?select=image

Dataset Samples:
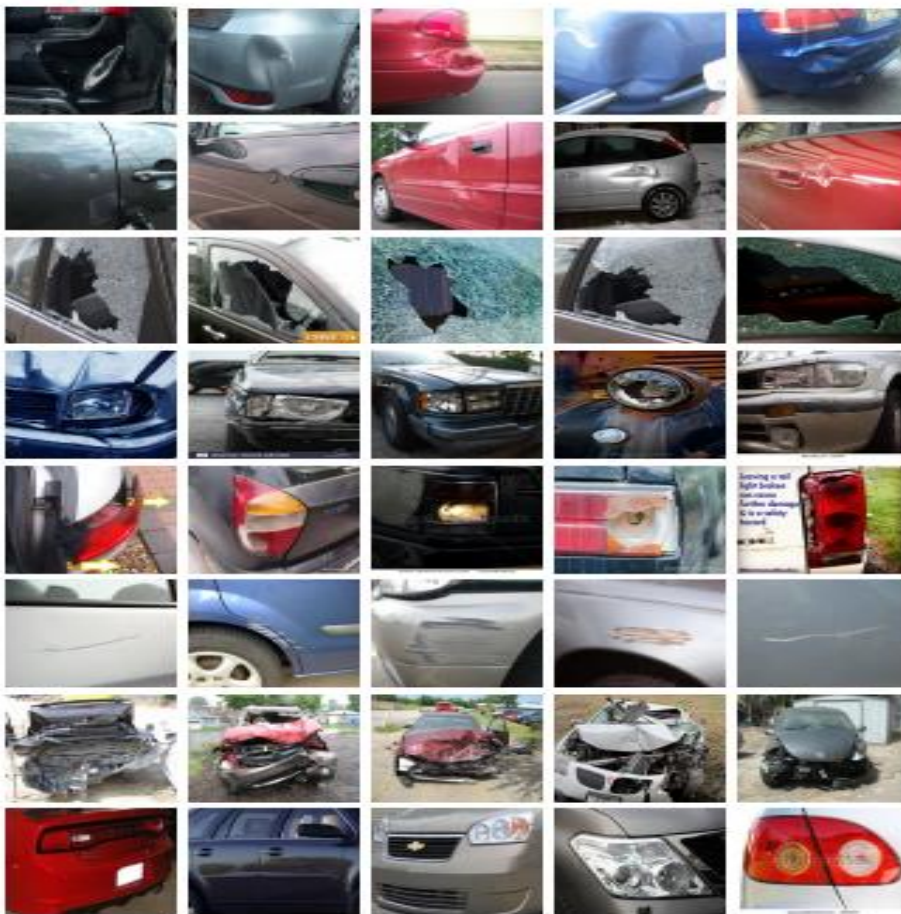
Model Architecture:

Our system architecture is built around the following modules:

1. User Input: User submits image containing the damage.
2. Gate 1: Checks to ensure the submitted image contains a car.
3. Gate 2: Checks to ensure the submitted image of car is damaged avoiding fraudulent claims.
4. Location Assessment: Tests image against the pre-trained model to locate damage.
5. Severity Assessment: Tests image against pre-trained models to determine the severity of damage.
6. Results: The results are sent back to the user.

Different models we are using for training:

1)Resnet50

2)InceptionV3

3)VGG16

4)VGG19

Finally we will use the model which gives us the highest accuracy.