INTELLIGENT VEHICLE DAMANGE ASSESSMENT AND COST ESTIMATOR INSURANCE

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Abstract: ***Vehiclse 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. There is a huge number of accidents prevailing in all urban and rural areas. Patterns involved with different circumstances can be detected by developing an accurate prediction models which will be capable of automatic separation of various accidental scenarios. Hence we are proposing a method that which can predict either the car is undergone with the accident or not. This process is performed using the CNN based transfer learning algorithm (MobileNet) of deep learning. In this study, we will look at the topic of car damage detection. Vehicle damage detection. Using pictures taken at the scene of an accident can save time and money when filing insurance claims, as well as provide more convenience to drivers. Artificial intelligence (AI) in the sense of machine learning and deep learning algorithms can help solve problems.***

Keywords: *Convolutional Neural Network, Artificial Intelligencem, Deep Learning*.

I. INTRODUCTION

Today, one of the first businesses to invest in innovation, cutting-edge technology, and artificial intelligence (AI) is the insurance industry. Car insurance companies spend millions of dollars each year due to evasion of insurance claims in today's society where the number of car accidents is on the rise.. In the insurance industry, Artificial intelligence (AI) based on machine learning and deep learning can assist with challenges including data analysis and processing, fraud detection, risk reduction, and claim automation. As a result, insurance companies have sought to reduce the time it takes to analyze damage and settle claims. However, developing current applications to solve these problems remains difficult, especially when using deep learning to assess car damage. Deep learning is an effective method for tackling complicated problems, but it necessitates more resources for model building, i.e., deep learning demands a large dataset and takes longer to compute.

A traffic collision, also called a motor vehicle collision, car accident or car crash, occurs when a vehicle collides with another vehicle, pedestrian, animal, road debris, or other stationary obstruction, such as a tree, pole or building. Traffic collisions often result in injury, disability, death, and property damage as well as financial costs to both society and the individuals involved. Road transport is the most dangerous situation people deal with on a daily basis, but casualty figures from such incidents attract less media attention than other, less frequent types of tragedy.

A number of factors contribute to the risk of collisions, including vehicle design, speed of operation, road design, weather, road environment, driving skills, impairment due to alcohol or drugs, and behavior, notably aggressive driving, distracted driving, speeding and street racing.

Human factors in vehicle collisions include anything related to drivers and other road users that may contribute to a collision. Examples include driver behavior, visual and auditory acuity, decision-making ability, and reaction speed. A 1985 report based on British and American crash data found driver error, intoxication, and other human factors contribute wholly or partly to about 93% of crashes.

Drivers distracted by mobile devices had nearly four times greater risk of crashing their cars than those who were not. Research from the Virginia Tech Transportation Institute has found that drivers who are texting while driving are 23 times more likely to be involved in a crash as non-texting drivers. Dialing a phone is the most dangerous distraction, increasing a drivers' chance of crashing by 12 times, followed by reading or writing, which increased the risk by ten times. Hence we are proposing a method that which can detect the crashes and send SMS alert to user as an alert message regarding the accident.

II. LITERATURE REVIEW

Literature survey is the most main step in software development process. Before creating the tool it is necessary to determine the time factor, economy n company strength. Once these things are assured, ten next steps are to determine which operating system and language can be used for developing the tool. Once the programmers begin building the tool the programmers need lot of external support. This support can be acquired from senior programmers, from book or from websites. Before building the system the above examination are taken into account for developing the proposed system.

[1] X. Wen, L. Shao, W. Fang, and Y. Xue: The focus of this paper is on the problem of Haar-like feature selection and classification for vehicle detection. Haar-like features are particularly attractive for vehicle detection because they form a compact representation, encode edge and structural information, capture information from multiple scales, and especially can be computed efficiently. Due to the large-scale nature of the Haar-like feature pool, we present a rapid and effective feature selection method via AdaBoost by combining a sample's feature value with its class label. Our approach is analyzed theoretically and empirically to show its efficiency. Then, an improved normalization algorithm for the selected feature values is designed to reduce the intra-class difference, while increasing the inter-class variability.

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[2] Yichuan Tang: Recently, fully-connected and convolutional neural networks have been trained to achieve state-of-the-art performance on a wide variety of tasks such as speech recognition, image classification, natural language processing, and bioinformatics. For classification tasks, most of these "deep learning" models employ the Softmax activation function for prediction and minimize cross-entropy loss. In this paper, we demonstrate a small but consistent advantage of replacing the Softmax layer with a linear support vector machine. Learning minimizes a margin-based loss instead of the cross-entropy loss. While there have been various combinations of neural nets and

SVMs in prior art, our results using L2-SVMs show that by simply replacing Softmax with linear SVMs gives significant gains on popular deep learning datasets MNIST, CIFAR-10, and the ICML 2013 Representation Learning Workshop's face expression recognition challenge.

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[3] P.A. Viola and M.J. Jones:This paper describes a machine learning approach for visual object detection which is capable of processing images extremely rapidly and achieving high detection rates. This work is distinguished by three key contributions. The first is the introduction of a new image representation called the "integral image" which allows the features used by our detector to be computed very quickly. The second is a learning algorithm, based on AdaBoost, which selects a small number of critical visual features from a larger set and yields extremely efficient classifiers. The third contribution is a method for combining increasingly more complex classifiers in a "cascade" which allows background regions of the image to be quickly discarded while spending more computation on promising object-like regions. The cascade can be viewed as an object specific focus-of-attention mechanism which unlike previous approaches provides statistical guarantees that discarded regions are unlikely to contain the object of interest.

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[4] V. Goud: The Rapid growth of technology and infrastructure has made our lives easier. The advent of technology has also increased the traffic hazards and the road accident take place frequently which causes huge loss of life and property because of the poor emergency facilities. Our project will provide an optimum solution to this draw back. An accelerometer can be used in a car alarm application so that dangerous driving can be detected. It can be used as a crash or rollover detector of the vehicle during and after a crash. With signals from an accelerometer, a severe accident can be recognized. According to this project when a vehicle meets with an accident immediately Vibration sensor will detect the signal or if a car rolls over, a Micro electro mechanical system (MEMS) sensor will detects the signal and sends it to ARM controller. Microcontroller sends the alert message through the GSM MODEM including the location to police control room or a rescue team. So the police can immediately trace the location through the GPS MODEM, after receiving the information. Then after conforming the location necessary action will be taken.

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[5] B. Prachi, D. Kasturi and C. Priyanka: Road accidents and traffic congestion are the major problems in urban areas. Currently there is no technology for accident detection. Also due to the delay in reaching of the ambulance to the accident location and the traffic congestion in between accident location and hospital increases the chances of the death of victim. There is a need of introducing a system to reduce the loss of life due to accidents and the time taken by the ambulance to reach the hospital. To overcome the drawback of existing system we will implement the new system in which there is an automatic detection of accident through sensors provided in the vehicle. A main server unit houses the database of all hospitals in the city. A GPS and GSM module in the concerned vehicle will send the location of the accident to the main server which will rush an ambulance from a nearest hospital to the accident spot. Along with this there would be control of traffic light signals in the path of the ambulance using RF communication. This will minimize the time of ambulance to reach the hospital.

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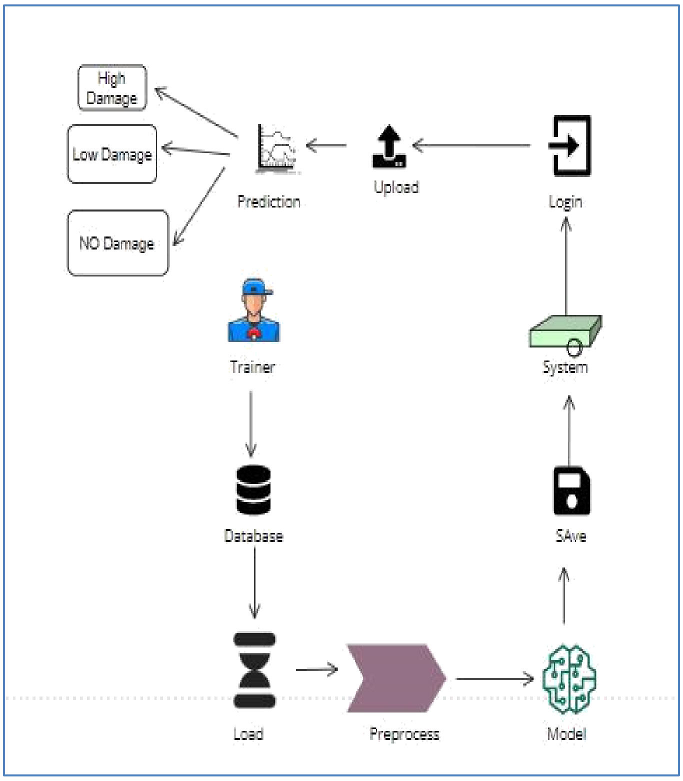
PROPOSED SYSTEM

In our proposed method we are proposing a method that which can predict either the car is undergone with the accident or not. This process is performed using the CNN based transfer learning algorithm (MobileNet) of deep learning. If the given input is detected as the car damaged then an alert SMS will be sent to the user. By using this we can send the information to the user who will be a family or friend of a person who went through the car crash.



Architecture of proposed system

ADVANTAGES OF PROPOSED SYSTEM

Detect the car damage using photo taken at the accident scene is very useful to reduce the cost of processing insurance claims, as well as provide greater convenience for vehicle users. Differentiate the proposed system that is maybe speed up the car damage that can be check in process. The following methods are used in the proposed system.

- Dataset Explanation.
- Describing the level of damage.
- CNN Model
- Accurate classifications
- Less complexity
- High performance

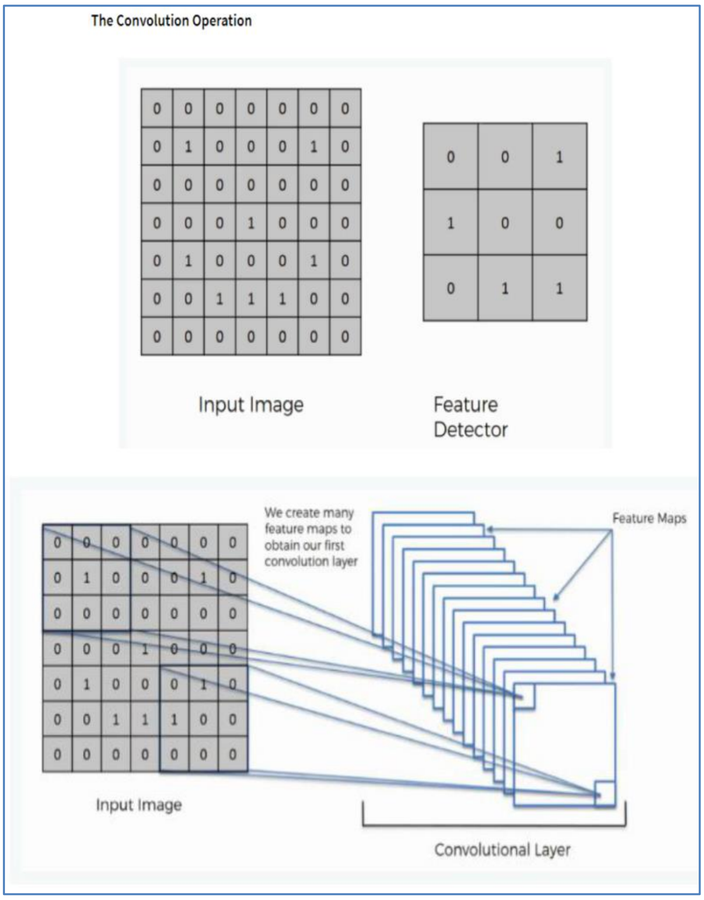
METHODOLOGY

CONVOLUTIONAL NEURAL NETWORK

CNNs are regularized versions of multilayer perceptrons. Multilayer perceptrons usually mean fully connected networks, that is, each neuron in one layer is connected to all neurons in the next layer. The "full connectivity" of these networks make them prone to overfitting data. Typical ways of regularization, or preventing overfitting, include: penalizing parameters during training (such as weight decay) or trimming connectivity (skipped connections, dropout, etc.) CNNs take a different approach towards regularization: they take advantage of the hierarchical pattern in data and assemble patterns of increasing complexity using smaller and simpler patterns embossed in their filters. Therefore, on a scale of connectivity and complexity, CNNs are on the lower extreme.

Convolutional networks were inspired by biological processes in that the connectivity pattern between neurons resembles the organization of the animal visual cortex. Individual cortical neurons respond to stimuli only in a restricted region of the visual field known as the receptive field. The receptive fields of different neurons partially overlap such that they cover the entire visual field.

CNNs use relatively little pre-processing compared to other image classification algorithms. This means that the network learns to optimize the filters (or kernels) through automated learning, whereas in traditional algorithms these filters are hand-engineered. This independence from prior knowledge and human intervention in feature extraction is a major advantage. Region Based Convolutional Neural Networks have been used for tracking objects from a drone-mounted camera, locating text in an image, and enabling object detection. he features of all region proposals that have an IoU overlap of less than 0.3 with the ground truth bounding box are considered negatives for that class during training. The positives for that class are simply the features from the ground truth bounding boxes itself. n order to improve localization performance, the authors include a bounding-box regression step to learn corrections in the predicted bounding box location and size.



CNN Operations

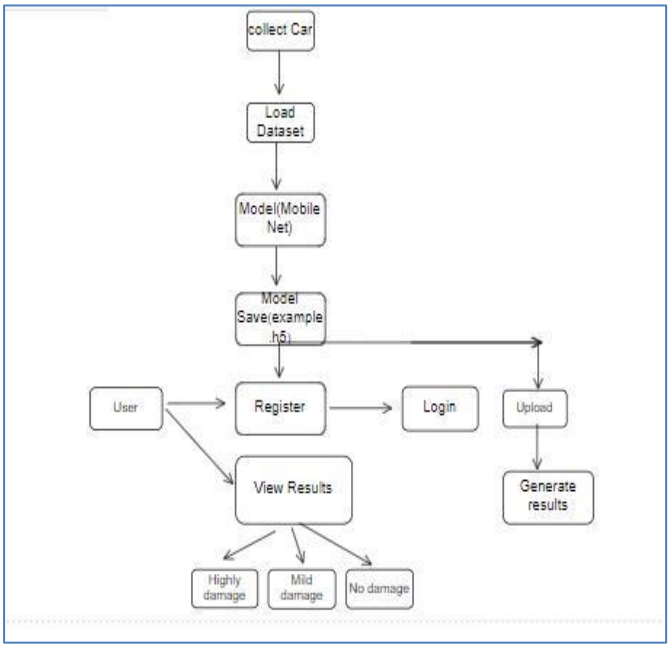
III. EXPERIMENTAL RESULTS AND DISCUSSION

Step 1: ReLU Layer

This step will involve the Rectified Linear Unit or Relook. We will cover Relook layers and explore how linearity functions in the context of Convolutional Neural Networks. Not necessary for understanding CNN's, but there's no harm in a quick lesson to improve your skills.

Step 2: Pooling Layer

In this part, we'll cover pooling and will get to understand exactly how it generally works. Our nexus here, however, will be a specific type of pooling; max pooling. We'll cover various approaches, though, including mean (or sum) pooling. This part will end with a demonstration made using a visual interactive tool that will definitely sort the whole concept out for you.



Block diagream of implementation

Step 3: Flattening

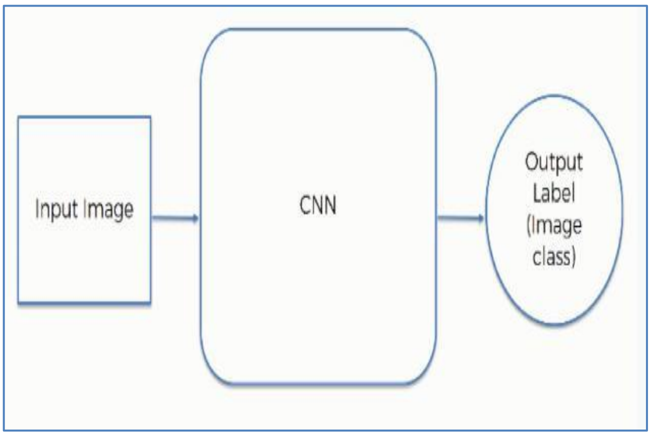
This will be a brief breakdown of the flattening process and how we move from pooled to flattened layers when working with Convolutional Neural Networks.

Step 4: Full Connection

In this part, everything that we covered throughout the section will be merged together. By learning this, you'll get to envision a fuller picture of how ConvolutionalNeural Networks operate and how the "neurons" that are finally produced learn the classification of images.

Step 5: Detection

In the end, we'll wrap everything up and give a quick recap of the concept covered in the section. If you feel like it will do you any benefit (and it probably will), you should check out the extra tutorial in which Softmax and Cross-Entropy are covered. It's not mandatory for the course, but you will likely come across these concepts when working with Convolutional Neural Networks and it will do you a lot of good to be familiar with them.



CNN ARchitecture

MODULES

Create Dataset: The dataset containing images which consists of car crashed and normal cars which are not undergone any accidents are split into training and testing dataset with the test size of 30-20%.

Pre-processing: Resizing and reshaping the images into appropriate format to train our model.

Training: Use the pre-processed training dataset is used to train our model using CNN based transfer learning algorithm.

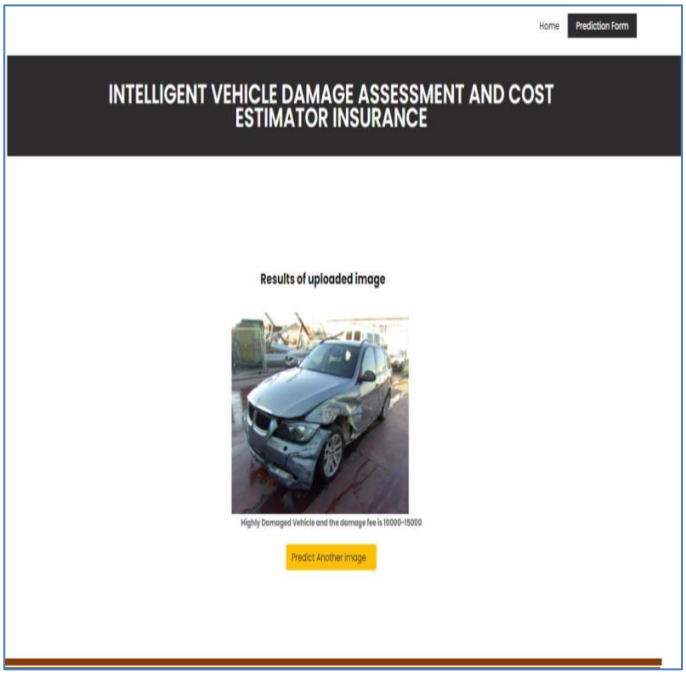
Classification: The results of our model is display of classified images either the car was crashed or not.

SMS alert: If the car is detected as crashed then an SMS alert will be send to user to pass the information regarding the accident.

Upload Image: The user has to upload an image which needs to be classified.

View Results: The classified image results are viewed by user.

SMS alert: Once after the classification of crashed car, user will get the SMS alert.



System classified image as highly damaged

IV. CONCLUSION

In this project we have successfully predicted the car crash detection. We have performed this process using the deep learning based transfer learning model (MobileNet) of CNN. We trained the dataset of the car with both the crashed and normal one. After the training we have tested for the classified output. Once after the detection a SMS alert was sent to the user about the crash to take the safety measures. To deal with the compensating problem of damaged autos, the model proposed here employs, a deep learning-based detection technique for vehicle-damage identification. The suggested approach of transfer learning-based damage detection of the vehicle is generic after testing, and can also better adapt to the diverse elements of damaged car images. Despite the model's training on a very short dataset, successful outcomes were obtained. Data extension can be done in the future to raise the dataset's size, gather additional automobile damage images under various degrees of illumination and weather conditions, enrich the data, the edge contour enhancement of images can be improved and the damaged parts of the car can be masked more accurately. Also, the model can be further enhanced to predict the repair price of the damaged area by extracting the predicted part details like the segmented mask area..

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