iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 11 **Issue:** III **Month of publication:** March 2023

DOI: https://doi.org/10.22214/ijraset.2023.49847

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 11 Issue III Mar 2023- Available at www.ijraset.com

Vehicle Insurance Damage Detection

A Jaya Sree[1], G Aravind[2], H Lalith[3], M Yuvraj[4]
[1]*Asst. Professor, Dept of IT, Malla Reddy College of Engineering & Technology, Hyderabad, Telangana, India*
[2, 3, 4]*UG Student, Dept of IT, Malla Reddy College of Engineering and Technology, Hyderabad, Telangana, India*

Abstract: ***These days every process we see has been automated. The Use of Artificial Intelligence and Machine Learning have been adopted by many people and businesses all around the world. One of the adoption is in the sector of vehicles, wherein it can identify the parts that have been damaged of a vehicle with the use of the widespread technologies that are present. The Machine can do many things like predict the repair the damage needs and the cost estimation for the damage. All of this is possible due to the Annotation of Images/Videos of the vehicles that have been damaged and building Computer Vision ML Models. The ML models does everything from detecting, predicting the amount of damage occurred and the cost required to repair it. With the help of these data Insurance Companies can be benefitted by eliminating the scope of fraud in claims processing.***
Keywords: Artificial Intelligence, Machine Learning, Annotation, Computer Vision, Detection, Prediction.

I. INTRODUCTION

These days the advancement in the Artificial Intelligence is taking place. We use Deep – Learning which is a sub field of Machine Learning, it uses different kind of algorithms and one of the algorithms it uses is called as Artificial Neural Networks which works like a Human brain. We use the Artificial Neural networks for this project as it can extract the exact thing from the image that we provide. There are many companies that uses deep learning model to predict the amount of damage occurred to vehicles, because a large amount of money is wasted in Claims leakage. Due to the problem of Claim leakage we must deploy the ML models to detect and predict the damage. In order to deal with this claim Leakage, we employ the Convolutional Neural Networks which deals with images. Then prepare a model on which the whole process stands. We can also employ different deep learning models which accurately predicts the insecurities present in the vehicle industry and help the insurance companies serve the customers better.

II. METHODOLOGY

In order to prepare and deploy the models there are certain modules through which we can define the whole process. There are basically four Modules present they are:

A. Data Collection

In this phase we collect all the images and the videos that are required for us to build a model. We collect different kinds of data from different sources as it would be good for the model. As we deal with large dataset it is good for the model to detect any kind of vehicle model irrespective of the company of manufacturer. Also It is good if the images/ videos we collect has 360^0 view of the vehicle.

B. Data Licensing

In this phase we license off the images of the vehicles that are damaged and then send those images for the model training. With this phase we can provide with accurate set of images/videos to the model so that it can train better.

C. Data Annotation

In the data annotation phase, we annotate all the images that we have gathered so that we can tell the models exactly that what kind of detection that It should do. We basically tell the type of damages the images has and also classify them. Now the model will be able to classify them according to damage it detects. The more and more annotations we provide the better it performs.

D. Data Segmentation

After the Annotation phase now we have the segmentation phase in this we take those annotated images and classify them according to the damages occurred to them. It makes easy for the insurance companies to classify according to the damages occurred to the vehicle.

E. Architecture

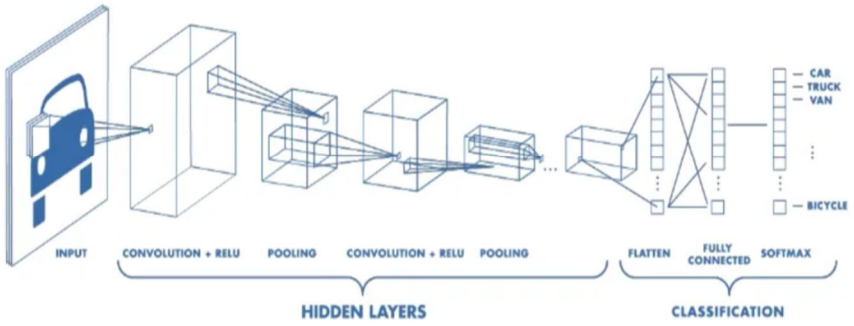


Figure 1: Representing the Architecture behind training an image

From the Architecture we can say the working process of the Machine Learning model. Here, from the image a single frame is taken out and then the machine trains the each frame individually by focusing on the minute details of the frame. First it goes through all the hidden layers and then extract the features from the frame. Now, after extracting the features from the frame the next step is to classify those features into various things. As there are vast number of things present for classification of a specific thing the ML model must be thorough in what it detects and predicts.

III. MODELING AND ANALYSIS

Here, in order to train and test the model we can use different kinds of object detection models. Nowadays, object detection is used to find instances of different visual things in digital photos and videos, much like a computer vision problem. Now we have several Models in the Object Detection Models Like the YOLO Model (You Only Look Once) and the SSD model (Single Short Detector). We have used the YOLO Model because of its speed and accuracy. It can process Multiple Images in a shorter period. It basically does process about 30 millisecond per frame.

YOLO Architecture is completely based on Convolutional Neural Networks (CNN) and it uses Anchor boxes to predict bounding boxes around the objects in an image. It also uses anchor-free and anchor-based methods to detect objects, which allow us to do accurate predictions. Also, we have different types of YOLO versions and based the specific type of use. We have used the YOLOv5 for this project due to its fast-processing time. YOLOv5 uses the Cross Mini – Batch Normalization (CmBN) method to improve the stability of the network and reduce the overfitting.

Below, We can see the performance of the YOLO Model. In the outline, the objective is to create a model that is very performant (Y-hub) compared with its deduction time (X-pivot). According to preliminary findings, YOLOv5 performs exceptionally well in this regard compared to other cutting-edge methods.

You can see that all YOLOv5 variants train faster than Efficient in the chart above. The most dependable YOLOv5 model, YOLOv5x, can handle pictures on different occasions quicker with a comparable level of precision than the Effective D4 model.

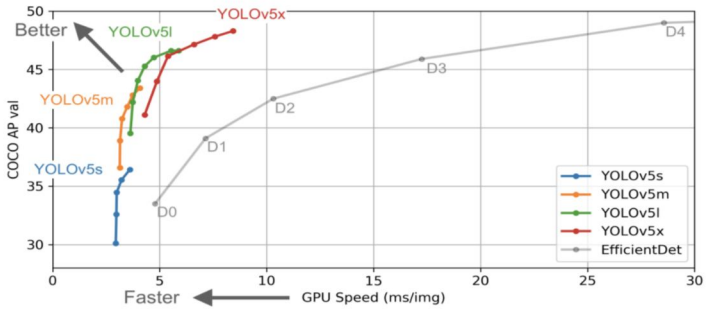


Figure 2: Performance of YOLOv5 Model

YOLO Model was one of the first object detector model to connect the procedure of predicting bounding boxes with class labels in an end-to-end differentiable network.

The YOLO network consists of three main pieces.

1) *Backbone:* A convolutional neural network that forms and aggregates image features at various granularities.
2) *Neck:* A series of layers used to mix and match image features for prediction.
3) *Head:* Uses features from the neck and performs steps for box and class prediction.

By using different versions of object detection Models we got to understand the which version of the model is best for us and thus we have extracted the features and done the prediction.

For developing the front-end part of the project, we have used the Streamlit Library which is an open – source Python Library for building interactive web applications. With just a few lines of code we can easily create data-driven apps and dashboards. With the help of Streamlit we can create a user interface for any python code that allows users to interact with the models and data. We can also create different sliders, buttons and other interactive widgets to explore and visualize data.

You can get started quickly and easily because Streamlit has an API that is easy to use and understand for building apps. Your application can be used in a web browser, shared with other people, and uploaded to the cloud. Streamlit's ability to iterate quickly and easily on your app is one of its main advantages. The web interface lets you make changes to your code and see the results right away. As a result, it is an excellent tool for developing and evaluating data-driven concepts.

We can add different kinds of Widgets in the Streanlit easily and there are also several widgets available in streamlit like st.selectbox, st.checkbox, st.slider, and etc. It is easy to create different things in streamlit. It is powerful tool using which anyone can share their work in an user-friendly manner.

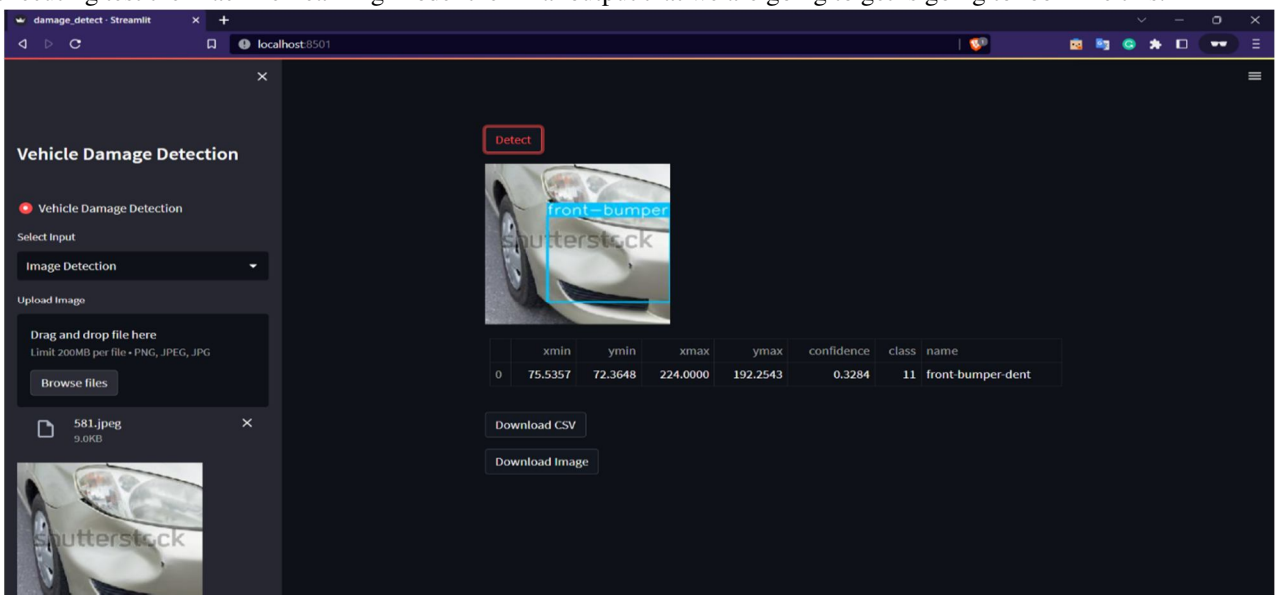
Stream lit also installs a Command – Line(CLI) tool, the main purpose of the tool is to run the Streamlit apps, change streamlit configuration options, and help you diagnose and fix issues. We can also different ways to configure the Streamlit by using each one of them we can change the behavior of the streamlit.

Also streamlit has various customization options as well we can selct from different kinds of themes present in the configuration options we can set a primary color, Background color, Second background Color, text color, font and base etc.… We can customize the whole application according to our specific need and it will be implemented quickly.

The Streamlit Cache allows our app to stay performant even when loading data from web, manipulating large datasets, or performing expensive computations. To cache a function in streamlit, you need to decorate it with one of two decorator, st.cahe_data and st.cache_resource.

IV. RESULTS AND DISCUSSION

After executing test the Machine Learning Model the Final output that we are going to get is going to look like this.

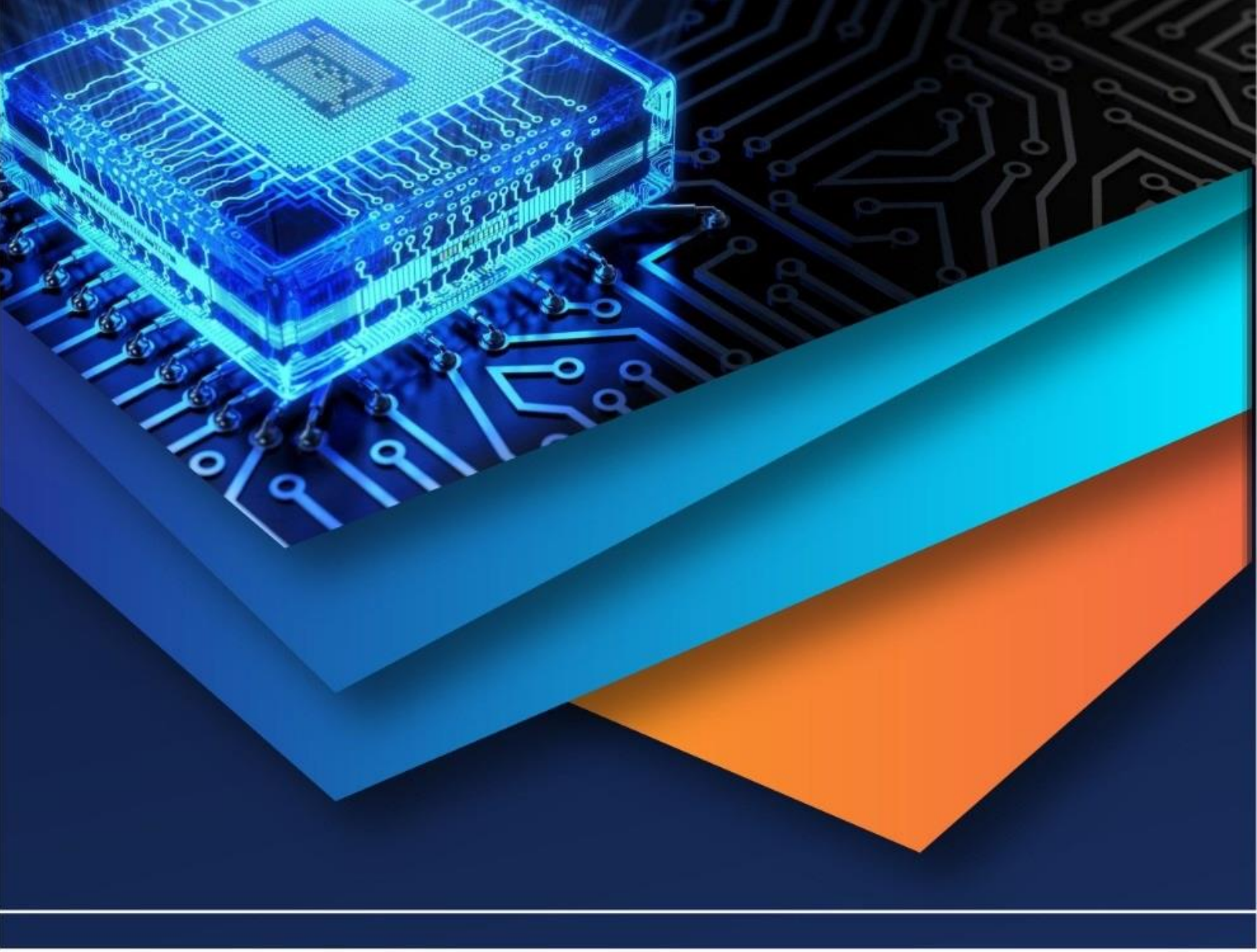


V. CONCLUSION

Recent years have seen significant advancements in the domains of computer vision and picture classification. Deep Convolutional Neural Networks were primarily, but not only, used in these breakthroughs. A few of these innovations were used to this project. These innovations were used to estimate the location and severity of damage in cars. These similar tasks, as well as others that rely on them, are currently carried out manually without the aid of computer technology. With the help of this project, we will be able to easily detect any car damage and automate the entire process. Also, we can stop the fraud that occurs in and around insurance businesses.

REFERENCES

[1] Srimal Jayawardena et al., “Image based automatic vehicle damage detection", Ph.D. thesis, Australian National University, 2013.
[2] K Kouchi and F Yamazaki, “Damage detection based on object-based segmentation and classification from high resolution satellite images for the 2003 boumerdes, algeria earthquake,” in Proceedings of the 26th Asian conference on Remote Sensing, Hanoi, Vietnam, 2005.
[3] Dumitru Erhan, Yoshua Bengio, Aaron Courville, Pierre-Antoine Manzagol, Pascal Vincent, and Samy Bengio, “Why does unsupervised pre-training help deep learning?” Journal of Machine Learning Research, vol. 11, no. Feb, pp. 625–660, 2010.
[4] Dumitru Erhan, Yoshua Bengio, Aaron Courville, Pierre-Antoine Manzagol, Pascal Vincent, and Samy Bengio, “Why does unsupervised pre-training help deep learning?” Journal of Machine Learning Research, vol. 11, no. Feb, pp. 625–660, 2010.
[5] Rakshata P, Padma H V, Pooja M, Yashaswini H V, Karthik V,” Car Damage Detection and Analysis Using Deep Learning Algorithm For Automotive”, Vol 5, Issue 6, International Journal of Scientific Research Engineering Trends (IJSRET), Nov-Dec 2019, ISSN (Online): 2395- 566X



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY