



# International Journal for Innovative Engineering and Management Research

A Peer Reviewed Open Access International Journal

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IJIEMR Transactions, online available on 06th Feb 2023. Link

[:http://www.ijiemr.org/downloads.php?vol=Volume-12&issue=ISSUE-02](http://www.ijiemr.org/downloads.php?vol=Volume-12&issue=ISSUE-02)

**DOI: 10.48047/IJIEMR/V12/ISSUE 02/08**

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Volume 12, Issue 02, Pages: 57-59

Paper Authors

**Sk.Arshiya Mahaboobunisa , S.Gayathri, YVNL Konda Babu, V.Sasi Kumar**



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## A Novel Approach for Using Common Objects in Context Dataset (Coco) and Real Time Object Detection Using ML

\*Sk.Arshiya Mahaboobunisa , \*S.Gayathri, \*YVNL Konda Babu, \*V.Sasi Kumar

B. Tech Students, Department of Information Technology

Prasad V. Potluri Siddhartha Institute of Technology, Vijayawada, Andhra Pradesh, India

### Abstract

Object detection is one the important aspect and takes a major role in autonomous driving technology. The system is complete in the sense that it is operational and it is tested by uploading an image or any live instance and hence detect all the objects from the input. Object Detection can be used efficiently and relates the computer vision and image processing that deals with detecting the instances of semantic objects of a class. The objects are detected and recognized faster by using an algorithm called YOU ONLY LOOK ONCE (YOLO)v3 algorithm. This algorithm detects all the objects in the given image or live instance. The training dataset which we have considered is COMMON OBJECTS IN CONTEXT DATASET (COCO). For a given image, object detection includes both classification and recognition of the objects and also localizes the objects by placing the bounding boxes around the objects with a specified accuracy.

### Introduction

Mainly aims to detect multiple objects from the given real time scenarios. One such application is Autonomous Vehicles. In present days we came across to see many road accidents due to over speed, distracted driving, reckless driving, vehicle defects etc. As new inventions were going to take part one such invention is Autonomous Vehicles. The reasons behind this invention is to reduce the number of crashes on our roads. Government data identifies driver behaviour or error as a factor in 94 percent of crashes, and self driving vehicles can help to reduce driving error. High levels of autonomy have the potential to reduce risky and dangerous driver behaviors.

To ensure the safe running of vehicles at high speed, real time and accurate detection of all the objects on the road is required. Hence the domain Machine Learning involves mainly four tasks such as

- Training Data/Input past data
- Machine Learning algorithms
- Build Logical Model
- Output=New Data

Hence, there are many machine learning algorithms in order to detect objects such CNN, RCNN, FCNN but all these algorithms cannot efficiently detect objects with high accuracy. So a new algorithm such as YOLOv3 was introduced to overcome the drawbacks of existing algorithms.

YOLOv3(You Only Look Once, Version3) is a real time object detection algorithm that identifies specific objects in videos, live feeds, or images. The biggest advantage of this algorithm is superb speed- It's incredibly fast and can process 45 frames per second. This algorithm understands generalized object representation with simplest architecture. YOLO has completely different approach and can be able to run in real-time or used for real-time applications.

Prior detection systems use localizers or classifiers to carry out the detection process. This network divides the image into regions which provides the bounding boxes and also predicts the probabilities for each region. These generated bounding boxes are weighted

by the predicted probabilities also classifies the objects.

For this project we train a dataset called COCO(Common Objects in Context Dataset) which contains various images which exists mostly in the real time. Hence the project works by training the input data using a dataset and with the help of algorithm detects various objects by classifying and localizing them with a bounding box. Finally helps to detect all kinds of objects related to the field of autonomous vehicles.

### Existing System

The existing system is a manual system which consists of some object detection methods which we can use to detect various kinds of objects and can be applicable to various kinds of applications.

But most of the algorithms such as CNN (Convolutional Neural Network), RCNN (Region-based Convolutional Neural Network) etc. But all these cannot be suitable for real time scenarios. Although these approaches have solved the challenges of data limitation and modeling in object detection, they are not able to detect objects in a single algorithm sun.

We considered an application such as Autonomous Vehicles, in that case the webcam needs to detect all the moving vehicles of any size can be detected. But the existed previous algorithms such as CNN, RCNN cannot detect all the moving vehicles. For this reason, we have chosen a new fast object detecting algorithm such as YOLO in our proposed system.

### Proposed System

In our proposed system we have used an algorithm called YOLOv3. This algorithm has gained popularity because of its superior performance over the aforementioned object detection techniques and is best known for its speed and accuracy. It is important because of the following reasons:

### Speed

This algorithm improves the speed of detection because it can predict objects in real time.

### High Accuracy

YOLO is a predictive technique that provides accurate results with minimal background errors.

### Learning Capabilities

The algorithm has excellent learning capabilities that enable it to learn the representations of objects and apply them in object detection.

Firstly the all the real time images will be stored in a dataset called COCO and this algorithm divide the given image into grids of equal dimensions and draw a bounding box around the objects and also classifies the object.

### Implementation (Modules)

We are using libraries like NumPy and OpenCV which are very helpful in image processing. Our application will take a video or a live instance and detect the objects with accuracy and also the precision. We are taking configuration and also the weight files of YOLOv3 model and by considering a dataset called COCO which consists of 80 different objects. Now our model will take the input and detect all the objects in every single frame in real time by providing accuracy of the object detected with class label and bounding box around the object. Since the application detects every object in the frame and in real time, it can be very efficiently used in Autonomous Vehicles.

### Sample Screens





## Conclusion

In future, new inventions will take a major role. And the invention is based on modifying the existing things with the new upgraded ones. One such invention is Autonomous Vehicles a self-driving vehicles eg. Tesla, a self driving car which will be very helpful in order to reduce pollution, traffic and work to humans.

Object Detection is the right approach to detect objects such as vehicles and all the objects in order to avoid various road accidents and to have a safe journey.

Hence Autonomous Vehicles rely on the perception of their surroundings to ensure safe and robust driving performance. This perception uses object detection algorithms to accurately determine objects such as pedestrians, vehicles, traffic signs etc.

## Future Scope for Further Development

As time passes, new machines can continue to transition into different sectors and industries. Among these Autonomous Vehicles is one of the useful and new invention.

The future of object detection technology is the process of providing itself, and much like the original Industrial Revolution, it has the potential to free people from menial jobs that can be done more efficiently by machines.

Object detection is breaking into a wide range of applications, including computer vision, image retrieval, security, surveillance, automated

vehicle systems and machine inspection.

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