# OBJECT DETECTION AND TRACKING USING DEEP LEARNING ALGORITHMS

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**ABSTRACT**

*An object needs to be detected. This is done by the use of first and foremost Computer vision Technology YOLO i.e. you Look Only Once. It finds several applications due to its tremendous speed in detecting objects. These object needs to be tracked down, also using YOLO algorithm. YOLO object detection in images means not only to identify what kind of object is included, but also localize it inside the co-ordinates of the "bounding box" containing the Object. YOLO uses deep learning and Convolution Neural Networks (CNN) for object detection. It needs to "see" the image only once and identifies the image. It creates a unique ID for each of initial detections. And then tracking each of the objects as they move around the frames in a video, maintaining the assignment of Unique ID's. This project will be robust to occlusion. It can also be used to detect missing object that has been lost in between frames also.*

**Keyword:** - *YOLO, Convolution Neural Network (CNN), Bounding Box, Unique ID.*

## 1. INTRODUCTION

Deep Learning is one of the fastest growing technologies in the booming world. It uses neural networks functions that imitate the workings of the human brain in processing data and creating patterns for use in decision making. We are using the deep learning algorithms to detect and track the objects in the real-time applications .Object Detection and Tracking System attempts to detect, track, and recognize objects of interest from multiple videos, and more generally to interpret object behaviors and actions.. This system performs moving. Object detection across multiple consecutive frames of a video and are compared by applying various tracking techniques to determine movement of an object. This systematic approach is to observe the object behaviors and then processing these behaviors using deep learning algorithm then it will detect objects. A Convolutional Neural Network (CNN) is a Deep Learning algorithm which takes in an input image, assign importance (learnable weights and biases) to various aspects/objects in the image and be able to differentiate one from another. YOLO uses Convolution Neural Networks (CNN) for object detection and it creates an unique ID for each of initial detections. The next step after object detection, is tracking each of the objects as they move around the frames in a video, maintaining the assignment of Unique ID's.

### 1.1 OBJECTIVE

In the existing system object is detected using high resolution optical remote sensing and it will not show the object name. In the proposed system we are using deep learning algorithms to detect and track the objects and it will show the object name.

### 1.2 APPLICATIONS

- Optical Character Recognition
- Self-driving cars
- Face detection
- Pedestrian detection

- Anomaly detection

## 2. LITERATURE SURVEY

**2.1 Bhunesh Patel,Neel Ray, Priyanka Patel developed Object Tracking System Using Motion Detection.** In this methodology it characterize moving objects with color histograms .Markov [6] process is used to quickly detect the texture boundary along a line objects are distinguished from the background by texture analysis. it fuses different features into two types of energy terms and combines them in a complementary fashion. Thus, it can achieve more robust performance.

**2.2 Sunig Kale, Ketki Patil, Poonam Satghare, Deepak Dharrao proposed Real Time Object Tracking System with Automatic Pan Tilt Zoom Features** for Detecting Various Objects .This paper aimed to design an Real-time object tracking system with automatic PTZ camera features for detecting various objects. It Uses the surveillance system that focuses on detecting and identifying the threat full objects out of the given subsets. The methodology it follows such as Noise Removal,Background Subtraction,reprocessing,Object Recognition,Object Tracking. The disadvantage of this methodology is can't detect continuous activities from the video.

**2.3 Bhunesh Patel,Neel Ray, Priyanka Patel developed a Motion based Object Tracking System**. The main objective of Motion based object tracking is recognizing the physical movement of associated video degree in particular objects in given video frames. This provides an outline of the existing methods for the detection of objects in motion along with the information of the importance this topic has grown globally. It lacks in finding high pattern of patterns for higher execution outcomes.

## 3. EXISTING SYSTEM

In this paper, we propose an object detection and tracking method based on deep convolutional neural networks for wide swath high-resolution optical remote sensing videos. The proposed method firstly segments each frame of a video into sub- samples using a sliding window of fixed size. In order to detect the objects appearing at the edge of the sliding window efficiently, we use an overlapping sliding window sampling method. Further, we design a network fusing region of interests (RoIs) of the previous and current frames to track the objects occurred in the previous frames of the video. RoIs of previous frame are applied directly to the feature layer of the current frame. Finally, for each frame, we merge the detection and tracking results of sub-samples by non-maximum suppression (NMS) method.

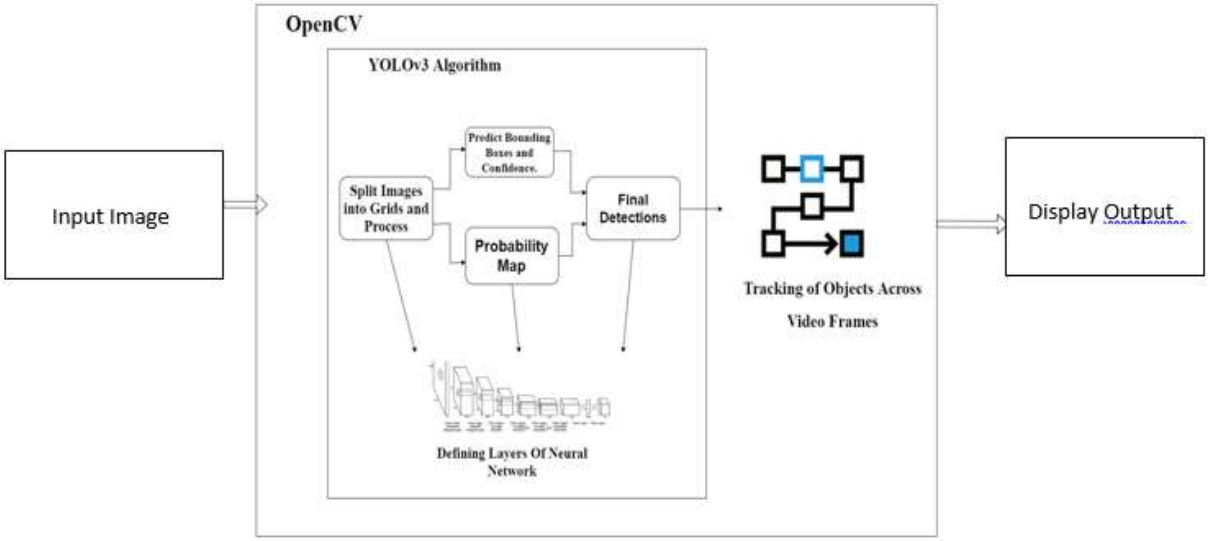
### 3.1 DISADVANTAGES

- Dual priorities: object classification and localization.
- Limited Data.
- Speed for real-time detection.
- Multiple spatial scales and aspect ratios.

## 4. PROPOSED SYSTEM

YOLOv3 is extremely fast and accurate (i.e.) 4x faster. We can easily trade off between speed and accuracy simply by changing the size of model. It also predicts with a single network evaluation unlike systems like R-CNN that require thousands for a single image. This will make it extremely fast, more than 1000x faster than R-CNN and 100x faster than Fast R-CNN. Based on application, Various Yolo models can be implemented with their appropriate levels of speed and accuracy.

## 5. ARCHITECTURE DIAGRAM




## 6. MODULE DESCRIPTION

### 6.1 OBJECT DETECTION

Object detection uses a YOLO concept. YOLO (You Only Look Once) is an algorithm that utilizes a single convolution neural network for object detection. But other object detection algorithms that move the image bit by bit, the algorithm takes the whole image. It takes the single image then divides the input image into an s x s grid using feature map. Each one of the grid will predict N possible "bounding boxes" .This methodology uses features from the entire image to predict each bounding box. It also predicts all bounding boxes across all classes for an image at the same. Then, it will predict the level of certainty (or probability) for all the bounding boxes. The Yolo algorithm proceeds to delete the bounding boxes that are below a certain threshold of minimum probability. The remaining boxes will be used for object detection. These boxes will be processing by Yolo algorithm which will eliminate the duplicate boxes. After that it will leads to object detection.

### 6.2 OBJECT TRACKING

In Object tracking ,to take an input set of bounding box coordinates then creating a unique ID for each of the initial detections. And then tracking each of the input objects move around the frames in a video, maintaining the unique IDs. The camera placed anywhere in the city where we wants to track the objects. We can capture multiple frames from video by using camera. Then, we will feed the images into Yolo algorithm. For tracking the object we need to find centroid for each bounding boxes. Then, it will assign unique id for each object in multiple video frame and also it classifies each objects. By using this unique id of objects we can track the images across multiple video frames. The detected and tracked images are stored in the local storage of the computer.

## 7. CONCLUSION

In proposed system the drawbacks of all the previous deep learning algorithms like R-CNN,Faster R-CNN, CSRT etc. , are overcome by using the YOLO algorithm. YOLO algorithm is a very efficient algorithm compared to all deep learning algorithms in object detection .It improves the speed and accuracy in the object detection and tracking.

YOLO is based on the concept of Convolutional neural networks and OpenCV.This can be used in various real time applications like crime investigations, manufacturing, space research etc.

**8. SCOPE AND FUTURE WORK**

In future, for a more reliable and less complex system the system can be improved by substituting advanced techniques. This can be used in various real time applications like crime investigations, manufacturing, space research etc.

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