<u>**SHRI RAMDEOBABA COLLEGE OF ENGINEERING AND MANAGEMENT**</u>

Department of Computer Science & Engineering

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<u>**SOFTWARE TECH. LAB-II PROJECT**</u>

Self Adaptive Traffic Light Control System

VI Semester, B.E.

Shift I

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1.Abstract:

Traffic congestion is becoming a serious problem with a large number of cars on the roads. Vehicles queue length waiting to be processed at the intersection is rising sharply with the increase of the traffic flow, and the traditional traffic lights cannot efficiently schedule it. In fact, we use computer vision and machine learning to have the characteristics of the competing traffic flows at the signalized road intersection. This is done by a state-of-the-art, real-time object detection based on a deep Convolutional Neural Networks called You Only Look Once (YOLO). Then traffic signal phases are optimized according to collected data, mainly queue density and waiting time per vehicle, to enable as much as more vehicles to pass safely with minimum waiting time. YOLO can be implemented on embedded controllers using Transfer Learning technique.

2.Problem Statement:

To build a self adaptive traffic light control system based on yolo.Disproportionate and diverse traffic in different lanes leads to inefficient utilization of same time slot for each of them characterized by slower speeds, longer trip times, and increased vehicular queuing.To create a system which enable the traffic management system to take time allocation decisions for a particular lane according to the traffic density on other different lanes with the help of cameras, image processing modules.

3.Introduction:

Traffic congestion is a major problem in many cities, and the fixed-cycle light signal controllers are not resolving the high waiting time in the intersection. We see often a policeman managing the movements instead of the traffic light. He sees road status and decides the allowed duration of each direction. This human achievement encourages us to create a smart Traffic light control taking into account the real time traffic condition and smartly manage the intersection. To implement such a system, we need two main parts: eyes to watch the real-time road condition and a brain to process it. A traffic signal system at its core has two major tasks: move as many users through the intersection as possible doing this with as little conflict between these users as possible.

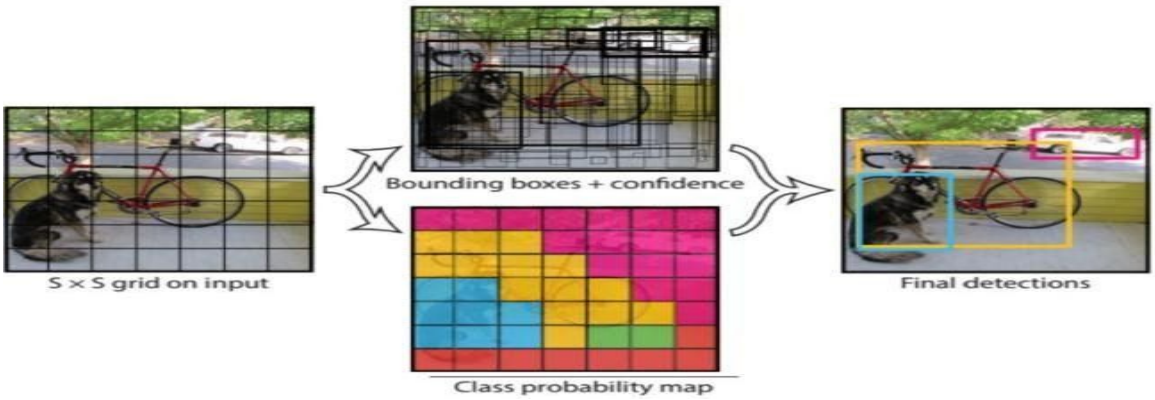
Video is a powerful medium for conveying information and data is plentiful wherever there are cameras. From dash, body, and traffic cams, to YouTube and other social media sites, there is no shortage of video data. Interesting applications that exploit this are ripe for development. One particularly compelling domain where video analytics has tremendous potential is in automated traffic control and public safety systems. The mere presence of automated traffic control systems, like red-light and speed cameras, has been shown to have a positive effect on the reduction of traffic violations.

4.Technology:

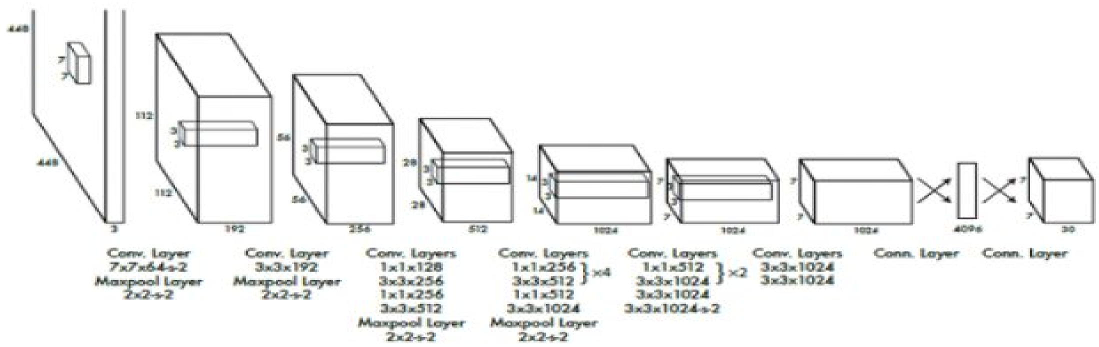
4.1Yolo

You only look once (YOLO) is a state-of-the-art, real-time object detection systemYOLO, a new approach to object detection. Prior work on object detection repurposes classifiers to perform detection. Instead, we frame object detection as a regression problem to spatially separated bounding boxes and associated class probabilities. A single neural network predicts bounding boxes and class probabilities directly from full images in one evaluation. Since the whole detection pipeline is a single network, it can be optimized end-to-end directly on detection performance.

The object detection task consists in determining the location on the image where certain objects are present, as well as classifying those objects. Previous methods for this, like R-CNN and its variations, used a pipeline to perform this task in multiple steps. This can be slow to run and also hard to optimize, because each individual



component must be trained separately. YOLO, does it all with a single neural network.



5.Working:

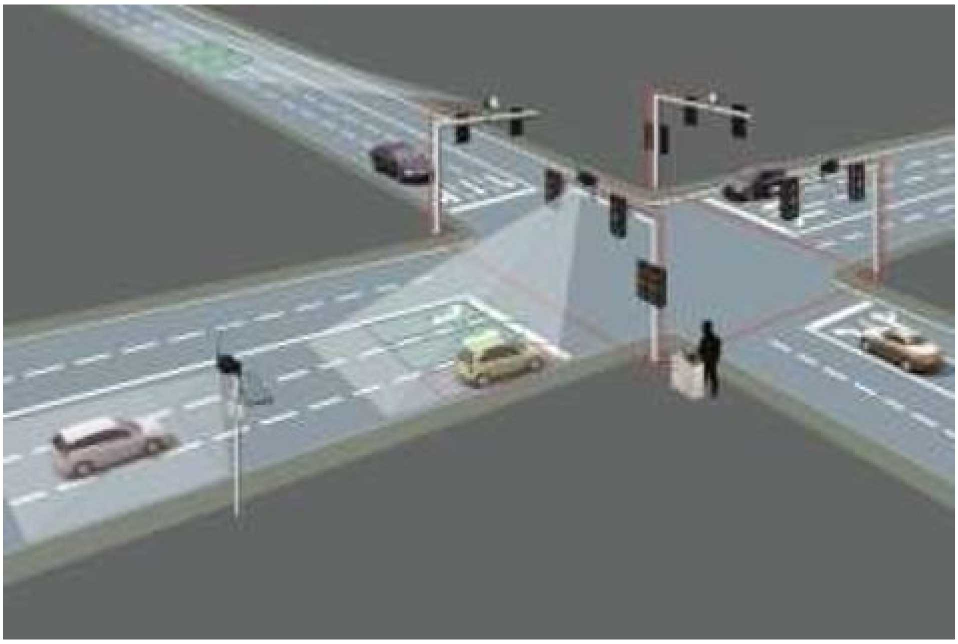
The solution can be explained in four simple steps:

1.Get a real time image of each lane.

2.Scan and determine traffic density.

3.Input this data to the Time Allocation module.

4.The output will be the time slots for each lane, accordingly.



5.1Sequence of operations performed:

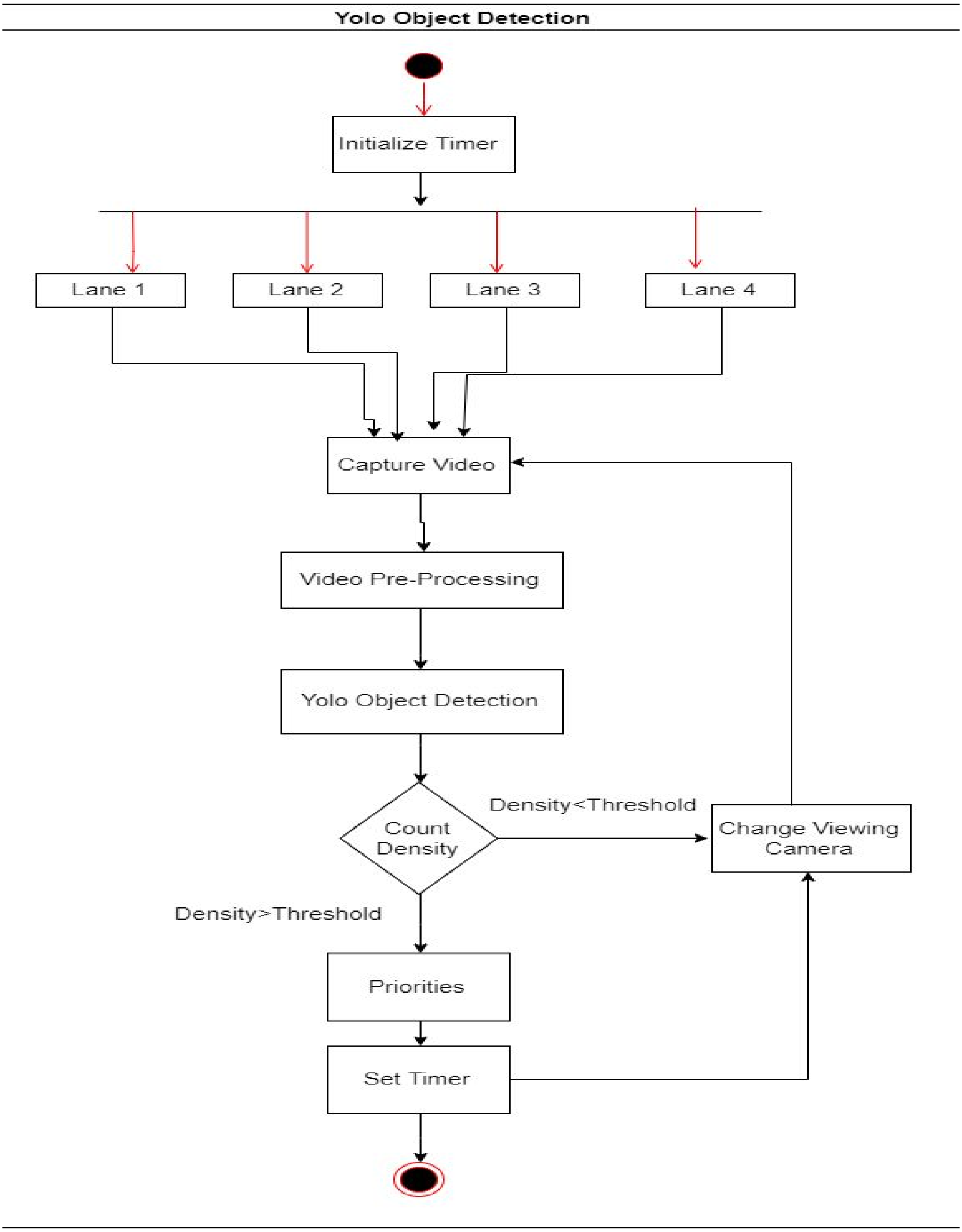
1.Camera sends images after regular short intervals to our system.

2.The system determines further the number of cars in the lane and hence computes its relative density with respect to other lanes.

3.Time allotment module takes input (as traffic density) from this system and determines an optimized and efficient time slot.

4.This value is then triggered by the microprocessor to the respective Traffic Lights.

5.2 Flow Control:

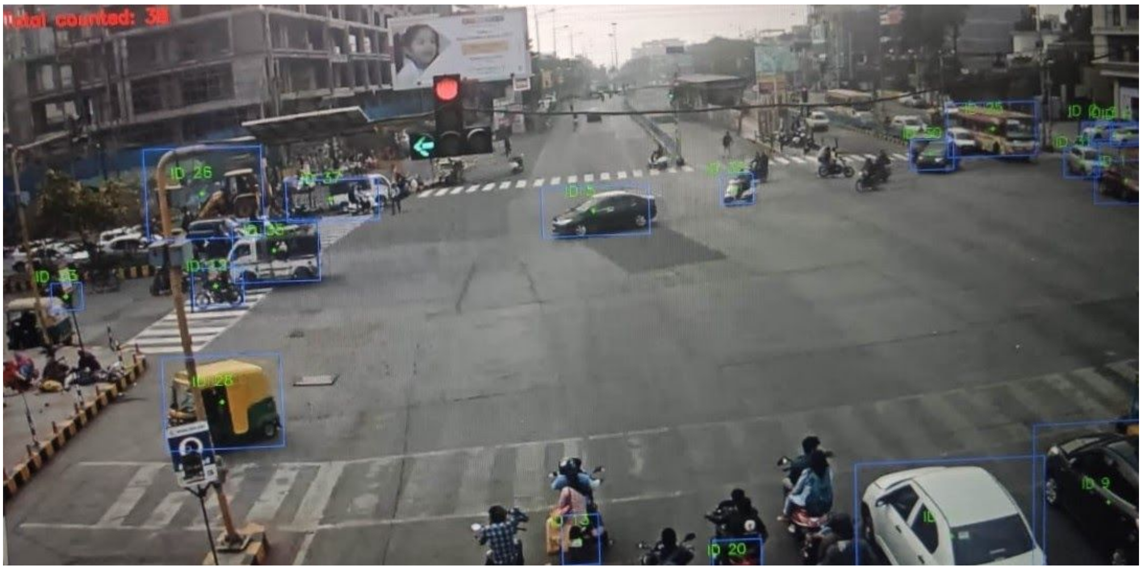


6.Code:

6.1.Synchronization logic:

```
f = open("out.txt", "r")

no_of_vehicles=[]

no_of_vehicles.append(int(f.readline()))

no_of_vehicles.append(int(f.readline()))

no_of_vehicles.append(int(f.readline()))

no_of_vehicles.append(int(f.readline()))


baseTimer = 120  # baseTimer = int(input("Enter the base timer value"))

timeLimits = [5, 30]  # timeLimits = list(map(int,input("Enter the time limits ").split()))


print("Input no of vehicles : ", *no_of_vehicles)

t = [(i / sum(no_of_vehicles)) * baseTimer if timeLimits[0] < (i / sum(no_of_vehicles))
* baseTimer < timeLimits[1]

else min(timeLimits, key=lambda x: abs(x - (i / sum(no_of_vehicles)) * baseTimer)) for
i in no_of_vehicles]


print(t, sum(t))
```

7.Result:



8.Conclusion:

The goal of this work is to improve intelligent transport systems by developing a Self-adaptive algorithm to control road traffic based on deep Learning. This new system facilitates the movement of cars in intersections, resulting in reducing congestion, less CO_2 emissions, etc. The richness that video data provides highlights the importance of advancing the state-of-the-art in object detection, classification and tracking for real-time applications. YOLO provides extremely fast inference speed with slight compromise in accuracy, especially at lower resolutions and with smaller objects. While real-time inference is possible, applications that utilize edge devices still require improvements in either the architecture's design or edge device's hardware.

Finally, we have proposed a new algorithm taking this real-time data from YOLO and optimizing phases in order to reduce vehicle waiting time.

9.References:

1. G. Dimitrakopoulos and P. Demestichas, “Intelligent transportation systems,” IEEE Vehicular Technology Magazine, vol. 5, no. 1, pp. 77–84, 2010.

2.K. Zaatouri and T. Ezzedine, "A Self-Adaptive Traffic Light Control System Based on YOLO," 2018 International Conference on Internet of Things, Embedded Systems and Communications (IINTEC), Hammamet, Tunisia, 2018, pp. 16-19.