

Smart Traffic System using Machine Learning

UTKARSH BAVISKAR

Department of Information Technology Engineering, VIIT Pune, India.

Abstract: - Now days we are in faster time zone. This can be growing very faster as per the early days. The technology as well as populations also increasing day by day. According to the largest populations the government wants manage or develop the roads, because in the largest population's country the traffic is biggest issues to be face by traffic officers. But sometimes single officers can't handle the larger traffic especially in festivals days. Therefore we are research on those situations. How to manage the traffic automatically? Another situation is while in larger traffic how to cross the ambulance from that traffic. So this paper is helping us to solve those entire problems regarding larger traffic. After all the research the new technology is highlighted i.e. Machine Learning (ML). We have use some of algorithm, dataset and mathematical calculations which can be done by machine learning and python. The python programming language which can be providing a platform to perform some operations like object detections, image processing, and video processing and so on. We have design some algorithm which is can handles larger traffic.

Keywords : Smart Traffic, machine Learning, AI, YOLO, AlexNet.

1. INTRODUCTION

The cities are highly developed with technology and uses different types of electronics devices, sensors, manages big data and one of highlighted is city roads and properly developed. But in these cities the most commonly issue is facing that can be traffic management. We have seen that because if some issues largest amount of traffic is created such as traffic lights not working properly, while occurring number's of vehicles arriving on single side of road as compare with other but the given time is not sufficient to be clear that side traffic. Therefore such types of traffic we want to handle very smartly. The Machine Learning is fulfilling this condition based of object detection.

2. METHODOLOGY

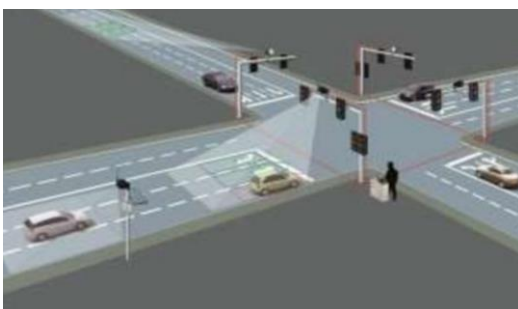


Fig 2.1: Virtual view of Traffic signal

The above figure shows the virtual traffic signals which contents the four roads and four traffic lights for each. In general 30 seconds are allots to every road to clear the traffics. Therefore we are planning to be monitoring the each side of traffic by camera and with help of the machine learning. Capturing images or live videos and processing this by using relevant libraries of python which is YOLO. We have different types of vehicles. The ambulance is one of them. We can't stop for signal to be clear traffic. Therefore we are needed to learn our project about that difference of vehicles. For training the systems the AlexNet CNN architecture are used. The steps of working are as follows,

1. The camera sending the images to system in some intervals for processing.
2. This can be determines the density of traffic from the roads and based on the calculations time of the traffic clear is changed which is shown in result.
3. The system is decided which is signal is open for which time and it will triggered the traffic signals.

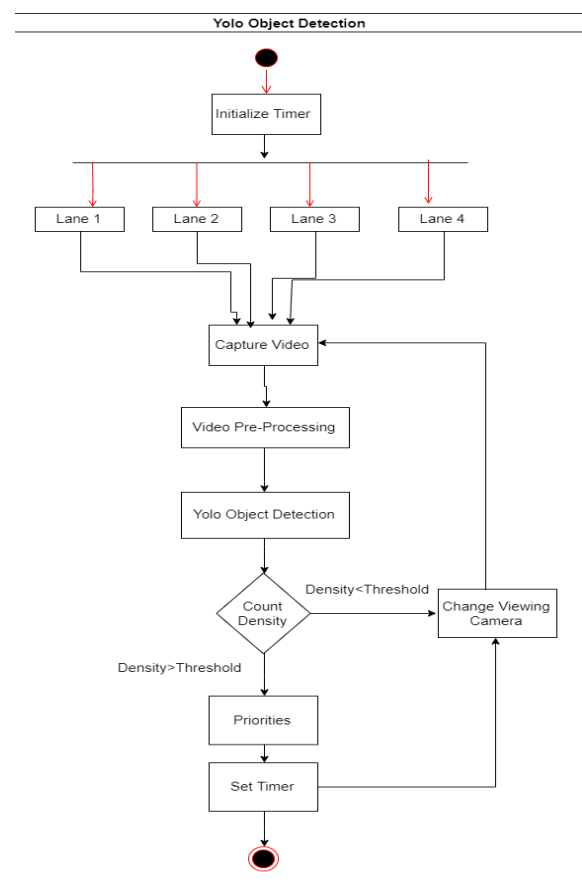


Fig 2.2:- Flow chart of project

3. SOFTWARE PLATFORM

- Python

The python is open source programming language it means you can use this for your own purpose or free to use anywhere. This is currently in higher demand to IT industry. It is mostly use for the Machine learning to develop the websites, data science and software's etc. The python is very friendly to everyone. The python is almost similar to the C language only the difference in coding syntax. It is capable to perform various types of operations and it use to build the machine learning, data analyze, complex statistical calculations.

The python has number's of libraries support to perform varieties of task. Therefore we are choosing this language for developing this project. If you want to use any kind of libraries you need to be installing in your desktop. "pip install" is the command to install any libraries of python.

- Machine learning

The Machine learning (ML) is nothing but the artificial intelligence (AI). This is software application. It is has ability to automatically learn and improve the performance without making a complex programming. "Machine learning focuses on the event of pc programs which will access information and use it to find out for themselves".

"The ML permits analysis of huge quantities of data. Whereas it usually delivers faster, additional correct leads to order to spot profitable opportunities or dangerous risks, it should additionally need extra time and resources to coach it properly. Combining machine learning with AI and psychological feature technologies will build it even simpler in process large volumes of information" [1].

4. YOLO

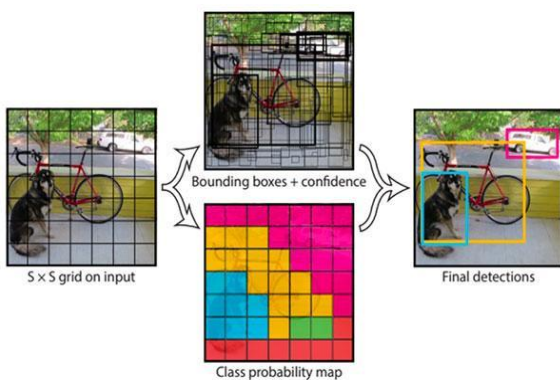


Fig. 4.1: Object detections

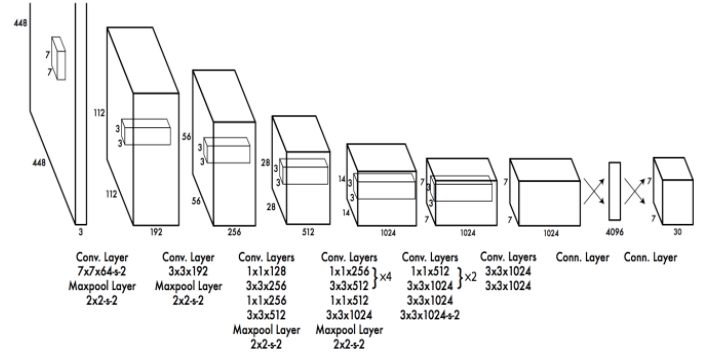


Fig. 4.2: Layer Views

This is the python library which is called "You Only Look Once". It is "real time object detections recognition system". The YOLO is a single neural network.

5. Alex Net's ARCHITECTURE

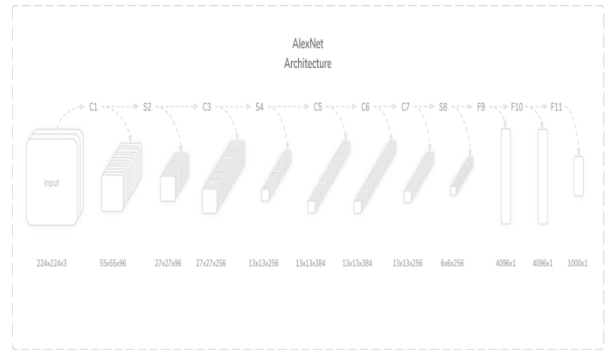


Fig. 5.1: AlexNet Architecture Diagram

We are using AlexNet CNN Model architecture to streaming videos. Basically we are using this for detecting the various types of Ambulance from video. For performing these operations we are training to or system to determine the Ambulance with help of dataset. In our dataset we are storing different types of vehicles image. This can help to our systems all detect all the cars motorcycles and so on.

- Convolution Layer (96, 11x11)
- Max Pooling Layer (3x3)
- Convolution Layer (256, 5x5)
- Max Pooling Layer (3x3)
- Convolution Layer (384, 3x3)
- Convolution Layer (384, 3x3)
- Convolution Layer (256, 3x3)
- Max Pooling Layer (3x3)
- Fully-Connected Layer (4096)
- Fully-Connected Layer (4096)
- Fully-Connected Layer (1000)

6. CONVOLUTION NEURAL NETWORK



Fig. 6.1: Convolution Operation Example

7. DATASET

Basically the Dataset which we have used it is an manually created dataset in this dataset we have collected the Emergency Vehicle images and Non Emergency Vehicle Dataset and we have gathered the images from Google, So in this dataset we have collected 1380 Emergency Vehicle Images and 1,496 Non Emergency Vehicle and further while training we have divide this dataset into training and testing part.

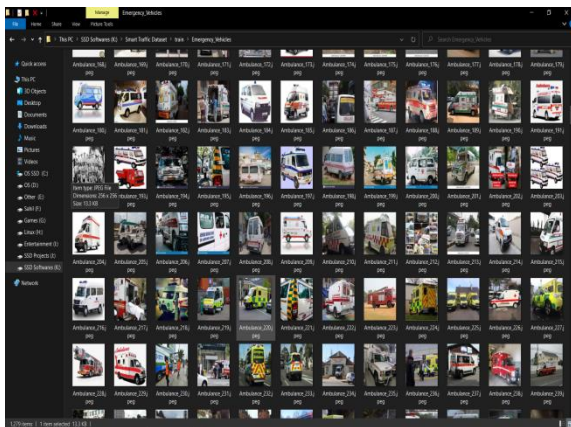


Fig. 7.1 :- Dataset 1

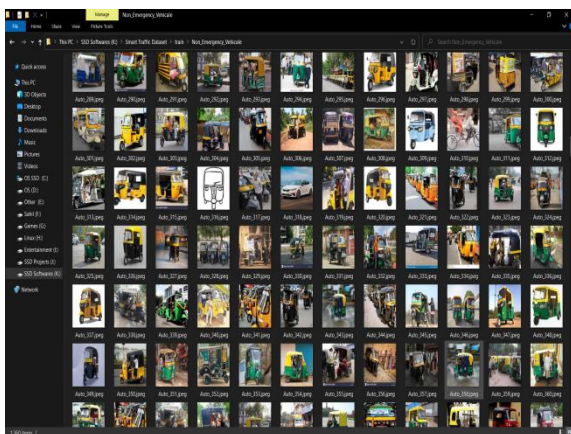


Fig. 7.2 :- Dataset 2

8. RESULT

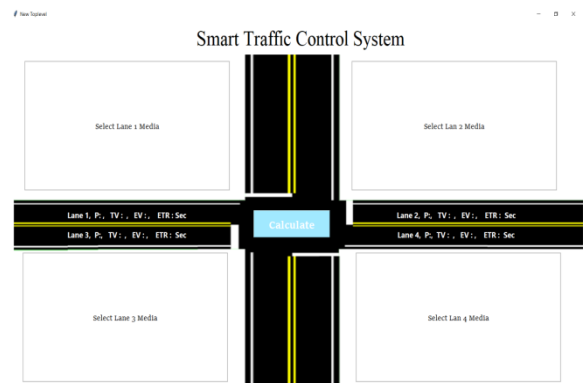


Fig 8.1:- Smart Traffic Control system

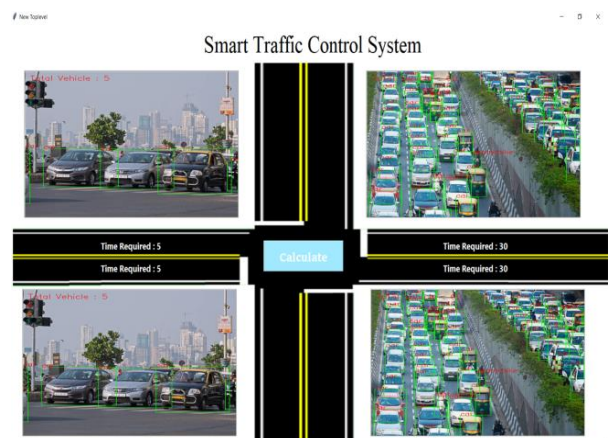
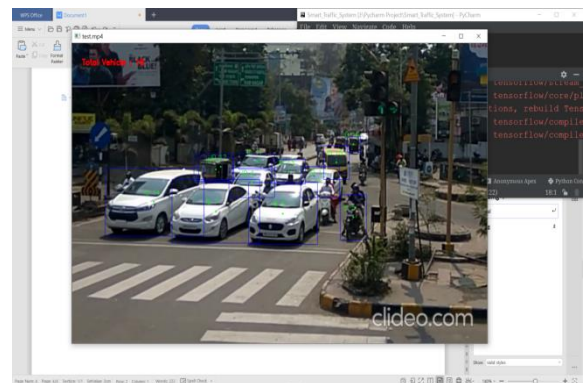


Fig 8.2:- Camera View of all side



9. ADVANTAGES

- The uses of this system make our cities as smartest cities.
- It has capabilities to handle traffic as well as monitor the traffic.
- The main advantage of this system is helping the ambulance vehicle. This can be happens by clearing the traffic from ambulance side roads.

10. CONCLUSION

In this way we are developing a very smart traffic control system which can be able to detect and monitor the traffic. It can be take decision according to the density of traffic.

11. REFERENCES

- [1] M.Wieringet,"Multi-agent reinforcement learning for traffic light control", *inICML*, pp. 1151-1158, 2000.
- [2] Y. K. Chin, N. Bolong, A. Kiring, S. S. Yang and K. T. K. Teo, "Q-learning based traffic optimization in management of signal timing plan", *International Journal of Simulation Systems Science & Technology*, vol. 12, no. 3, pp. 29-35, 2011.
- [3] S. El-Tantawy and B. Abdulhai, "Multi-Agent Reinforcement Learning for Integrated Network of Adaptive Traffic Signal Controllers (MARLIN-ATSC)", *2012 15th International IEEE Conference on Intelligent Transportation Systems*, Sep. 2013.
- [4] Q Wang, J Wan, Y Yuan, "Locality constraint distance metric learning for traffic congestion" Pitu, Larry Head, A real-time traffic signal control system: architecture, algorithms, and analysis, NOV 2016
- [5] X. Liang, X. Du, G. Wang and Z. Han, "Deep Reinforcement Learning for Traffic Light Control in Vehicular Networks", *arXiv:1803.11115*, vol. 1, Mar. 2018.
- [6] H. Wei, G. Zheng, H. Yao and Z. Li, "IntelliLight", *Proceedings of the 24th ACM SIGKDD International Conference on Knowledge Discovery & Data Mining - KDD 18*, 2018.
- [7] MayuriLakhani, Shivansh Dave, Jignesh J.Patoliya "Internet of Things based Adaptive Traffic Management System as a part of Intelligent Transportation System (ITS)", *IEEE* 2018.
- [8] AditiYadav, Vaishali More, NehaShinde, ManjiriNerurkar, NitinSakhare, "Adaptive Traffic Management System Using IoT and Machine learning", *Journal of Electrical Technology*, Vol 4, pp.221-226, Jan 2019.
- [9] Dr.A.Ravi,R.Nandhini, Bhuvaneshwari, J.Divya, K.Janani," Traffic Management System using Machine Learning Algorithm" , *INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH IN TECHNOLOGY*, Volume 7 Issue 11, April 2021.