

# A REVIEW ON TRAFFIC MANAGEMENT SYSTEM

<sup>1</sup>Pulkit K Nigam, <sup>2</sup>Sudhir Chauhan, <sup>3</sup>Mayur Bhojar, <sup>4</sup>Siddharth Tambe, <sup>5</sup>Prof. Nivedita R Kadam

<sup>1,2,3,4</sup>Students, <sup>5</sup>Guide

G.H. Raisoni college of Engineering and Management, PUNE

**Abstract:** This paper presents the design and development of a Traffic Management System that utilizes concepts of Machine Learning and Object Recognition. This system thus can be used for efficient computing within urban cities with high traffic congestion. In this paper, we present the general working principle of the system and various components and methods used within. This system functions based on state of the system and thus is dynamic.

## I. INTRODUCTION

The system is designed for road junctions. The system thus analyzes the situation at each road and then decides the time accordingly. Generally green light is used for allowing people to commute whereas red is intended to stop those same people. In an ideal situation, everyone on one side would be able to cross traffic light within the allotted time. In reality, the duration of a typical traffic system is static and does not consider the length of queue waiting for green light. Efficient transportation is essential to the economy of cities and thus modification of traffic system requires serious thought. The regular system may result in traffic congestion problems on junctions where duration of green light is not enough to clear the lanes with traffic conditions. Traffic congestion can adversely affect physical and mental health of people and the environment. Also, this problem increases possibility of accidents on roads. This is also crucial for smooth motion of emergency vehicles of high priorities such as ambulances, police, fire brigade and VIP persons. Also a smooth and effective system will help pedestrians. The system thus can adapt to the situation. The basic blueprint of system consists of an agent that detects the number of people in each path (the length of queue) and then smartly decided efficient time for each path to smoothly commute without any inconvenience. Our system also collects the above data and uses it for prediction in similar situation such as time and day of the week. Machine learning is used for predicting the suitable number of cars and the agent detects length of queue (based on Object Recognition). A camera is used to detect number of cars (length of queue) and the above steps take place accordingly. Another feature of our system is prediction of next node. As one node (traffic junction) will read the situation, it will predict the traffic for surrounding nodes based on incoming and outgoing traffic.

This traffic management system requires The counting of number of cars need to be efficient to avoid inaccuracies in the long term, The data communication between various components such as sensors (such as camera), actuators (such as traffic signal), central processing system, database warehouse etc., Calibration of traffic signal based on previous and current data needs to be error-free, Prediction of the next square needs to be optimal.

## II. LITREATURE SURVEY

There have been many attempts to resolve the problem of traffic congestion using computer science and technology. In 1956, US funded \$114 billion for its interstate highway system which completed in 1991. Several institution have proposed systems that enable users to be better informed and make safer, more coordinated, and smarter use of transport networks. Intelligent Transportation System and Advance Transportation System have been developed and introduced in some countries.

Q learning method used by Sunil Ghane, Vikram Patil, Kumaresan Mudliar & Abhishek Naik [1] explored the use of reinforcement learning (based on reward and punishment system) also known as "Markov Decision Process". The formula for the process accounts for the various states, actions, rewards and the learning rate which represents the "discount factor" (degree of tendency to move to another state). It also explained how there are 24 different types of states based on the traffic comparison. Each state represents different permutations of comparisons of the four paths. The paper later discusses the accuracy of Neural Networks and how it is a better choice than other learning methods.

Safeullah Soomro, Mahdi H. Miraz , Anupama Prasanth and Mirza Abdullah [2] discussed the importance of an efficient and automatic transportation system in Smart Cities and proposed a suitable pseudocode for the congestion problem. The paper later discusses the various uses of different IOT devices and ends with solving of a real life like situation using A\* algorithm.

Although the paper by Nathaniel Fairfield & Chris Urmson [3] is not particularly related to Traffic management (it discusses detection of traffic light using cameras on onboard cars), the concepts of Automatic Labeling, Camera Configuration, Classification, Position Estimation can be helpful in our study of Object Recognition. The paper ends with optimization of classifier used.

Ritesh R.N., Vignesh R, Anala M.R. in their paper discussed an autonomous traffic signal control system using decision trees. The paper clearly explains concepts of Object recognition and Vehicle Counting. It also explains how the system decides based on decision tree confirming its autonomy. The algorithm used is easy to understand and suitable formulae are explicitly stated. The paper ends with discussion of the algorithm's accuracy.

### III. MOTIVATION

Thus we decided to build an efficient alternative that could solve the existing problems using the power of computers. This Traffic Management System is supported to eliminate and in some cases reduce the hardship faced by existing system. Moreover this system is designed to carry out operations in a smooth and effective manner. We used Machine Learning, and Object Recognition to facilitate error-free, secure, reliable and fast management system.

The existing traffic system affects the entire population and the consequences can be exhausting economically or otherwise. Although traffic at large scale is only experienced in Metro cities, other semi-Metro cities have considerable amount of traffic. The peak hour is between 7 and 9 in the morning and 6 to 8 in the evening, which is due to large number of people commuting to their workplace or home respectively. The traffic is primarily caused by the sheer number of cars on the road but also the total duration of traffic lights.

### IV. PROJECT SCOPE

Project's main objectives are to predict traffic in next junction and calibrate traffic signals according to traffic. Our system uses the length of queue as the only attribute to calculate duration of traffic lights. Other attributes such as speed, influx of pedestrians etc. can be added in future development of systems. Also, other IOT devices can be used for better information fetching. The limitation of system needs to be explored and tackled as they come. Minimal use of hardware can be encouraged saving cost.

### V. CONCLUSION

Traffic Lights must be autonomous and dynamic in nature. The review paper presented concise literature review on various traffic management systems and its importance in Urban cities. It also discussed various problems and solution concerning traffic congestion. Future research directions were also discussed. The various models researched are coherent with its purpose with its many advantages and disadvantages. An efficient system needs to take the best of all the possible methods.

### REFERENCES

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