Machine learning based automatic traffic control system.

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Abstract: Almost all (metropolitan) cities including the major ones, like Los Angeles, Beijing, New York, are suffering from heavy traffic congestion. Statistics show that, in 2015, 43 cities in China are suffering a prolonged travel time of more than 1.5 h every day during rush hours. In the meanwhile, traffic accidents are plaguing the economic development as well. In order to achieve a better performance of detection and recognition of multi-vehicle targets in complex urban environment, a step of detection algorithm based on the features of Histogram of Oriented Gradients (HOG). This algorithm makes full use of HOG characteristic advantages for target vehicles, i.e., the good descriptive ability of HOG feature. With the ever-increasing demand in urban mobility and modern logistics sector, the vehicle population has been steadily growing over the past several decades. One natural consequence of the vehicle population growth is the increase in traffic congestion.
In our proposed method, the system is designed to manage traffic signal timings based on the density of traffic on its corresponding road. Detecting traffic through roadside CCTV cameras. It acts as multi-class classification which is recognizing traffic. The system detect traffic event in real-time. We here propose a density based traffic signal scheduling algorithm.

Keywords— Multi-class classification, Histogram of Oriented Gradients, Detection, Recognition, scheduling algorithm.

I. Introduction

With the ever-increasing demand in urban mobility and modern logistics sector, the vehicle population has been steadily growing over the past several decades. One natural consequence of the vehicle population growth is the increase in traffic congestion. The normal function of traffic lights requires more than slight control and coordination to ensure that traffic and pedestrians move as smoothly, and safely as possible. A variety of different control systems are used to accomplish this, ranging from simple clockwork mechanisms to sophisticated computerized control and coordination systems that self-adjust to minimize delay to people using the junction.

This innovative software projects are an effective traffic scene perception project that allows for managing 4-way traffic signal management system. The system consists of 4 signals corresponding to each road. We here propose a density based traffic signal scheduling algorithm. The system is designed to manage traffic signal timings based on the density of traffic on its corresponding road. The system represents the traffic strength of a road graphically using traffic judgments. By measuring the traffic lined up on a particular road the signal timings are adjusted to let that particular way clear out and then the next populated one. The entire system works according to an algorithm that allows for smooth and efficient traffic flow across all four ways. It also consists of an emergency override that allows traffic authorities to remotely let go a particular signal in case an ambulance or important vehicle arrives on that way.

II. Literature Review

Several researchers have studied on various types of techniques for multitraffic scene based perception and also in the field of social network, that how it is helpful in this multitraffic scene base perception for vehicle detection [1]. P Naveen Kumar oriented to analyzed and implemented twitter stream by real-time traffic detection and find the framework that checked the activity occasion location through the examination of twitter stream [2]. Alberto Rosi studied on social sensors and pervasive services approaches and perspectives they explored how this social sensing technique integrated into computing system [7].

Yun Wei studied on multi-vehicle detection algorithm through combining Harr and HOG features they developed the system to achieving the better performance

for detection of multi-vehicle in complex urban environment with two step detection algorithm. This system provides a higher accuracy in detection of vehicle and also higher time efficiency [12]. Dr. Pradeep K. Gupta and Ishant Sharma are design a project to developed an automatic traffic signal system for Chandigarh city. This system monitor automatically flow of traffic in traffic signal. In this system sensors was also which senses the road data in traffic. This system provided real-time detection of traffic and eliminates the wastage of green time allotted to phase.

Chiung-Yao Fang examined automatic change detection of environment for drivers in a vision-based driver assistant system. They developed a computational model for explored critical changes of environment for driver in assistance system of driver. In this they demonstrated practicability of both computational model and changed in system which getting explored [9]. Hulin Kuang was improved the detection method of vehicle based on Bio-Inspired image enhancement approach weighted score level feature fusion technique. By using this technique detection of vehicle was possible at night time. Because of this system there was possible to deal with number of different types of scenes including vehicle of different types and sizes. It also identified vehicle at various location and numbers of vehicle [4].

Ravi Kumar Satzoda studied on the vehicle detection used active learning and symmetry derived analysis. They developed system that performed on on-road vehicle detection which was very crucial operation. In this system they use seven kinds of datasets that captured road, weather and traffic condition [10]. Olivier Regniers developed multivariate model for classification of high resolution optical images which was wavelet-based textural features. This model was based on strategy of supervised classification framework which classified the images according to learning database stored information that enabled classifier to take decision [11].

III. PROPOSED SYSTEM

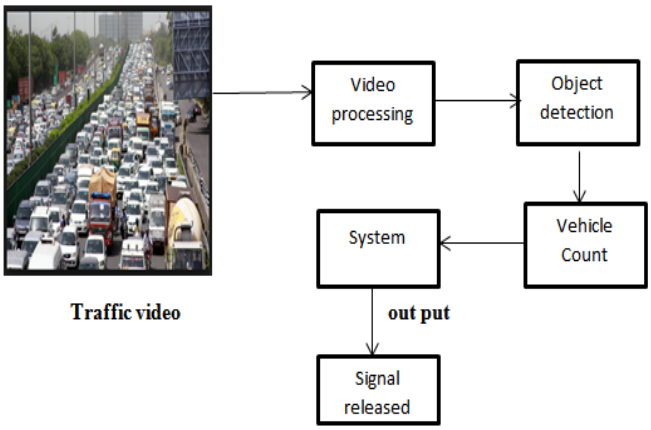


Figure 4.1: Proposed System Architecture

IV. Methodology

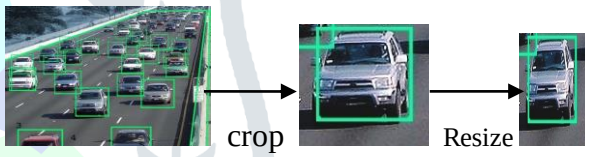
1. Convolutional Neural Network

A Convolutional Neural Network (CNN) is one of the most popular algorithm for deep learning. CNN are used to image and video recognition and classification problems. In our system we use this algorithm for calculate density of traffic. In each stage feature extraction is done and it produces the large feature set for original input. These feature sets helps for describing the characteristics of data. Each frame is classified and the resulting value is output on the video frame window.

Mechanism of CNN algorithm:

1. Preprocessing.

As referenced before Hoard highlight descriptor utilized for vehicle discovery is determined on a 64×128 fix of a picture. Obviously, a picture might be of any size. Commonly fixes at different scales are examined at many picture areas. The main limitation is that the patches being broke down have a fixed angle proportion. For our situation, the patches need to have a viewpoint proportion of 1:2. For instance, they can be 100×200, 128×256, or 1000×2000 yet not 101×205.



2. Calculate the Gradient pictures

To calculate a HOG descriptor, we want to initial calculate the horizontal and vertical gradients; finally, we would like to calculate the bar graph of gradients. This can be simply achieved by filtering the image with the subsequent kernels.

3. Compute Histogram of Gradients in 8×8 cells

In this step, the image is split into 8×8 cells and a bar graph of gradients is calculated for every 8×8 cells.

4. 16×16 Block Normalization

In the above step, we made a histogram dependent on the angle of the picture. Gradient of a picture are touchy to in general lighting. On the off chance that you make the picture darker by separating all pixel esteems by 2, the inclination greatness will change considerably, and along these lines the histogram esteems will change significantly. In a perfect world, we need our descriptor to be free of lighting varieties. As such, we might want to "standardize" the histogram so they are not influenced by lighting varieties.

5. Compute the HOG feature vector

To compute the last element vector for the whole picture fix, the 36×1 vectors are linked into one goliath vector. What is the size of this vector? Allow us to compute 1. How numerous places of the 16×16 squares do we have? There are 7 level and 15 vertical positions making a sum of 7 x 15 = 105 positions. 2. Each 16×16 square is spoken to by a 36×1 vector. So when we link them all into one giant vector we acquire a 36×105 = 3780 dimensional vector.

V. *Problem Statement*

The present arrangement of traffic light have been gives a fixed traffic control plan, which settings depend on earlier traffic checks however might be physically changed. It is the most widely recognized type of sign control for the present a days and result in wrong conduct in rush hour gridlock which varies from that which the arrangement was based, for example, the utilization of superfluous stages when the traffic is light.

VI. Conclusion

We can integrate our system with an application for analyzing the official traffic signal, so as to capture traffic condition notifications in real-time. Thus, our system will be able to signal traffic-related events in the worst case. Further, we are investigating in feature scope the integration of our system into a more complex traffic detection infrastructure. This infrastructure may include both advanced physical sensors and social sensors such as streams of social media. In particular, social sensors may provide a low-cost wide coverage of the road network, especially in those areas (e.g., urban and suburban) where traditional traffic sensors are missing.

VII. *References*

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