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Real Time Traffic Management Using Machine Learning

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Abstract: The number of vehicles on the road is increasing every day, and standard traffic management methods are insufficient to deal with such a big volume of traffic. In today's scenario, the traditional strategy works well only when the count is low; if the density of vehicles on one side of the road increases, or if traffic is disproportionately heavier on one side than the other, the approach fails. As a result, we want to modify the traffic signal system from static to signal switching, so that we can monitor and handle signals in real time. As a result, in this project, the signal switching time will be determined using real-time image detection with high accuracy in crowded traffic. This approach has shown to be quite helpful in releasing congested traffic in a timely and efficient manner.

Keywords- Traffic Congestion, Vehicle Count, image Processing, Machine Learning.

I. INTRODUCTION

Nowadays, rather than public or shared transport modes, many decide to traffic through private cars, leading to a considerable number of private road vehicles. This constant increase in vehicle numbers on the road produces a range of problems that are most seriously linked to traffic jams. In this case it is not possible to impose limitations on the use of private vehicles on individuals, but one can regulate traffic flow so as not to alleviate congestion problems. Numerous programmes, including intelligent transportation systems, are underway to turn the conventional transportation networks of cities into intelligent transport and a number of initiatives are being launched as part of this endeavour. A system for the real-time monitoring of traffic lights has been developed in many steps, which means that the time to change the traffic signals is not fixed in advance; it is varying depending on the number of vehicles on each side of the road. This operation can be carried out by using a variety of detection techniques to measure the number of vehicles on the road. Our goal is to establish and build a model, which accurately illustrates the current road situation and monitors and addresses transport issues. We therefore carry out this endeavour by employing a pre-trained model known as YOLO for object detection. The pre-trained model of YOLO uses OpenCV to detect objects and remove several input images from the input fields. The monitoring cameras can be employed for the recording of traffic images; this image is used as the input image for the pretrained model. In order to photograph the scene, each side of the road is divided into individual frames of same height and width.

II. MOTIVATION

We are motivated by the shortcomings of the current system. Existing systems just detect traffic, however the suggested system sends out a signal based on vehicle detection.

III. PROBLEM STATEMENT

Recently, social and road networks have been used as sources of data for event detection, with a focus on road traffic issues such as jamming, congestion, and accidents. As a result, we design a system to address real-time traffic detection and signal release as vehicles arrive.

IV. LITERATURE SURVEY

Xiaoyuan Liang, Xusheng Du," Deep Reinforcement Learning for Traffic Light Control in Vehicular Networks"[1], In this research, we look at ways to determine the length of traffic lights using data from various sensors and vehicular networks. To regulate the traffic signal, we present a deep reinforcement learning model. We collect data and divide the entire intersection into small grids to quantify the complex traffic scenario as states in the model. A traffic light's timing adjustments are activities that are characterised as a high-dimension Markov decision process. The difference in waiting time between two cycles is the prize. A convolutional neural network is used to map the states to rewards in order to solve the model. Dueling network, target network, double Q-learning network, and prioritised experience replay are some of the components of the suggested model that help to increase performance. We test our model in a vehicular network using Simulation of Urban MObility (SUMO), and the simulation results suggest that our model is effective at controlling traffic signals.

Lisheng jin1, mei chen 1, yuying jiang2, and haipeng xia1,"Multi-Traffic Scene Perception Based on Supervised Learning"[2], The current vision driver aid technologies in this system are designed to work in pleasant weather. To make vision improvement algorithms more efficient, classification is a way for identifying the type of optical features. A multi-class weather classification system based on numerous weather features and supervised learning is provided to improve machine vision in bad weather settings. The feature was expressed as an eight-dimensional feature matrix after the underlying visual features were retrieved from multi-traffic scene photos. Second, classifiers are trained using five supervised learning techniques. The results reveal that extracted features may effectively characterise image semantics, and the classifiers have a high rate of recognition accuracy and adaptability. The proposed method lays the groundwork for improving the identification of anterior vehicles during nocturnal illumination shifts and improving the driver's field of vision on foggy days.

Caixia Zheng, Fan Zhang,1 Huirong Hou, Chao Bi, Ming Zhang, and Baoxue Zhang, "Active Discriminative Dictionary Learning for Weather Recognition"[3], The purpose of this study is to propose a novel framework for distinguishing various weather conditions. The proposed method has the following advantages when compared to other algorithms. To begin with, our method extracts in photos both visual appearance properties of the sky region and physical attributes features of the nonsky region. As a result, the retrieved characteristics are more extensive than some previous approaches that simply analyse sky region features. Second, unlike other techniques that use traditional classifiers (e.g., SVM and K-NN), we use discriminative dictionary learning as the classification model for weather, which may solve earlier work's limitations. In addition, the active learning approach is used in dictionary learning to eliminate the need for a large number of labelled samples to train the classification model for strong weather recognition performance. To test the efficiency of the suggested strategy, experiments and comparisons are conducted on two datasets.

Hamid Reza Riahi Bakhtiari, Abolfazl Abdollahi, Hani Rezaeian, "Semi-automatic road extraction from digital images"[4], The authors offer a semi-automated method for extracting different road types from high-resolution remote sensing photos in this work. The method employs edge detection, SVM, and a mathematical morphology method. The road's outline is first recognised using the Canny operator. The Full Lambda Schedule merging method then joins segments that are contiguous. The entire image was then categorised into a road image using a Support Vector Machine (SVM) and several spatial, spectral, and textural properties. Finally, morphological operators are used to increase the quality of the discovered roadways. On a range of satellite photos from Worldview, QuickBird, and UltraCam airborne photographs, the algorithm was thoroughly tested. The results of the accuracy evaluation show that the suggested road extraction approach can extract multiple road types with high accuracy.

Andrew Payne, Sameer Singh. ," Indoor vs. outdoor scene classification in digital photographs"[5], We present a real-time technique for reconstructing the three-dimensional track of a monocular camera while it traverses an unknown scene. Our MonoSLAM system is the first to successfully apply the SLAM methodology developed for mobile robotics to the "pure vision" domain of a single uncontrolled camera, resulting in real-time but drift-free performance previously unattainable to Structure from Motion approaches. The approach's fundamental component is the online generation of a sparse but permanent probabilistic map of natural landmarks. Our key original contributions include an active approach to mapping and measuring, the use of a general motion model for smooth camera movement, and solutions for monocular feature initialization and orientation estimation. These elements combine to create a very efficient and dependable algorithm that operates at a rate of 30 Hz on standard PC and camera hardware. This discovery not only expands the range of robotic systems for which SLAM may be useful, but also opens up new avenues. MonoSLAM is utilised to do real-time 3D mapping and localization on a full-size humanoid robot, as well as live augmented reality using a hand-held camera.

V. SYSTEM ARCHITECTURE

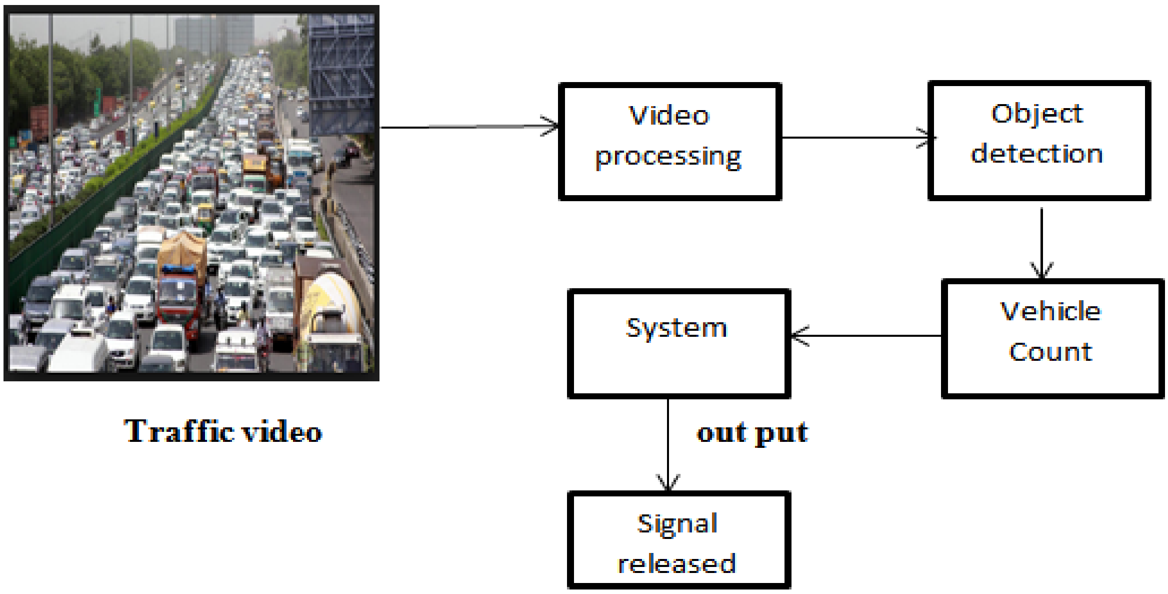

Fig. system architecture

- **Modules :**

Pre-processing : - Although geometric changes of images (such as rotation, scaling, and translation) are known as pre-processing methods, the purpose of pre-processing is to improve the image data by suppressing undesired distortions or improving particular image attributes that are required for future processing. Possessiveness is a term used to describe someone who is possessive about something. The use of a digital computer to perform an algorithm on digital photographs is known as image processing. As a subsection or area of digital logic, image processing provides a number of advantages over analogue image processing.

1. Read the Image

2. Image Resized (220,220, 3)/Resized (width, height, no. RGB channels)

3. Conversion of RGB to Grayscale

4. Identification of segmentation edges The Gaussian filter is used to remove noise.

Segmentation : It entails segmenting a visual input to facilitate picture analysis. We can segment the image and analyse it further if we wish to eliminate or identify something from the remainder of the image, for example, detecting an object in the background. This technique is referred to as segmentation. Segments are composed of "super-pixels," which are clusters of pixels that represent objects or segments of objects.

Feature Extraction : Complex structures, such as points, edges, or objects, can be found in an image. Feature extraction is a technique for reducing the amount of features in a dataset by creating new ones from old ones (and then discarding the original features). The new, condensed set of features should be able to summarise the bulk of the information in the old set. Feature extraction begins with a set of measured data and creates derived values (features) that are intended to be useful and non-redundant, easing the learning and generalisation phases and, in some situations, resulting in superior human interpretations. Dimensionality reduction is linked to feature extraction.

Classification : CNNs are utilised for picture detection and recognition because of their high precision. The classification convolutional neural network is three-dimensional, with each group of neurons analysing a different area or "function" of the image. In a CNN, each group of neurons concentrates on a distinct aspect of the image. Smaller sections of the photos are examined by the algorithm. The end result is a probabilistic vector that predicts the likelihood of each feature in the image belonging to a class or group.

VII.ALGORITHM

CNN (Convolutional Neural Network): CNN (convolutional neural network) is a type of neural network for deep learning. In a word, consider CNN to be a machine learning algorithm capable of taking an input image, assigning significance (learnable weights and biases) to various aspects/objects inside it, and discriminating between them. CNN works by pulling information from videos. A CNN is composed of the following elements:

1. The input layer is a grayscale image.

2. The output layer, which may be binary or multi-class in nature.

3. The hidden layers consist of convolutional layers, ReLU (rectified linear unit) layers, pooling layers, and a fully connected Neural Network. It is crucial to understand that ANNs, or Artificial Neural Networks, are incapable of extracting characteristics from images since they are composed of numerous neurons.

This is where the combination of convolution and pooling layers comes into play. Likewise, the convolution and pooling layers are unable to do classification, necessitating the usage of a fully connected Neural Network. Before we delve deeper into the principles, let us first attempt to comprehend these particular pieces.

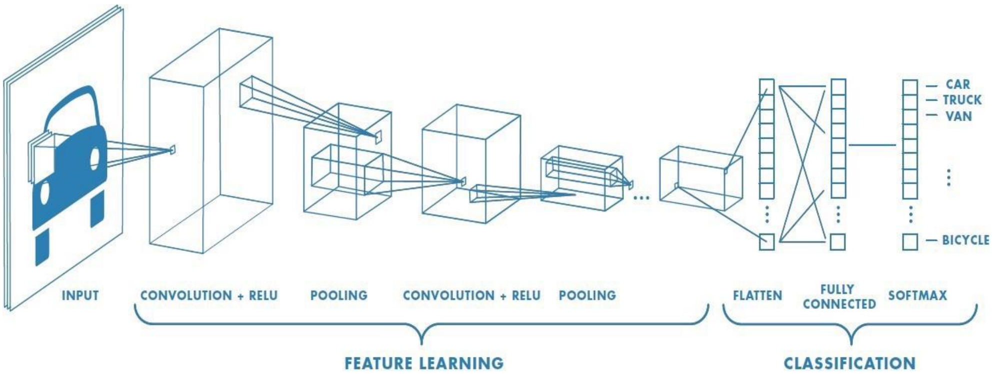

Fig - Illustrates the CNN process from input to Output Data

VI. CONCLUSION

The Real Time Traffic Signal Monitoring & Handling system aims to alleviate the traffic problem that most cities in urban and rural areas face with the assistance of this project, which focuses on reducing vehicle congestion virtually without the installation of any hardware. The configuration, which results in a portable media, requires the usage of a camera and a Raspberry Pi board, as well as communication. The trained model can be utilised to maintain smooth traffic flow while minimising road interruption. While training the model will take longer, the reaction time will be faster. The model is configured in such a way that it decides the timing of smart signal switching on both sides of the road, guaranteeing that no one is forced to wait on the road for extended periods of time and that traffic flows smoothly.

REFERENCES

1) F. Atefeh and W. Khreich, “A survey of techniques for event detection in Twitter,” Comput. Intell., vol. 31, no. 1, pp. 132–164, 2015.
2) P. Ruchi and K. Kamalakar, “ET: Events from tweets,” in Proc. 22nd Int. Conf. World Wide Web Comput., Rio de Janeiro, Brazil, 2013, pp. 613–620.
3) A. Mislove, M. Marcon, K. P. Gummadi, P. Druschel, and B. Bhattacharjee, “Measurement and analysis of online social networks,” in Proc. 7th ACM SIGCOMM Conf. Internet Meas., San Diego, CA, USA, 2007, pp. 29–42.
4) G. Anastasiet al., “Urban and social sensing for sustainable mobility in smart cities,” in Proc. IFIP/IEEE Int. Conf. Sustainable Internet ICT Sustainability, Palermo, Italy, 2013, pp. 1–4.
5) A. Rosiet al., “Social sensors and pervasive services: Approaches and perspectives,” in Proc. IEEE Int. Conf. PERCOM Workshops, Seattle, WA, USA, 2011, pp. 525–530.
6) T. Sakaki, M. Okazaki, and Y.Matsuo, “Tweet analysis for real-time event detection and earthquake reporting system development,” IEEE Trans. Knowl. Data Eng., vol. 25, no. 4, pp. 919–931, Apr. 2013.
7) J. Allan, Topic Detection and Tracking: Event-Based Information Organization. Norwell, MA, USA: Kluwer, 2002.
8) K. Perera and D. Dias, “An intelligent driver guidance tool using location based services,” in Proc. IEEE ICSDM, Fuzhou, China, 2011, pp. 246–251.
9) T. Sakaki, Y. Matsuo, T. Yanagihara, N. P. Chandrasiri, and K. Nawa, “Real-time event extraction for driving information from social sensors,” in Proc. IEEE Int. Conf. CYBER, Bangkok, Thailand, 2012, pp. 221–226.
10) B. Chen and H. H. Cheng, “A review of the applications of agent technology in traffic and transportation systems,” IEEE Trans. Intell. Transp. Syst., vol. 11, no. 2, pp. 485–497, Jun. 2010.

