IJARSCT

ISSN (Online) 2581-9429

International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)

IJARSCT
Impact Factor: 6.252

Volume 2, Issue 3, May 2022

Real-Time Video Monitoring Of Vehicular Traffic Management Using Machine Learning

Omkar Argade[1], Sunny Geete[2], Amritesh Pandey[3], Abhinav Sinha[4], Prof. Prathmesh Bajare[5]

Students, Department of Computer Engineering[1,2,3,4]

Faculty, Department of Computer Engineering[5]

NBN Sinhgad School of Engineering, Pune, Maharashtra, India

Abstract: *The goal of the project is to create a density-based dynamic traffic light system. When the traffic intensity at the intersection is detected, the signal time adjusts automatically. Many major cities throughout theworld are experiencing extreme traffic congestion, which has turned commuters' lives into a nightmare. The traditional traffic signal system is based on a set time notion that is assigned to each side of the intersection andcannot be adjusted to accommodate changing traffic congestion. Junction timings allotted are fixed. In certain cases, heavier traffic congestion on one side of the intersection necessitates a longer green duration than the typical permitted time. The object detection in the traffic signal is processed and transformed into a simulator, after which a threshold is created based on which a contour has been made to compute the number of cars present in the region. After estimating the number of cars, we will be able to determine which side has the highest density depending on which signals will be allocated to that side.*

Keywords: Traffic Signal, Machine Learning, Convolutional Neural Network, Training

I. Introduction

Create a real-time traffic analysis detecting system. When a vehicle arrives, the signal timing changes. When the traffic began to build, it was time to put the manual labour on hold. The system makes a self-decision to adjust the signal timing based on the number of vehicles in that lane. To prevent problems of transportation such as traffic jams. Analysis of traffic patterns is required, as is near-real-time reporting of smooth traffic flow. For the usage, there is a scarcity of resources. People in today's world prefer to commute in their own private automobiles rather than taking public or shared transportation, resulting in a significant number of private vehicles on the road. The ever-increasing number of automobiles onthe road causes a slew of issues, the most serious of which is traffic congestion. Individuals cannot be forced tolimit their use of private automobiles in such a situation, but we may regulate traffic flow in such a manner thatcongestion is not alleviated. Many projects are growing to transform cities' conventional transportation systemsto 'Smart systems,' and there are numerous efforts under this umbrella, one of which is the Intelligent Transportation System. Many efforts have been made to build a system that can monitor traffic lights in real time.

II. Literature Survey

Xiaoyuan Liang, Xusheng Du," Deep Reinforcement Learning for Traffic Light Controlin Vehicular Networks" [1] In this research, we look at ways to determine the length of traffic lights using data from varioussensors and vehicular networks. To regulate the traffic signal, we present a deep reinforcement learning model.We quantify the complicated traffic scenario as states in the model by gathering data and partitioning the wholeintersection into tiny grids. A traffic light's timing adjustments are activities that are characterized as a high- dimension Markov decision process. The cumulative waiting time difference between two cycles is calculated in this way. 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 prioritized experience replay are some of the components of the suggested model that help to increase performance. We test our model in a vehicular networkusing Simulation of Urban MObility (SUMO), and the simulation results suggest that our model is effective at regulating traffic signals.

LISHENGJIN, MEICHEN, YUYINGJIANG, AND HAIPENGXIA," Multi-Traffic Scene Perception Based on Supervised Learning"[2] —The current visual 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 identifyingthe kind of optical features. A multi-class weather classification system based on numerous weather features and supervised learning is provided to improve machine vision in adverse weather settings. The feature was represented as an eight-dimensions feature matrix after the underlying visual characteristics were retrieved frommulti-trafficscene photos. Second, classifiers are trained using five supervised learning techniques. The results reveal that extracted features may effectively characterize image semantics, and the classifiers have a high rate of recognition accuracy and adaptability. The suggested technique lays the groundwork for improving the identification of anterior vehicles during nocturnal light shifts and improving the driver's field of vision on foggy days.

CaixiaZheng, Fan Zhang, HuirongHou ,ChaoBi, Ming Zhang ,and Baoxue Zhang," Active Discriminative Dictionary Learning for Weather Recognition" [3] The purpose of this study is to propose a unique frameworkfor distinguishing various weather situations. The suggested technique has the benefits listed below when compared to other methods. To begin, our technique extracts both visual aspects of the sky area and physical properties of the nonsky region in photos. As a result, the retrieved characteristics are more extensive than someprevious approaches that simply analyse sky region features. Second, unlike other techniques that employ standard classifiers (e.g., SVM and K-NN), we use discriminative dictionary learning as the classification modelfor weather, which may solve earlier work's shortcomings. 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 identification 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] This research provides a semi-automated method for extracting distinct types of roads from high- resolution remote sensing photos. Edge detection, SVM, and a mathematical morphology technique are used in this method. The outline of the road is first recognized using the Canny operator. Then, using the Full Lambda Schedule merging approach, neighbouring segments are combined. The entire image was then categorized into aroad 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 thoroughlytested. The results of the accuracy evaluation show that the suggested road extraction method can extract various road types with high accuracy.

Andrew J. Davison, Ian D. Reid, Member, IEEE, Nicholas D. Molton, and Olivier Stasse "MonoSLAM: Real- Time Single Camera SLAM" [5] In this paper, we offer a real-time approach for recovering the 3D track of a monocular camera travelling fast across an unknown scene. Our MonoSLAM system is the first to successfully apply the SLAM technique from mobile robots to the "pure vision" domain of a single uncontrolled camera, yielding real-time yet drift-free performance previously unattainable with Structure from Motion methodologies. The approach's heart is the construction of sparse but consistent map of natural and marks inside a probabilistic framework online. An active approach to mapping and measuring, the use of a generic motion model for smooth camera movement, and solutions for monocular feature initialization and feature orientation estimation are among our significant innovative contributions. These factors combine to create an incredibly efficient androbustal algorithm that works at 30Hz on regular PC and camera hardware. This research not only broadens the field of robotic systems in which SLAM might be effective, but it also offers up new possibilities. MonoSLAM is used to achieve real-time 3D localization and mapping for a high-performance full-size robot.

Andrew Payne, Sameer Singh,": MIndoor vs. outdoor scene classification in digital photographs " [6] Based on edge analysis, this research provides a novel approach for classifying indoor and outdoor photographs. Our method is based on analysing picture edge straightness. We propose an unique claim that indoor photographs have a higher proportion of straight edges than outside images, and we apply multi- resolution edge straightness estimations to improve our results. We also look at how this strategy may be usedin a real-time system. We compare our proposed strategy to a number of different ways for indoor/outdoor picture classification that have been published, and we show that our method provides substantially greater accuracy on a large database.

Hua Wei, Guanjie Zheng, Huaxiu Yao, Zhenhui Li" :IntelliLight: A Reinforcement Learning Approach for Intelligent Traffic Light Control "[7] We present a more effective deep reinforcement learning model for trafficlight management in this work. We put our technique to the test on a large-scaler ealtraffic dataset gathered from security cameras. We also present several compelling case studies of policies derived from real-world data.

Alvaro Gonz´alez, Luis M. Bergasa.," Text Detection and Recognition on Traffic Panels from Street-LevelImagery Using Visual Appearance "

Detection and identification of traffic signs has been researched extensively for a long time. However, due to the many types of traffic panels and the vast variety of the information shown in them, traffic panel detectionand recognition remains a difficulty in computer vision. As an application to intelligent transportation systems,this work provides a technique for detecting traffic panels in street-level photographs and recognizing the information contained on them (ITS). The main goal might be to create an automated inventory of all traffic panels along a route to help with road maintenance and driver assistance. After using blue and white colour segmentation, our solution extracts local descriptors at several critical places of interest. Then, using Nave Bayes or support vector machines, pictures are represented as a "bag of visual words" and categorized. This visual appearance classification method is a state-of-the-art solution for traffic panel detection. Finally, for photographs where a traffic panel has been recognized, our unique text detection and recognition technology is used to automatically read and record the information presented in the panels. Using a reverse geocoding service, we propose a language model based in part on a dynamic dictionary for a limited geographical region.

Experiments on real photographs from GoogleStreetView demonstrate the efficacy of the suggested strategyand open the door to exploiting street-level images for various ITS applications.

Sahar Araghi, Abbas Khosravi, Michael Johnstone, Doug Creighton" Intelligent Traffic Light Control ofIsolated Intersections Using Machine Learning Methods "

The suggested neural network's performance is compared to two standard solutions for managing traffic lights in this research. In comparison to existing techniques, simulation results show that using the suggestedstrategy considerably minimizes the total latency in the network.

Baher Abdulhai; Rob Pringle; and Grigoris J. Karakoulas," Reinforcement Learning for True Adaptive TrafficSignal Control " This paper provides an overview of Q-learning, a basic yet effective reinforcement learning algorithm, as well as a case study of its application to traffic light control. The application to an isolated traffic light yielded encouraging results, especially under fluctuating traffic circumstances. Extension to linear and networked signalsystems, as well as integration with dynamic route guiding, are all part of a larger research endeavor. The goalof the study is to find the best way to handle extremely congested traffic throughout a two-dimensional road network, which is a difficult problem for traditional traffic signal control methods.

III. Proposed System

We apply machine learning techniques to the suggested system. We employ the CNN Algorithm for training and testing. The proposed approach was created with the traffic scheduling problem in mind as an artificial intelligence challenge, which is a departure from traditional traffic scheduling problem formulations.

3.1 System Architecture

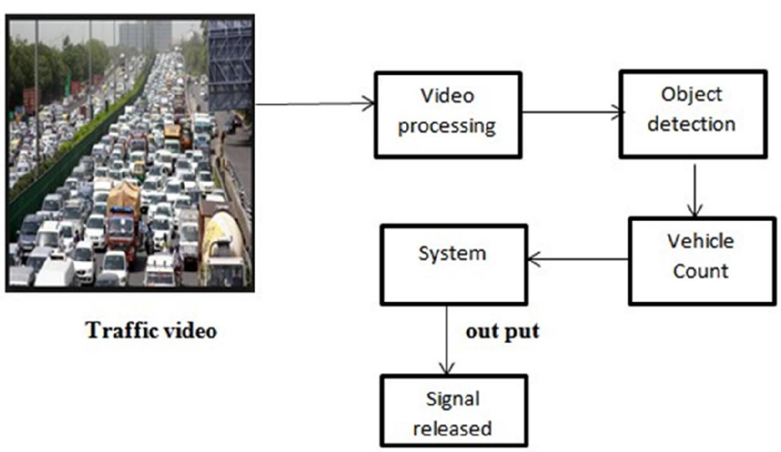

Figure: System Architecture

IV. Algorithm

We used the CNN Algorithm. CNN is a powerful image processing technique which is currently the best algorithm we have for image processing that is automated. Many businesses utilize these algorithms to do tasks such as identifying the objects in a photograph.

Images contain data in the RGB colour space. Matplotlib may be used to load an image from a file into memory. The computer doesn't sees an image rather is just sees a series of numbers. Three-dimensional arrays are used to store colour images. The height and width of the images are represented by the first two dimensions (the number of pixels). The last dimension represents each pixel's red, green, and blue hues.

Three layers of Convolutional Neural Networks (CNN), optimized for image and video recognition applications. Image recognition, object detection, and segmentation are among of the most common image analysis tasks that CNN is employed for. Convolutional Neural Networks have three layers:

1. Convolutional Layer: Each input neuron in a conventional neural network (CNN) is linked to the next hidden layer and only a small portion of the input layer neurons connect to the hidden layer neurons.
2. Pooling Layer: To minimise the feature map's dimensionality the pooling layer is used. There are several activation and pooling layers inside the CNN's hidden layer.
3. Fully connected Layer: The network's final layers are the fully connected layers. The output from the Convolutional Layer or Final Pooling, which is flattened and then fed into the fully connected layer, is the input to the fully connected layer.

V. Conclusion

We may combine our system with an app that analyses official traffic signals in order to record real-time traffic condition notifications. As a consequence, in the worst-case scenario, our system will be able to signal traffic- related events at the same time as the console's result appear on the web sites. Furthermore, we are researching the integration of our technology into a more comprehensive traffic monitoring infrastructure in terms of feature coverage. This infrastructure might incorporate enhanced physical sensors as well as social sensors such as social media feeds.

References

[1]. F.AtefehandW.Khreich,"AsurveyoftechniquesforeventdetectioninTwitter," 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]. 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]. 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,"IEEETrans. Knowl. DataEng., 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.