Journal of Engineering Sciences

Vol 11, Issue 12,DEC /2020

ISSN NO:0377-9254

Dynamic Traffic Control System with Reinforcement Deep Learning Technique

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Abstract

As the problem of urban Road Traffic, there's a pressing want for the introduction of advanced technological know-how and gear to beef up the state-of-the art of site Road Traffic Control. The current ways used equivalent to timers or human manage are proved to be not as good as alleviate this difficulty. On this paper, a method to manage the site visitors through measuring the true time car density using objects detection with image AI is proposed. This imposing traffic manipulate procedure presents tremendous growth in response time, vehicle administration, automation, reliability and total affectivity over the prevailing methods. Apart from that, the whole technique from photo acquisition to object detection and subsequently green sign allotment making use of four pattern Videos of one-of-a-kind visitors conditions is illustrated with proper schematics and the final results are confirmed by means of hardware implementation.

Key Words: - Dynamic Traffic Control, Object Detection, Image AI.

1. INTRODUCTION

Traffic congestion is among the primary modern day-day obstacle in each giant city on this planet. Latest be trained of World bank has proven that common automobile pace has been lowered from 21 km to 7 km per hour within the last 10 years in Dhaka [1]. Intermetropolitan subject experiences recommend that traffic congestion reduces regional competitiveness and redistributes monetary activity by slowing progress in county gross output or slowing metropolitan subject employment growth [2].As more and more automobiles are commissioning in an already congested traffic method, there's an urgent need for a whole new site visitors control procedure utilizing evolved applied sciences to utilize the already existent infrastructures to its full extent. Because building new roads, flyovers, extended throughway etc. Wishes wide planning, big capital and tons of time; center of attention should be directed upon availing present infrastructures extra effectually and diligently. Previously extraordinary techniques had been proposed, comparable to infra-crimson gentle sensor, induction loop etc. To collect site visitors date which had their fair share of demerits? In latest years, picture processing has proven promising results in acquiring real time site visitors knowledge utilizing same traffic videos established alongside the site visitors mild. One of kind strategies had been proposed to glean site visitor's information. A few of them depend total number of pixels [3], one of the crucial work calculate quantity of automobiles [4 - 6].These methods have proven promising results in amassing traffic data. Nevertheless, calculating the quantity of automobiles may give false outcome if the intravehicular spacing is very small (two autos almost each other is also counted as one) and it would possibly not depend rickshaw or auto-rickshaw as automobiles which are the quotidian means of traffic in particular in South-Asian countries. And counting quantity of pixels has disadvantage of counting insubstantial materials as cars similar to footpath or pedestrians. One of the crucial work have proposed to allocate time established exclusively on the density of traffic. However this may be disadvantageous for those who are in lanes which have less frequency of site visitors. Image AI detection method is principal to extract the desired traffic information from the CCTV videos. It can be used to isolate the required understanding from rest of the videos. There are a couple of photo AI detection methods available. They've specified characteristics in phrases of noise discount, detection sensitivity, accuracy and many others. Amongst them, Prewitt [7], canny [8],Sobel [9], Roberts and LOG are most approved operators. It has been determined that the Canny snapshot AI detector depicts larger accuracy in detection of object with greater entropy, PSNR(height sign to Noise Ratio), MSE(imply rectangular Error) and execution time

compared with Sobel, Roberts, Prewitt, Zero crossing and LOG [10-12].Here's a assessment between designated picture AI detection approaches .

2. RELATED WORK

Existing System

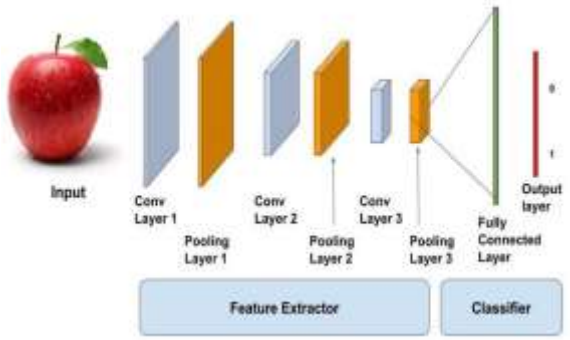
In present system, manually we ought to control site visitors wherein part is having heavy visitors then that side put for green signal for very long time. But for every time no longer controlling site visitors by using manually because of timings (i.E. Nighttime), to overcome we use synthetic wise for automatically the visitors shall be managed.

Proposed system

To overcome the above drawback in this approach we are utilizing object detection procedure for detect automobiles. We are giving the enter sample traffic videos which is containing heavy traffic then performing the detection method on that video. It first calculates the percentage of automobiles from that video then it will possibly manipulate the site visitors will depend on threshold price (percentage).

3. IMPLEMENTATION

Algorithm



CNN

- Input Layer: This layer holds the raw input of image with width 32, height 32 and depth 3.
- Convolution Layer: This layer computes the output volume by computing dot product between all filters and image patch. Suppose we use total 12 filters for this layer we'll get output volume of dimension 32 x 32 x 12.
- Activation Function Layer: This layer will apply element wise activation function to the output of convolution layer. Some common activation functions are RELU:
- max(0, x), Sigmoid: 1/(1+e^-x), +Tanh, Leaky RELU, etc.
- **Pool Layer:** This layer is periodically inserted in the convolution neural networks and its main function is to reduce the size of volume which makes the computation fast reduces memory and also prevents from overfitting. Two common types of pooling layers are **max pooling** and **average pooling**.

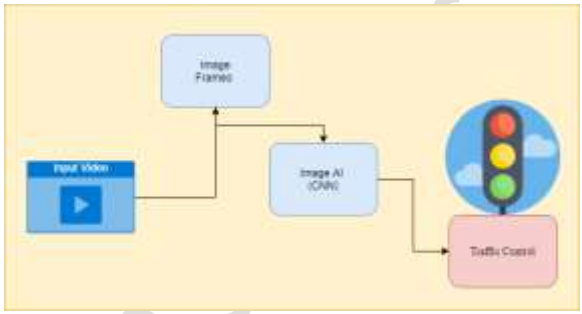


Fig:-1 System Architecture

Image Preprocessing

This Moduleis for image preprocessing is performed to convertthe raw videos into more accessible form for Object detectionpurpose. At first, four videos of different traffic scenario areselected and image of the empty road is chosen as referenceimage.

Percentage Matching

Since reference image is basically an image of the Traffic road,the less the similarity between sample image and referenceimage, the more vehicles are present on the road. As irrelevant Objects detected in sample videos such as Cars Bus etc.

Time Allocation

Time allocated to green signal is governed by the percentageof objects in the Images. The proposed timeallocation is based on assumption. Contemporary timeallocation may depend on miscellaneous factors; for instance,number of vehicles, traffic condition on neighboringinterssections etc.

Traffic calculation

```
for var in d:
    print(d[var])
    if d[var] < 30 and d[var] > 0:

        b = TrafficDetection2.addDens(a, 30)
        a = str(a)
        a = a[0:1]

        f.write("Signal"+str(var)+" :"+str(a)+"-"+str(b)+" : "+str(d[var])+"\n")
        f.write("Signal" + str(var) + " : 30 sec : \n\n")
        a = b


    elif d[var] > 29 and d[var] < 50:


        b = TrafficDetection2.addDens(a, 40)
        a = str(a)
        a = a[0:1]
        f.write("Signal"+str(var)+" :" + str(a)+"-" +str(b) + " : "+str(d[var])+"\n")
        f.write("Signal" + str(var) + " : 40 sec : \n\n")

        a=b

    else:
        b = TrafficDetection2.addDens(a, 50)
        a = str(a)
        a = a[0:1]

        f.write("Signal"+str(var)+" :" + str(a) +"-"+str(b) + " : "+str(d[var])+"\n")
        f.write("Signal" + str(var) + " : 50 sec : \n\n")

        a=b
```

Tensorflow Python

TensorFlow is a Python library for fast numerical computing created and released by Google. It is a foundation library that can be used to create Deep Learning models directly or by using wrapper libraries that simplify the process built on top of TensorFlow.

OpenCV

OpenCV was started at Intel in 1999 by Gary Bradsky and the first release came out in 2000. VadimPisarevsky joined Gary Bradsky to manage Intel's Russian software OpenCV team. In 2005, OpenCV was used on Stanley, the vehicle who won 2005 DARPA Grand Challenge. Later its active development continued under the support of Willow Garage, with Gary Bradsky and VadimPisarevsky leading the project. Right now, OpenCV supports a lot of algorithms related to Computer Vision and Machine Learning and it is expanding day-by-day.

Tutorials

This page contains more in-depth guides for using Matplotlib. It is broken up into beginner, intermediate, and advanced sections, as well as sections covering specific topics.

Keras Tutorial

Inside this Keras tutorial, you will discover how easy it is to get started with deep learning and Python. You will use the Keras deep learning library to train your first neural network on a custom image dataset, and from there, you'll implement your first Convolutional Neural Network (CNN) as well.

4. EXPERIMENTAL RESULTS

Fig:-2 Flow of the application

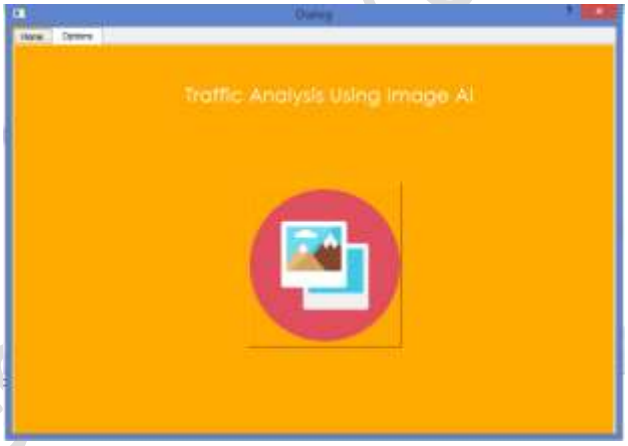


Fig:-3 Home Screen

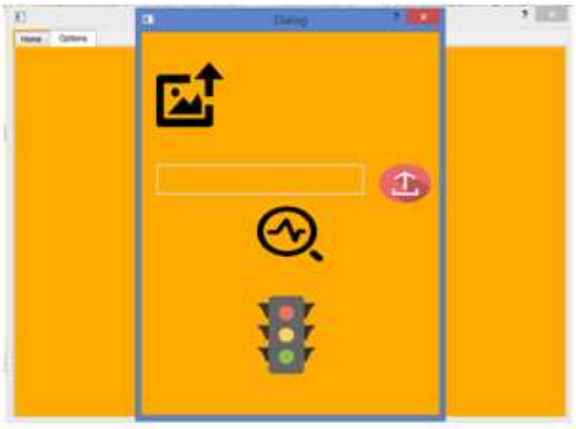


Fig:-4Video Upload

Fig:-5 object detection

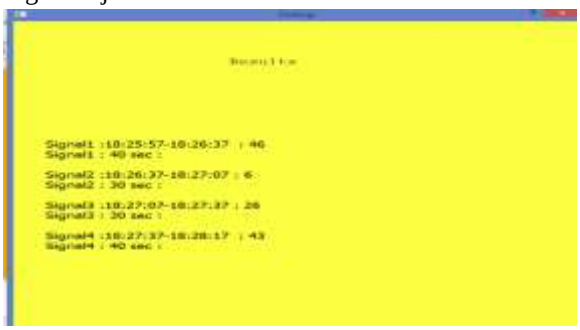


Fig:-6 Traffic Control

5. CONCLUSION

In this paper, a Dynamic traffic control system availing imageprocessing as an instrument for measuring the density hasbeen proposed. Besides explaining the limitations of currentnear obsolete traffic control system, the advantages ofproposed traffic control system have been demonstrated. Forthis purpose, four sample videos of different traffic have been attained. Upon completion of Image AI detection, thesimilarity between sample videos with the reference imagehas been calculated. Using this similarity, time allocation hasbeen carried out for each individual image in accordance withthe time allocation algorithm. In addition, similarity inpercentage and time allocation have been illustrated for eachof the four sample videos using Python programminglanguage. Besides presenting the schematics for the proposedDynamic traffic control system, all the necessary results havebeen verified by hardware implementation.

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