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Morphological Operations-Based Vehicle Detection and Counting System

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Abstract:

Reconnaissance cameras are generally installed at genuine street intersections and crossing locations in metropolitan areas for human administrators to see. Instead of limiting the cameras' capability for these reasons, the images from the cameras may be captured and broken down for more fundamental leadership forms. For traffic counting, line length estimate, speed estimation, and vehicle grouping, this article presents image handling computations. This investigation's traffic tallying computation is based on changes in pixel values in the middle of traffic routes. A single line of pixels positioned along a traffic path is monitored for line length estimate, vehicle layout, and speed assurance. The example of these pixel values is used to quantify line length, individual vehicle length, and to recognise the location of a single vehicle in a short period of time. The security camera was utilised to monitor the cars and count them using image processing algorithms. The vehicle detection has been subjected to a variety of morphological procedures. As a result, the planned job will be 91 percent accurate.

Keywords **—Image processing, video processing, morphological processes, and accuracy rate .**

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INTRODUCTION

Picture processing plays an important role in a variety of ongoing applications, ranging from medical imaging to example and item recognition for diverse reasons. Object identification of flexible focuses in a given area is one such use [1]. Vehicle placement on roadways is an example of such an item that is used for traffic investigation, monitoring, and control. As a result, vehicle discovery and arrangement using traffic estimation techniques is an important first step in traffic control. Picture handling techniques are a standout amongst the most often used methods for achieving this goal. [2] employs image division and edge finding techniques. To remove the cars of fascination, [3] uses foundation extraction and estimation techniques. Vehicle identification can also be done with the help of vehicle shadows [4]. When the shadows of other things, such as overhead extensions, overlap with the shadows of cars, this technique becomes problematic. Vehicle grouping can also be done using the morphological method. The arrangement of cars depending on their sizes or forms implies a task in traffic management and stream control [5].

Regardless of the computation or technique used, camera positioning and camera nature play a critical and fundamental role in vehicle detection. A high-altitude aviation camera is an example of camera positioning that is frequently used due to its large coverage area [6]. In this work, we present a method for identifying and categorising cars based on their dimensions. The computation is based on how morphological advancements are arranged, as well as image differencing and thresholding. The research is based on the outlines (still images) of roadway pieces captured by close vertically positioned cameras. Using the proposed formula, a victory rate of more than 85% may be achieved. The remainder of the work is organized as follows: in section 2, concise descriptions of the exploratory scenario as well as the underlying pre-processing processes are discussed. In section 3, a morphological technique is presented alongside vehicle order for real calculation dependent tense detection. Finally, in section 4, the conclusion is provided.

I. PROPOSED WORK

PRE-PROCESSING STAGE

The camera location, as seen in the previous part, plays an important role in the vehicle finding process. In our case, because we are concerned about the tally and classification of cars on the street, a vertical or close vertical camera position is chosen to capture the whole area of interest. Figure 1 shows some camera placements and the corresponding photos obtained by these regions. Camcorders are used to record a street for a certain period of time. At certain intervals, the captured footage is split down into outlines. autonomously designed to obtain data on the number of cars and their categorization at a given point in time. The suggested architecture for vehicle finding and, more importantly, characterisation is depicted in Figures. The edges are processed in two stages: first, they are preprocessed, and then they are extracted from the vehicle. Figure 1 depicts a block schematic of the planned work.

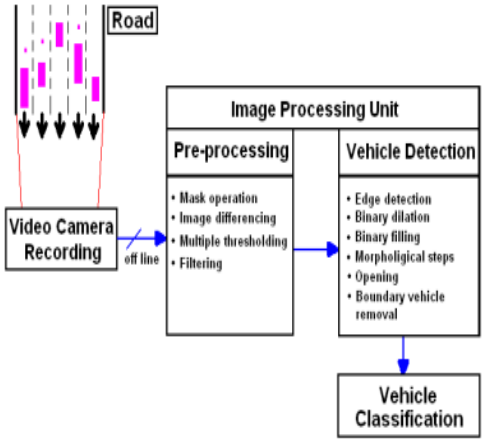


Figure.1 Block diagram of the proposed work

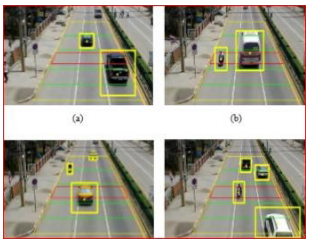
II. VEHICLE RECOGNITION CALCULATION

The real handling for vehicle recognition is done in this part. The first is edge recognition, which is based on the image obtained from the preprocessed computation. The purpose of using an edge recognition technique is to determine the form of the vehicles. We used the "Sobel edge" recognition to produce the fewest amount of edges since we would most likely just have the car's external edges because the inside edges are unimportant for vehicle identification [7]. Second, in three bearings on a level plane, vertically and through 45 degrees, straight parallel morphological expansions are arranged. As a result of the three expansions. Clearly, the cars are becoming more distinguishable, but some noisy items are also rising. As a result, these unwanted things may result in a false discovery. Additionally, the spaces are filled twice. Openings are defined as a large number of foundation pixels that cannot be reached by filling in the foundation from the picture's edge. It's worth noting that the unwanted little objects did not grow in size as a result of the filling activity. To reduce the unpredictability of computation, those objects touching the picture's periphery were removed.

a

b

A. Figure 2 a) Original image b)Gray scale image



When a single vehicle is fragmented into surrounding sections as a result of previous preparation processes, it is sometimes necessary to associate them; otherwise, they might be mistaken for separate vehicles, resulting in false discovery. As a result, a second dimension expansion ensures that such disengaged components are available. The precious stone structure, which is one of the most skilled structures in morphological expansion and disintegration, was used for this enlargement. Another casing appeared in Figure 9 as a result of this enlargement. At three superior locations, the blue conveyance on the extreme right route has a black rooftop. The transport is divided into three portions before the second dimension of expansion is applied. These pieces are unmistakably connected as a single vehicle after applying the second dimension expansion. Despite the fact that the growth of the second dimension leads in an increase in the size of undesirable things, the increase in the size of target vehicles and undesirable goods is the same. As a result, unwanted things may be easily recognized. The two pictures from the top-hat transform can be masked or merged, and then the objects can be added or ignored. The presence of more items has been identified. Objects that aren't vehicles are ignored. Following that, the identified cars are counted.

IV SIMULATION RESULTS

Binarization: Binarization is the process of converting a grayscale image to a binary image.

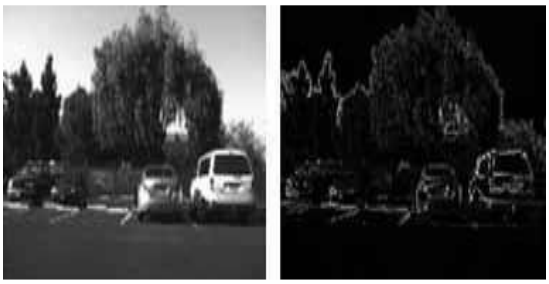


Figure 2 a) Binary image b)Edge image

Figure 3 a) Top-hat image b)Detected image

Each foreground object's centroid is computed and tallied. When a vehicle's centroid is initially identified, often in zones 1 or 2, its status is set to 0. (have not been counted). After then, its whereabouts is monitored.

CONCLUSION

We have developed a unique computation for vehicle identification and characterization that is based on photo processing in this article. The suggested computation achieves a victory rate of over 85 percent in both vehicle identification and characterization by combining thresholding, image differencing, edge identification, and several

morphological methods. This can be extremely useful for traffic investigations and executives.

Fig.4 Vehicle Counting

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