Purposed algorithm for advanced vehicle surveillance using image segmentation and extraction technique

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ABSTRACT: ***Solution to the problem of vehicle surveillance in the society where accidents are more likely to happen when someone does not stop at a Red Light and cars may collide with other cars or there could be theft at the parking area. Anyone in the vicinity of an intersection is in jeopardy of an accident when a driver does not obey motor vehicle law and as a result injuries may occur. Hence there is need of vehicle surveillance.***

So in this paper we purposed an algorithm for advanced vehicle surveillance, which is the task of measuring moving road vehicles to automatically obtain information about vehicle shape, appearance, identity, path of motion, and, ultimately, driver behavior.

1. INTRODUCTION

Image processing-: Image processing is the processing of image to improve its pictorial information. It involves the change of parameters of an image to increase the quality and visibility of image for human interpretation. Image processing is the process to make the images look better, i.e., more clear, more sharp and detailed. A part of image processing is image segmentation. Image segmentation is an important and, perhaps, the most difficult task in image processing. Segmentation refers to the grouping of image elements that exhibit "similar" characteristics, i.e. subdividing an image into its constituent regions or objects. All subsequent interpretation tasks, such as object recognition and classification, rely heavily on the quality of the segmentation process. There are many applications whether on synthesis of the objects or computer graphic images which require precise segmentation. In general, image noise should be eliminated through image preprocessing.

2. IMAGE SEGMENTATION

Image segmentation refers to the major step in image processing in which the inputs are images and, outputs are the attributes extracted from those images. Segmentation divides image into its constituent regions or objects. The level to which segmentation is carried out depends upon the problem being solved i.e. segmentation should stop when the objects of interest in an application have been isolated. Image segmentation refers to the decomposition of a scene into its components. For example in the automated inspection of electronic assemblies, interest lies in the analyzing images of the products with the objective of determining the presence or absence of specific anomalies, such as missing components or broken connection paths. There is no point in carrying segmentation past the level of detail required to identify those elements. Segmentation of nontrivial image is one of the most difficult tasks in image processing.

Segmentation accuracy determines the eventual success or failure of computerized analysis procedures. For this reason considerable care is taken to improve the probability of rugged segmentation. In some situations such as industrial inspection applications, at least some measure of control over the environment is possible.

3.IMAGE EXTRACTION

In pattern recognition and in image processing, feature extraction is a special form of dimensionality reduction. When the input data to an algorithm is too large to be processed and it is suspected to be notoriously redundant (much data, but not much information) then the input data will be transformed into a reduced representation set of features (also named features vector). Transforming the input data into the set of features is called feature extraction. If the features extracted are carefully chosen it is expected that the features set will extract the

relevant information from the input data in order to perform the desired task using this reduced representation instead of the full size input.

Feature extraction involves simplifying the amount of resources required to describe a large set of data accurately. When performing analysis of complex data one of the major problems stems from the number of variables involved i,e. analysis with a large number of variables generally requires a large amount of memory and computation power or a classification algorithm which overfits the training sample and generalizes poorly to new samples. Feature extraction is a general term for methods of constructing combinations of the variables to get around these problems while still describing the data with sufficient accuracy.

4.LITERATURE SURVEY

Image segmentation is the most widely used image processing techniques that emerged in early 1960's. Recent segmentation schemes in are largely either texture based or edges based and are designed to operate on grey scale images. In early 1970's the techniques introduced were based on histogram thresholding and on detection of discontinuities.
Image extraction emerged in 1960's when J. Forgarty first systematically touched the invariant theory in image extraction in 1969. The feature here wass defined as a function of one or more measurements, each of which specifies some quantifiable property of an object, and is computed such that it quantifies some significant characteristics of the object. In 1962 M. K. Hu introduced moment invariants as image features that are invariant to translation, rotation, and scale changes Invariant descriptions allow for efficient image understanding in relatively unconstrained environments.
Then in 1980 theory of edge detection for image segmentation was proposed by D.Marr and E.Hildreth. In this paper edge detection is used for image segmentation and image extraction..
In 1986, an optimal canny edge detection technique was introduced by J.Canny. In the same year Bajcsy et al. showed that both edge detection and region growing are aspects of the same processes under the assumption of step edges and approximately uniform brightness within the regions. It was described that both processes can be unified by making the decision whether the point is on boundary or on a homogeneous surface.

5. PURPOSED ALGORITHM FOR IMAGE SEGMENTATION AND IMAGE EXTRACTION

ALGO 1:The algorithm based on segmentation of vehicles involves the following steps:

STEP 1:Read in the whole image and get its size
STEP 2: Convert the image in RGB format
STEP 3: Do the "EdgeDetection" on the edges of the image.
STEP 5: Read in the HUE of certain part of the image
STEP 6: Segmentize the partial part of the image.
STEP 7: Pass the temperary image back.
STEP 8: Screen through every pixel in the temporary Image matrix. If the pixel value is NOT zero, pass the pixel value to the corresponding location of the segmented image matrix. Otherwise, don't pass any value.
STEP 10: Combine the Segmentation and EdgeDetection that was obtained. As long as the pixel value in any of these two matrix 1, then assign the pixel value in combine matrix with the value 1. Otherwise, its pixel value stays 0.
STEP 11:Store the segmented image after combine result from EdgeDetection. and Segmentation in sImage
STEP 13: Convert the image back to RGB format and do the final modification.
STEP 14 Convert the image of "sImage" matrix from HSI format back to RGB format.
STEP 15:RGB: the image converted from HSI to RGB format
STEP 16:Create a 7x7 structure element to dilate the "edge" matrix to fill in some of the boundaries that were not connected.
STEP 17:Perform dilation 5 times, and then apply "imfill".
STEP 18:After intersection, the target image will be captured. However, part of the unwanted image around the boundary are also captured. Therefore, we intersect image with the segmented image, "sRGB", to filter out the unwanted part.
STEP 19: It is the final image.
STEP 20: Convert the image of final Image matrix from HSI format back to RGB format.
STEP 21: finalImageRGB: the image converted from HSI to RGB format
STEP 22: Show the image on the screen.

ALGO 2:The algorithm based on the extraction of numbers from number plate of car involves the following steps:
STEP 1: Read the degraded image.
STEP 2: Then, convert this image in to grey scale.
STEP 3: After that, convert this image to the binary image.
STEP 4: Then, remove all the objects containing fewer than 30 pixels.
STEP 5: After that, that particular image is again read which is given by step 3.
STEP 6: Then the labels in the figures which contain words are chosen.
STEP 7: After that, that particular labels are shown one by one.

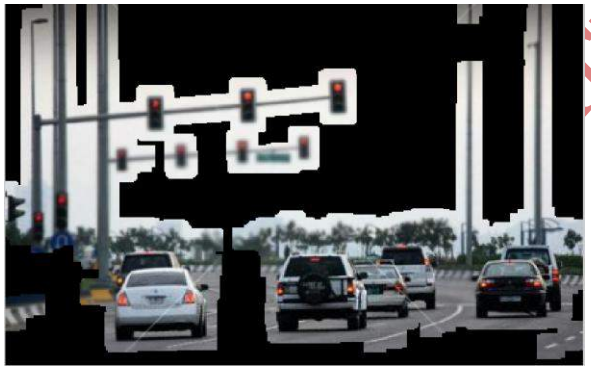
STEP 8: Then, words in that particular labels are extracted one by one.

6.RESULTS AND DISCUSSIONS OF IMAGE SEGMENTATION

CASE 1: SURVELLAINCE OF MOVING VEHICLES AT HIGHWAY

The image segmentation is applied to the following for the surveillance on moving vehicles at the highway. The vehicles and the traffic lights are being segmented. Here it can be judged that rules of traffic are being obeyed or not.

(a)



(b)

Figure 1: Image segmentation of Vehicles moving on highway

(a) Original Image (b) Segmented Image from background.

CASE 2: SURVEILLANCE OF VEHICLE AT TRAFFIC LIGHT:

Another view of the vehicles being segmented at the traffic lights to keep check of the vehicles obeying traffic rules.

(a)

(b) Figure 2 : Vehicle under surveillance at traffic lights. (a) Original image, (b) Segmented image

CASE 3: CARS AT ZEBRA CROSSING

Vehicles under surveillance at the zebra crossing being segmented to keep the check of vehicles crossing over the zebra crossing and also to keep the record of accidents occurring.

(a)

(b)

Figure 3: Segmentation of vehicles at the zebra crossing. (a) Original image, (b) Segmented image.

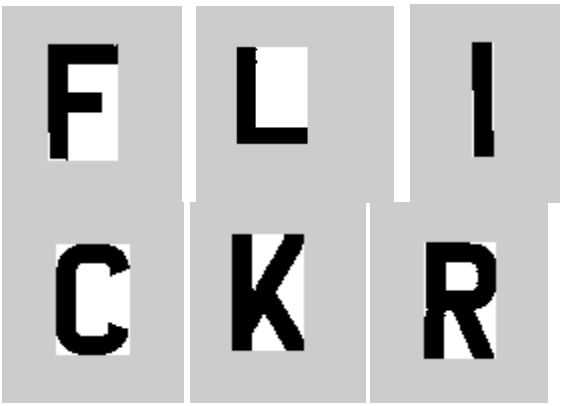
7. RESULTS AND DISCUSSION OF IMAGE EXRACTION

CASE 1: NUMBER PLATE OF CAR:

(a)

(b)

(c)



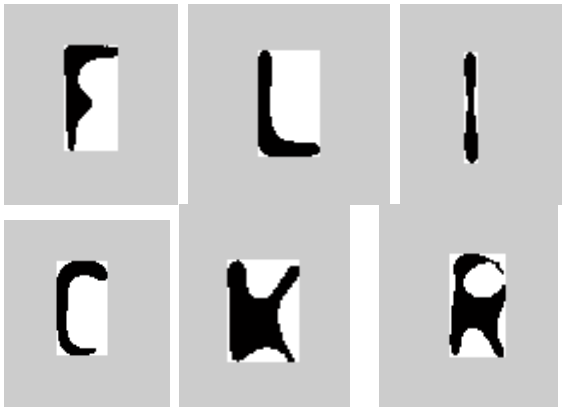
(d)

Figure 4: Words extracted from the number plate of vehicle. (a) Original image with noise, (b) Image without noise, (c) Extracted number plate, (d) Extracted words from the number plate.

CASE 2: EXTRACTION OF NUMBERS FROM NUMBER PLATE UNDER BLURRED CONDITIONS

(a)

(b)



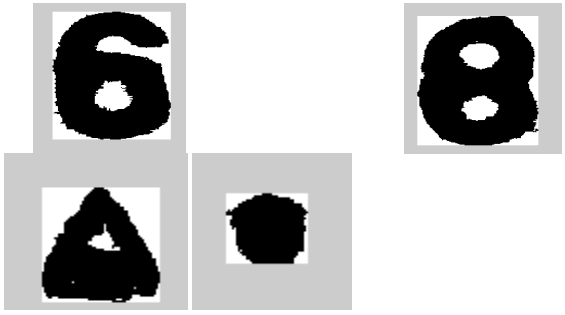
(c)

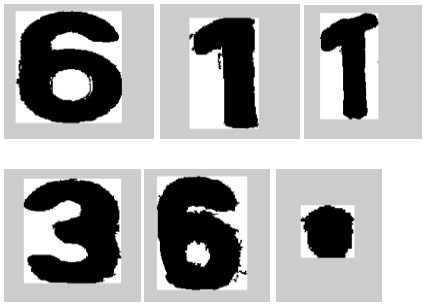
Figure 5:Words extracted from number plate under blurred conditions. (a) Original image with noise, (b) Image without noise, (c) Extracted words from the blurred number plate.

CASE 3: EXTRACTION OF NUMBERS FROM NUMBER PLATE IN NIGHT TIME

(a)

(b)





(c)

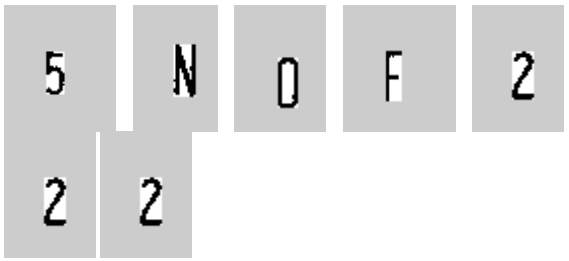
Figure 6: Number extracted from number plate in night time. (a) Original image with noise, (b) Image without noise, (c) Extracted number during the night.

CASE 4: EXTRACTION OF NUMBERS FROM NUMBER PLATE DURING FOGGY DAY

(a)

(b)

(c)



(d)

Figure 7: Number extracted from the number plate on a foggy day. (a) Number plate image on normal day, (b) Number plate image on foggy day with noise, (c) Number plate image on foggy without noise, (d) Extracted number from the number plate on foggy day.

8.CONCLUSION

In above experimental results, vehicle surveillance is done using the help of image segmentation and image extraction. Vehicle surveillance is the task of measuring moving road vehicles to automatically obtain information about vehicle shape, appearance, identity, path of motion, and, ultimately, driver behavior. Here image segmentation and image

extraction is used to detect the vehicle in different places and extract the number from the number plate. Vehicle surveillance has become a need as with the increasing traffic of vehicles it difficult to check every vehicle manually. Vehicle surveillance will help in keeping the information of vehicles in the area and also maintaining the traffic properly.

First image segmentation is applied, the image segmentation of the images with blurred background is segmented out. The blurred image colour should be as much different from the foreground as possible. Here the images of the vehicles on the roads, at the traffic lights, in the parking area or at any highway are being segmented from the rest of the unwanted image. After the segmentation the vehicles the words and numbers are extracted from the number plate of the vehicles. This work will be helpful in keeping the surveillance of the vehicles moving on the road, or vehicles violating the rules of the traffic and also keeping continuous check on the stolen vehicles.

After the segmentation of the image, the extraction from number plate of the vehicles under various conditions i.e. under normal conditions, at the dark night, on foggy day and under blurred conditions. First we take the degraded image of the number plate containing noise, then convert image into grey scale and to binary form. After removing all the objects fewer that 30 pixels and extract words one by one.

This method works even for those images where the objects are blurred, at night and foggy conditions. This method not only segments images with bad illumination, but also detects the object boundaries in such images correctly. This method is very successful for the growing need for the vehicle surveillance.

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