

Object detection by morphological image processing

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**ABSTRACT**

In this project we had tried to reduce the cost which is being used to set up traffic detection predominantly. Moreover these days there is too much traffic all over the place and it is difficult to monitor everything manually. So we have proposed a method to detect vehicles which include cars, bikes, trucks and other kind of vehicles to monitor and track them in real time using a camera placed over a good altitude to have a clear view on the road. So you need not have a manual need to monitor the traffic in that particular place. These can be logged and it can predominantly help in reducing the cost for doing the work manually. We have used background subtraction to detect the vehicle from the background and used morphological image processing technique to detect vehicles in real time directly from the recorded video.

**INTRODUCTION**

Image and vision processing has become one of the most important field these days because everything is getting automated. These days it plays a crucial role in detecting and analyzing images automatically. Use of image and vision has increased the analysis of videos getting from cctv camera and then processing the image to get the needed output. This is more effective than conventional way of traffic monitoring and drastically helps in improving the traffic regulation and its analysis. This method is cost efficient because just a normal quality camera is required to take the video and to process the video to detect the cars and count it. This method helps in providing easier ways to automate traffic regulations.

**LITERATURE SURVEY**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| SI.No | Paper Title | Paper Author | Advantages | Disadvantages | Techniques |
| 1. | The Automated Vehicle Detection of Highway Traffic Images by Differential Morphological Profile | Bharti Sharma | The proposed algorithm in the paper has 96% positive rate, which is more than the convention method which has 86% positive rate.  True Positive Rate is high for the proposed algorithm. | There are some misclassification in semantic and geometric properties of roads and vehicles.  Some cars are blurred out because they got merged with the background. | This algorithm creates a differential morphological profile to create a feature vector from a single image.  Shape index techniques is used to extract the images more accurately. |
| 2. | Vehicle Detection And Tracking Techniques Used In Moving Vehicles | Siddhartha A. Meshram | The proposed method accurately uses a remote multimodal monitoring system to extract and reconstruct vehicles in real-time motion scenes.  The model based tracking system and classification system is capable of working robustly in most circumstances. | It is not suitable for the traffic environment such as crossroad in which most of the time the vehicles has to stay. | Frame differencing and motion based technique is used. |
| 3. | Moving Vehicle Identification using Background Registration Technique for Traffic Surveillance | Vibha L  and Venkatesha M | The proposed method monitors activities at traffic intersections for detecting congestions, and then predict the traffic flow which assists in regulating traffic.  Background subtraction is used which improves the adaptive background mixture model and makes the system learn faster and more accurately. | Higher dimensional features can be added along with some extra constraints so that the adverse effects can be compensated. | Background registration technique to detect moving objects.  The tracking system uses a combination of a temporal difference and correlation matching techniques. |
| 4. | Automatic Vehicle Detection and Road Traffic Congestion Mapping with Image Processing Technique. | Pradip Singh Maharjan  And  Ajay Kumar Shrestha | This technique is very efficient when the sensor is placed on the top of the road so that this gives a proper view of the road which actually reduces overlapping of the vehicles. | The static background subtraction technique produces inefficient result against illumination changes and weather changes so automatic background extraction can be used.  This algorithm couldn’t produce accurate result because of factors like overlapping of vehicles and shape of vehicles | Image segmentation through thresholding and inversion.  Median filter is used to remove the extra noise in the image.  Morphological operations such as binary erosion and dilation is used. |
| 5. | Vehicle Detection and Tracking Using the Block Matching Algorithm | Luigi Di Stefano | The Block Matching Algorithm is used in order to differentiate between close objects, in this way this algorithm is more effective | Tracking in night images can’t be done using this method  The BMA algorithm used in this paper has a problem with computational load.  Perspective Correction Algorithm is not used which causes problem with heavy vehicles | The Block Matching Algorithm is used for detecting the block displacement between the actual frame and the previous frame |
| 6. | Moving Object Tracking of Vehicle Detection”: A Concise Review | P. Shukla and Mona Saini | This review gives better understanding and highlights the issues and their solutions for traffic surveillance. | Could’ve been used the optical flow method and Background Subtraction technique which helps to find out the speed of the vehicle from the video sequence. | Background Subtraction Methods, Feature Based Methods and Frame Differencing and Motion Based methods. |
| 7. | VEHICLE DETECTION AND TRACKING IN VIDEO | A.N. Rajagopalan and R. Chellappa | This approach combines higher order statistical information about the image patterns of vehicles with motion information for classification and tracking and also robust to orientation, changes in scale, and lighting conditions. | This paper should work on best-view selection and automatic detection of change in background to adaptively update statistical information about the background scene. | The centroidal locations in conjunction with the average of the HOS-based difference measurement values of the detected vehicle pattern are used for tracking. |
| 8. | Application of Edge Detection for Vehicle Detection in Traffic Surveillance System | Ashwini. B  and  Yuvaraju B N | Once Edges are detected the image is fed to the next module for finding the connected components. Using the parameters of the detected connected components, we remove the false detected objects. | The detected vehicle information should be used for analyzing the behaviour of the vehicle in the future. | Sobel edge detection operator is used in the edge detection algorithm. |
| 9. | Vehicle Detection Using Image Processing and Fuzzy Logic | Isha Jain &  Babita Rani | Enhances its use in the areas which are too difficult to be detected by normal means.  After detection objects can be classified  using techniques like neuro-fuzzy etc so as supervised  and unsupervised learning can be used to train the  System. | This algorithm can be applied on real time projects and further improvement can be the techniques mentioned. | Sobel edge detection technique  A series of linear binary morphological dilations are  performed in three directions, horizontally, vertically and  through 45 degrees.  Binary open operation based on the size of the objects is  used to remove small unwanted objects |
| 10. | A Region Tracking-Based Vehicle Detection Algorithm in  Night time Traffic Scenes | Jianqiang Wang 1 and Xiaoyan Sun | Represent and classify the traffic surveillance systems to three types based on specific methods which are used for developing it and in addition shadow and partial occlusion matters and its available solutions are discussed. These types shows the detailed information that how the traffic surveillance systems uses the image processing methods and analysis the tools for detection, segmentation and tracking the vehicles of the road. | ----- | Region-Based Tracking Methods  Contour Tracking Methods  3D Model-Based Tracking Methods  Feature-Based Tracking Methods |

**The Automated Vehicle Detection of Highway Traffic Images by Differential Morphological Profile**

Vehicle detection has been the basic part of the movement observation framework for a long time. In any case, vehicle detection technique is as yet difficult. In this paper, differential morphology closing profile is utilized to remove the vehicle consequently from the activity picture. Alongside closing profile, some expansion operation has been connected as a part of the calculation to get the high discovery furthermore, quality rate. Result showed that the novel strategy has a superb discovery and quality rate. We likewise have contrasted our mechanized recognition strategy and other customary picture preparing based strategies and the outcomes demonstrate that our proposed strategy gives better comes about than customary picture handling based strategies. Vehicle detection and following applications assume a vital part for non-military personnel and military applications, for example, in thruway activity reconnaissance control administration and urban movement arranging. Test comes about demonstrating that this technique can recognize moving vehicles quick and precisely in complex movement circumstance. An automatic vehicle recognition calculation for the activity pictures is proposed. Differential morphological profile is utilized to distinguish the vehicles and averaging channel decreases the commotion impact in the info picture. Proposed calculations, naturally distinguishes the vehicles by setting some underlying parameters like a progression of closing operation of various structure sizes to execute the differential profile.

**Vehicle Detection and Tracking Techniques Used In Moving Vehicles**

The difficulty of acquiring the underlying foundation there is the mistake of ongoing foundation overhaul and the trouble of controlling the redesign speed in moving vehicle recognition of movement video, this paper proposes a precise and viable moving vehicle identification technique which can be utilized as a part of complex movement environment. This method first constructs initial background image with respect to the real time situation of traffic environment and then segments the present edge into forefront area and foundation locale precisely utilizing the joined technique for between casing contrast and subtraction technique. The test comes about to demonstrate that this technique can recognize moving vehicles quick and precisely in complex activity circumstance. Vehicle detection and following applications assume an essential part for regular citizen and military applications, for example, in thruway movement reconnaissance control administration and urban activity does the major part. Test comes about to demonstrate that this technique can distinguish moving vehicles quickly and precisely in complex movement circumstance.

**Moving Vehicle Identification using Background Registration Technique for Traffic Surveillance**

Real-time segmentation of moving region in image arrangements is a first and foremost step in numerous vision frameworks counting computerized visual surveillance and human-machine interface. In this paper we display a system for distinguishing some imperative however obscure information like vehicle recognizing and its flow count. The goal is to screen exercises at movement convergences for distinguishing blocks, and after that anticipate the activity stream which helps with directing activity. The present calculation for vision-based location and including of vehicles monocular picture successions for activity scenes are recorded by a stationary camera. The technique depends on the foundation of correspondences amongst regions and vehicles, as the vehicles travel through the picture succession. Background subtraction is utilized which enhances the versatile foundation and blend display furthermore, makes the framework learn quicker and more precisely, also as adjust viably to evolving situations. The subsequent framework recognizes vehicles at convergence, dismissing background and tracks vehicles over a particular timeframe. Real-life traffic video sequences are utilized to illustrate the adequacy of the proposed calculation.

**Automatic Vehicle Detection and Road Traffic Congestion Mapping with Image Processing Technique**.

Road Traffic Congestion Mapping is a framework that enables people to discover data about the movement of clog in the city. One of the real issues in the downtown areas like Kathmandu is the automobile traffic jam in the streets. This project gives an achievable answer for the clients in finding less congested way making progress toward their destination. The system gathers movement congestion information from the streets and makes it accessible to clients by means of open street guide. The observation cameras introduced at the streets give ceaseless contribution to our systems which then include the frequency of vehicles in the street to find time to decide the blockage in the street. The system executes Background subtraction and thresholding for location of vehicles from the picture input got from the cameras. The congestion is plotted in open street outline. It indicates with red line for very congested street, blue line for somewhat congested street and green line with the free flow of vehicles in the street. When this data is obtained, one can substitute way to their destination.

**Vehicle Detection and Tracking Using the Block Matching Algorithm**

The paper proposes a way to deal with vehicle detection and following completely in light of the Block Coordinating Algorithm (BMA), which is the motion estimation calculation utilized in the MPEG compression standard. BMA separates the present casing in little, settled size pieces and matches them in the past edge with a specific end goal to gauge squares removal (alluded to as movement vectors) between two progressive casings. The location and following methodology is as per the standards provided. BMA gives movement vectors, which are then regularized utilizing a Vector Median Filter. After the regularization step, movement vectors are assembled in light of their distance and comparability, and an arrangement of vehicles is fabricated per particular casing. At long last, the following calculation sets up the correspondences between the vehicles distinguished in every edges of the arrangement, permitting the estimation of their directions and the discovery of new passages and ways out. The following calculation is firmly in light of the BMA. We consider the BMA yield as the fundamental following data connected with every square and consolidate this effectively accessible square level following with the gathering yield in order to accomplish the following of vehicles accessible to clients by means of open street guide. The reconnaissance cameras introduced at the streets give nonstop contribution to our framework which then include the quantity of vehicles the street in a traverse of time to decide the blockage in the street. The framework executes Background subtraction and thresholding for discovery of vehicles from the picture input got from the cameras. The blockage is plotted in open street delineate, illustration red line for exceedingly congested street, blue line for somewhat congested street and green line with the expectation of complimentary stream of vehicles in the street. When this data is acquired, one can easily find an alternate way.

**“Moving Object Tracking of Vehicle Detection”: A Concise Review**

In military and several other places vehicle detection and tracking application plays a vital role. This paper introduces a survey on the different methods of On-Road Vehicle detection frameworks that depend on movement display. In this paper a survey of old work is introduced on vision-based vehicle detection using sensors. Recognizing the items in the video and following their movement to distinguish their qualities has been developing research territory in the area of Image Processing and Computer Vision. The moving picture examination involves three sections: (1) Traffic Analysis (2) Motion Vehicle Detection and Segmentation Approaches and (3) Vehicle Tracking Approaches. In this review, we have characterized these strategies into different groups, and these groups will give a point by point description of different techniques and will find their positive and negative aspects.

**VEHICLE DETECTION AND TRACKING IN VIDEO**

In this paper, we have discussed about vehicle detection and tracking in traffic surveillance video. The proposed technique joins statistical knowledge about the type of vehicles with moving information. The unknown distribution of the image patterns of vehicles is roughly displayed using accurate data got from test pictures. A motion detector recognizes block of action. The technique uses a accurate measure to figure out which of the things are really comparable to moving vehicles. The tracking module utilizes position co-ordinates and measurement values for correlation.

**Application of Edge Detection for Vehicle Detection in Traffic Surveillance System**

Detecting the vehicles and having a point by point detail of the vehicles and their behavior in a traffic surveillance system is an emerging area of research. Vehicle detection would be the first step for this procedure. Different classes of vehicles are to be identified from the surveillance video and after that they should be characterized in light of different feature points. This paper draws out the diverse techniques used for the vehicle detection from a video. A review of the edge detection technique is given here, which is one of the techniques used as a part of vehicle detection.

**Vehicle Detection Using Image Processing and Fuzzy Logic**

Vehicles going on street are of important since issues like traffic congestion, financial waste, sticking on the underpasses and over-bridges (if the vehicle going through is not of the allowable size) are connected with them. These issues can be managed; by using different morphological processes based image processing techniques to detect the vehicles. In this paper, the pictures of moving and non-moving vehicles have been considered and an algorithm is used for vehicle detection which depends on image processing systems and characterization of vehicles as common portrayal (in phonetic terms) based on fuzzy logic.

**A Region Tracking-Based Vehicle Detection Algorithm in night time Traffic Scenes**

The difficulty of getting the initial background is not exact as real-time background update and the issue of controlling the speed in vehicle detection video, this paper proposes a precise and powerful vehicle detection technique which can be used as a part of advanced environment. This technique first develops initial background image as indicated by the real-time situation of traffic environment then segments the current frame into foreground region and background region accurately using the combined method of inter-frame difference and subtraction method. The experimental results demonstrate that this strategy can identify moving vehicles quickly and precisely in complex moving time. Vehicle detection and following applications assume a vital part for regular citizen and military applications, for example, highway traffic surveillance control management and urban traffic planning.

**METHODOLOGY**

Initially the video has to imported to the program which is to be processed by using the vision.VideoFileReader(). First you have to detect the foreground in the video using the foreground detector class and you have to do this by taking 150 – 200 frames initially as test frames and run it in a loop . Then the foreground detector class gives the frame as output which give the foreground of the image and it is a binary image. The detected foreground has some unwanted white pixels that is the noise and it can be removed by first eroding the image using a square structuring element and then dilating it. This can be done using the imopen() function. This function gives an output of a very clean background image and this can be further sent for blob analysis to detect the blobs. The blobs are recognized using the class vision.BlobAnalysis().

This will give you the output where there are blobs present in the image and then detect it by using BoundingBoxOutputPort. Now store the analysed image and then send it to insert a rectangle around the detected area. Then we need to calculate the number of blobs using the size function and it will output it . Now the number of blobs is displayed in the frame using the insert text function with parameters where to display and the shape of the box with box with its color and box opacity. The final frame is given output and stored it in another variable. This is the final frame with detected cars along with the number of cars in that particular frame. Now we need to run the video frame by frame as a video using videoPlayer() function and using the step function to bring the next frames. Then as in the previous the same steps are followed where you detect the foreground using the foreground detector and do image opening to remove the noise in the image . After that we need to use blob analysis to detect the blobs where to insert the box along with number of cars which is displayed in the right corner of the video which runs frame by frame. The video will run till the last frame is reached and this is the stopping condition fiven to the while loop. We then finally release the video object because it is considered to be the good practice while using the video player class.

**Flow Diagram:**

IIII

RGB to Grayscale

Image Enhancement

Image Acquisition

Vehicle Tracking

Morphological Operations

**CODE:-**

clear all;

close all

clc;

videoReader = vision.VideoFileReader('carsRt9\_3.avi');

videoPlayer = vision.videoReader;

fgPlayer = vision.VideoPlayer;

foregroundDetector = vision.ForegroundDetector('NumGaussians', 3,'NumTrainingFrames', 50);

for i = 1:75

videoFrame = step(videoReader);

foreground = step(foregroundDetector,videoFrame);

end

figure;

imshow(videoFrame);

title('Input Frame');

figure;

imshow(foreground);

title('Foreground');

cleanForeground = imopen(foreground, strel('Disk',1));

figure;

subplot(1,2,1);imshow(foreground);title('Original Foreground');

subplot(1,2,2);imshow(cleanForeground);title('Clean Foreground');

blobAnalysis = vision.BlobAnalysis('BoundingBoxOutputPort', true,...'AreaOutputPort', false, 'CentroidOutputPort', false,...'MinimumBlobArea', 150);

while ~isDone(videoReader)

videoFrame = step(videoReader);

foreground = step(foregroundDetector,videoFrame);

% Perform morphological filtering

cleanForeground = imopen(foreground, strel('Disk',1));

bbox = step(blobAnalysis, cleanForeground);

result = insertShape(videoFrame, 'Rectangle', bbox, 'Color', 'green');

numCars = size(bbox, 1);

text = sprintf('Detected Vehicles = %d',numCars);

result = insertText(result, [10 10], numCars, 'BoxOpacity', 1,...'FontSize',14);

step(videoPlayer, result);

step(fgPlayer,cleanForeground);

end

release(videoPlayer);

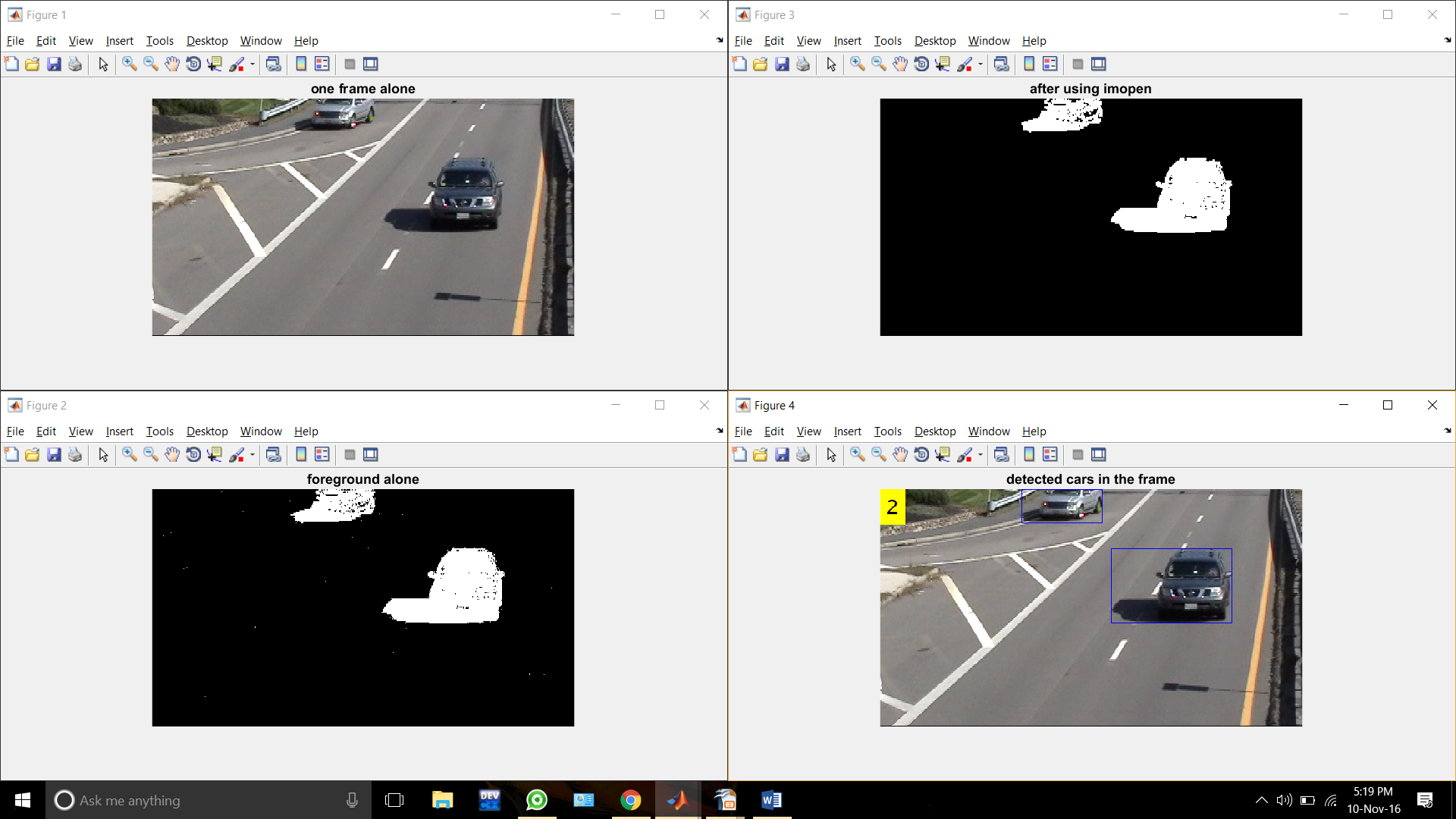
release(videoReader);

release(fgPlayer);

delete(videoPlayer);

delete(fgPlayer);

**OUTPUT :-**



**RESULTS AND CONCLUSION**

The process is tested under various conditions, using MATLAB methods it gives the mentioned output in the figure. There are 4 images which show the various descriptions. Namely, one frame alone (1), foreground alone (2), after using imopen (3), detected cars in the frame (4). This proposed model is reliable and it helps properly in traffic automation, this can also detect cars in the video which have comparatively low quality.

A method of detecting the vehicle using Image Processing is discussed. This is done by recording the vehicles in the road (foreground) and it is converted into frame by frame using ‘step’ function. Each frame is processed independently and the number of cars has been counted. Main advantage is, not using any sensor and it is cost efficient with good accuracy and it will also detect the cars which are moving fast. This is because we have implemented this using Image Processing Technique with MATLAB software, Production costs are really less with this.

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