

AREA MEASUREMENT OF OBJECTS

Bryni Sanjez.J,

Department of Computer Science and Engineering,
Velammal Engineering College,
Chennai, India.

Karthikha.M,

Department of Computer Science and Engineering,
Velammal Engineering College,
Chennai, India.

Nandhini.K,

Department of Computer Science and Engineering,
Velammal Engineering College,
Chennai, India.

Gunasundari.S,

Assistant Professor,
Department of Computer Science and Engineering,
Velammal Engineering College,
Chennai, India.

Abstract: The objective of this project is to enable Charged Coupled Device (CCD) camera for area measuring while recording images simultaneously. We can derive the horizontal length of a targeted object and subsequently calculate the area covered by the object. Even though there are several methods available to measure the area but it is difficult for finding accurate area. An image processing based method was developed to measure surface area the dimension of object are determined from a digitized picture of the product acquired by a CCD camera. The projected area measuring method is easy to implement and based on the identification method of the bright spots on a CCD cameras. The MATLAB software was used to find the edge of the object using Sobel edge detection algorithm. After finding the edge of the object, shape detection is done. The projected area of the object is calculated using algebraic formulas.

I INTRODUCTION

“MATLAB is a high-level language and interactive environment for computer computation, visualization, and programming. Image Processing Toolbox is an application available for use in MATLAB, which provides a comprehensive set of reference-standard algorithms, functions, and apps for image processing, analysis, visualization, and algorithm development.” Using these tools provides a fast and convenient way to process and analyze images without the need for advanced knowledge of a complex coding language. Measuring objects within an image or frame can be an important capability for many applications where computer vision is required instead of making physical measurements. This application note will cover a basic step-by-step algorithm for isolating a desired object and measuring its area.

Image processing is a method to convert an image into digital form and perform some operations on it, in order to get an enhanced image or to extract some useful information from it. It is a type of signal dispensation in which input is image, like video frame or photograph and output may be image or characteristics associated with that image. Usually Image Processing system includes treating images as two dimensional signals while applying already set signal processing methods to them. It is among rapidly growing technologies today, with its applications in various aspects of a business.

Image Processing forms core research area within engineering and computer science disciplines too. Image processing basically includes the following three steps. Importing the image with optical scanner or by digital photography. Analyzing and manipulating the image which includes data compression and image enhancement and spotting patterns that are not to human eyes like satellite photographs. Output is the last stage in which result can be altered image or report that is based on image analysis.

II RELATED WORK

Detecting a Cell Using Image Segmentation: This example shows how to detect a cell using edge detection and basic morphology. An object can be easily detected in an image if the object has sufficient contrast from the background. In this example, the cells are prostate cancer cells.

1) Step 1: Read Image

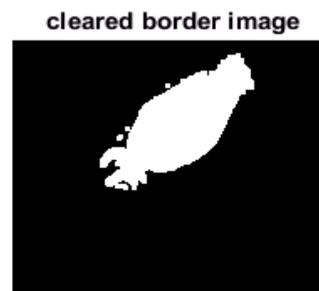
Read in the cell.tif image, which is an image of a prostate cancer cell.



Image courtesy of Alan Partin
Johns Hopkins University

2) Step 2: Detect Entire Cell

Two cells are present in this image, but only one cell can be seen in its entirety. We will detect this cell. Another word for object detection is segmentation. The object to be segmented differs greatly in contrast from the background image. Changes in contrast can be detected by operators that calculate the gradient of an image. The gradient image can be calculated and a threshold can be applied to create a binary mask containing the segmented cell. First, we use edge and the Sobel operator to calculate the threshold value. We then tune the threshold value and use edge again to obtain a binary mask that contains the segmented cell.



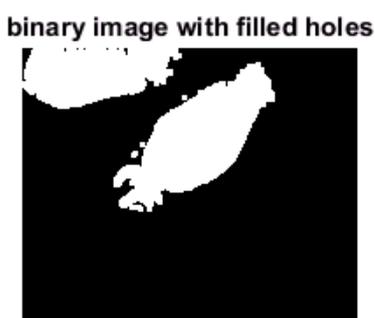
3) Step 3: Dilate the Image

The binary gradient mask shows lines of high contrast in the image. These lines do not quite delineate the outline of the object of interest. Compared to the original image, you can see gaps in the lines surrounding the object in the gradient mask. These linear gaps will disappear if the Sobel image is dilated using linear structuring elements, which we can create with the strel function. The binary gradient mask is dilated using the vertical structuring element followed by the horizontal structuring element. The imdilate function dilates the image.



4) Step 4: Fill Interior Gaps

The dilated gradient mask shows the outline of the cell quite nicely, but there are still holes in the interior of the cell. To fill these holes we use the imfill function.

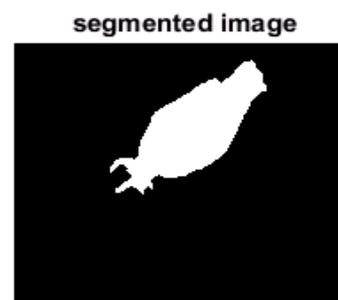


5) Step 5: Remove Connected Objects on Border

The cell of interest has been successfully segmented, but it is not the only object that has been found. Any objects that are connected to the border of the image can be removed using the imclearborder function. The connectivity in the imclearborder function was set to 4 to remove diagonal connections.

6) Step 6: Smoothen the Object

Finally, in order to make the segmented object look natural, we smoothen the object by eroding the image twice with a diamond structuring element. We create the diamond structuring element using the strel function.



An alternate method for displaying the segmented object would be to place an outline around the segmented cell. The outline is created by the bwperim function.

Noise removal: Digital images are prone to a variety of types of noise. Noise is the result of errors in the image acquisition process that result in pixel values that do not reflect the true intensities of the real scene.

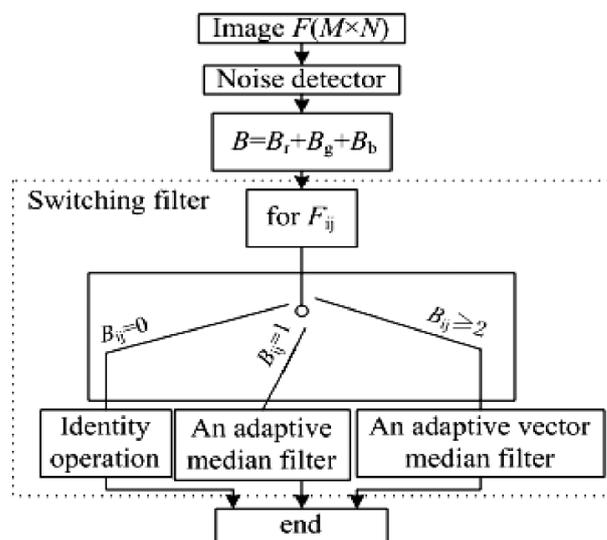


Figure : Noise removal architecture

There are several ways that noise can be introduced into an image, depending on how the image is created. For example:

- If the image is scanned from a photograph made on film, the film grain is a source of noise. Noise can also be the result of damage to the film, or be introduced by the scanner itself.
- If the image is acquired directly in a digital format, the mechanism for gathering the data (such as a CCD detector) can introduce noise.
- Electronic transmission of image data can introduce noise.

ii) Shape recognition

The distinguish is based on some characteristic of the shapes. MATLAB function regionprops() can automatically calculate some properties of the input image, such as the major axis length, minor axis length and extent. The value extent is calculated by the rate of minimum enclosing rectangle's area of the image and the image's area. The minimum enclosing rectangle for square and rectangle are themselves, therefore the extent values for rectangle and square are both 1. Besides, the major axis length and minor axis length of square are the same, however, these values are different for rectangle. Therefore, we can detect square and rectangle. Other regular geometric shapes can be detected follow the same process in theory.

III. PROPOSED WORK

To acquire images from a Webcam, you first create a Webcam object. Use the webcam function to create a Webcam object. You can use it in one of three ways,

- Connect to the first or only camera, by using no input arguments
- Specify a camera by name, by using the Webcam name (as a character vector) as an input argument
- Specify a camera by the list order, by using an index number as the input argument

The first step taken is to divide the image into three images based on the intensities of each red, green and blue component within the image. This is Color Based Image Segmentation. The blue plane is the best choice to use for Image Thresholding because it provides the most contrast between the desired object (foreground) and the background. Image Thresholding takes an intensity image and converts it into a binary image based on the *level* desired. A value between 0 and 1 determines which pixels (based on their value) will be set to a 1 (white) or 0 (black)). To choose the best value suited for your application right-click on the value and at the top of the menu and select "Increment Value and Run Section". Set the increment value to 0.01 and choose the best value at which to threshold. *Figure* shows the result of the Image Thresholding at 0.37. The image has been segmented between the object we desire to measure and the background.

In this proposed work, Figure represents the architecture diagram of an Area measurement system.

IV SYSTEM ARCHITECTURE

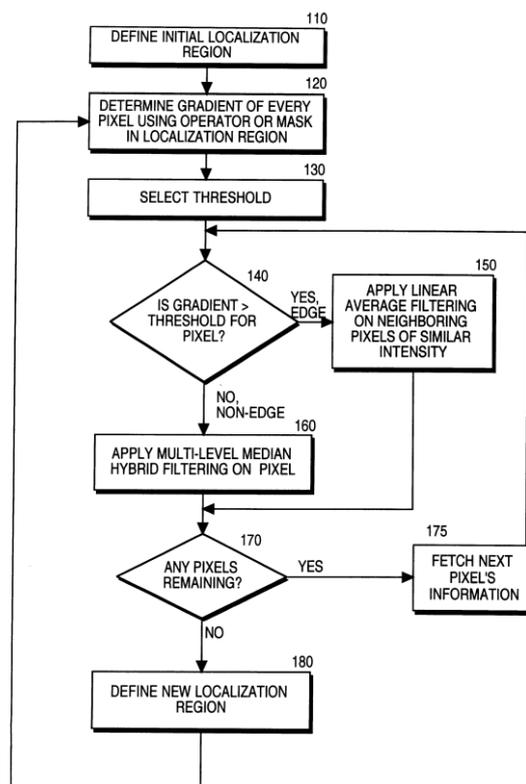


Figure: System architecture

V MODULE DESCRIPTION

OBJECT CAPTURING

The CCD will capture the object .

IMAGE PROCESSING

The captured image will be sent to the MATLAB software which then processes the image.

1. EDGE DETECTION

After the processing ,the edge of the object is detected.

2. SHAPE RECOGNITION

Based on the edge ,the shape will be recognized and stored in the database.

3. PIXEL COUNTING

The pixel is then counted . Based on the shape ,the formula is applied

VI.CONCLUSION

The project 'Area Measurement of objects' totally had acquired and it is the program that important to form a good database. Transferring a 2-D pixel array into a statistically uncorrelated data set enhances the removal of redundant data, which leads to the reduction of the amount of data required to represent a digital image. Considering data communication these days, especially the internet, massive data transfer causes

serious problems for interactive network users and techniques such as these go a long way to enable faster data transfer and solve, to a certain extent, the memory consumption problem. The method that been used is the entire basic program from reading the image to acquiring the database from a binary image that already converted to an edge image. This image then is analyzing using Singular Value Decomposition to extract the identity of that particular image and finally the step of how the neural network forming recognition. Recognition is highly complex activity that can be done only in human brains.

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