IJITCE

ISSN 2347- 3657

International Journal of
Information Technology & Computer Engineering

Email : ijitce.editor@gmail.com or editor@ijitce.com

International Journal of Information Technology & Computer Engineering

ISSN 2347–3657

Volume 9, Issue 3, 2021

IMAGE SEGMENTATION USING MULTILEVEL THRESHOLDING

N MD BILAL1,S HAROON RASHEED2,D ANURADHA3, K NAGENDRA KUMAR4

1,2,3,4, Assistant Professor, ECE Department, SVR Engineering College

ABSTRACT

Multilevel thresholding (MLT) is one of the most widely used methods in image segmentation. However, the exhaustive search method is computationally time consuming for selecting the optimal thresholds. Consequently, heuristic algorithms are extensively used to reduce the complexity of the MLT problem. In this paper, an efficient Exchange Market Algorithm (EMA) is proposed to segment images using minimum cross entropy thresholding method. In the EMA, a market risk variable is used to balance the exploration and exploitation capabilities of the algorithm. Moreover, the local search capability is strengthened by the search and absorbent operators of EMA. Meanwhile, the most competent shareholders of EMA retain their best rank without undergoing any changes in their shares. These help in reducing the computational time. The proposed EMA based MLT is tested on benchmark and brain images with different threshold levels. Additionally, EMA approach is compared with other well-known algorithms such as, genetic algorithm, particle swarm optimization, bacterial foraging algorithm, firefly algorithm, honey bee mating optimization and teaching–learning based optimization. The experimental results show that the proposed EMA approach provides better outcomes than other algorithms.

Index Terms— Exchange Market Algorithm, optimal thresholds

I. INTRODUCTION

Image segmentation is the foundation in examining an image in detail and it finds applications in machine learning, medical anal- ysis, iris recognition etc. Non– overlapping part of an image is pre- cisely described based on intensity, color, pattern or shape. In order to infer information from an image, a simple, intuitive thresholding technique is generally used . Thresholding is a similarity-based detection approach of image Segmentation.

Thresholding outputs a binary image from a gray scale image based on intensity value. On this basis, image thresholding is generally classified as bi-level and multi-level thresholding. In general, single threshold divides the image into foreground and

background while distinct, desired part of an image is extracted by multiple thresholds for complex images .

But, as time consumed goes up with increase in numberof thresholds, computational cost also increases. Thus, to analyze complex images, multilevel thresholding is used, and it receives the required objective information from an image.

Normally, fit- ness functions are the mathematical models to find solutions for optimization problems. The minimization objective function such as Minimum Cross Entropy (MCE) provides unconstrained expansion to MLT. MCE has considerable attraction in information theory, and it measures the average amount of information from the considered probability distribution. It computes the distance between two distributions and minimizes the cross entropy between original and its segmented image.

Segmentation
Image segmentation is an important technology for image processing. There are many applications whether on synthesis of the objects or computer graphic images require precise segmentation. With the consideration of the characteristics of each object composing images in MPEG4, object-based segmentation cannot be ignored. Nowadays, sports programs are among the most popular programs, and there is no doubt that viewers' interest is concentrated on the athletes. Therefore, demand for image segmentation of sport scenes is very high in terms of both visual compression and image handling using extracted athletesGao et al. presented the automatic predic- tion of global threshold using an improved ABC algorithm with Otsu fitness function.Li et al. proved the significant improvement of image segmentation quality through partitioned cooperative tum behaved PSO. Pare et al. introduced the CS algorithm along with Egg Lying Radius (ELR-CS) to solve the multilevel thresholding problems. Sarkar et al. proposed the differential evolution (DE) algorithm aided with minimum cross entropy to predict optimal thresholds and the experimental results authenticated the reduced computational time. we introduce a basic idea about color information and edge extraction to
achieve the image segmentation. The color information helps obtain the texture
information of the target image while the edge extraction detects the boundary of the target image. By combining these, the target image can be correctly segmented and represent. Besides, because color information and edge extraction can use basic image processing methods, they can not only demonstrate what textbook claims but also make us realize their function works. We expect that we can extract most part of the target.
There are many algorithms used for image segmentation, and some of them segmented an image based on the object while some can segment automatically. Nowadays, no one can point out which the optimal solution is due to different constraints. In a similarity close measure was used to classify the belonging of the pixels, and then used region growing to get the object. Unfortunately, it required a set of markers, and if there is an unknown image, it is hard to differentiate which part should be segmented. Linking the area information and the color histogram were considered for building video databases based on objects However, the color information has to be given first, and it is not useful for the life application. A genetic algorithm adapted the segmentation process to changes in image characteristics caused by variable environmental conditions , but it took time learning. In, a two-step approach to image segmentation is reported.
It was a fully automated model-based image segmentation, and improved active shape models, line-lanes and live-wires, intelligent scissors, core-atoms, active appearance models. However, there were still two problems left. It is strong dependency on a close-to-target initialization, and necessary for manual redesign of segmentation criteria whenever new segmentation problem is encountered. The authors in proposed a graph- based method, the cut ratio is defined following the idea of NP-hard as the ratio of the corresponding sums of two different weights of edges along the cut boundary and models the mean affinity between the segments separated by the boundary per unit boundary length. It allows efficient iterated region- based segmentation as well as pixel-based segmentation.

III. THRESHOLD BASED SEGMENTATION

Histogram thresholding and slicing techniques are used to segment the image. They may be applied directly to an image, but can also be combined with pre- and post-processing techniques Thresholding is probably the most frequently used technique to segment an image.

ISSN 2347–3657
Volume 9, Issue 3, 2021

If we have an image which contains bright objects on a dark background, thresholding can be used to segment the image. See figure 10.2 for an example. Since in many types of images the grey values of objects are very different from the background value, thresholding is often a well- suited method to segment an image into objects and background. If the objects are not overlapping, then we can create a separate segment from each object by running a labelling algorithm (see chapter 8) on the thresholded binary image, thus assigning a unique pixel value to each object.

Introduction

Image processing is a topic of great relevance for practically any project, either for basic arrays of photo detectors or complex robotic systems using artificial vision. It is an interesting topic that offers to multimodal systems the capacity to see and understand their environment in order to interact in a natural and more efficient way.

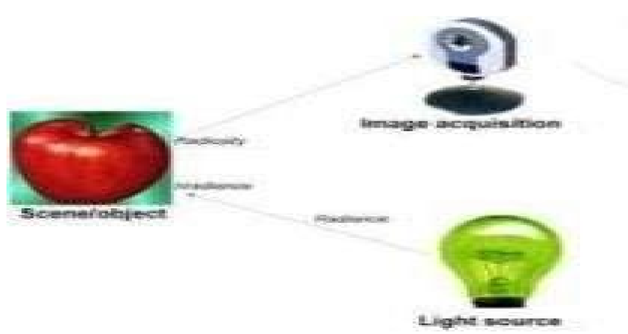
The development of new equipment for high speed image acquisition and with higher resolutions requires a significant effort to develop techniques that process the images in a more efficient way. Besides, medical applications use new image modalities and need algorithms for the interpretation of these images as well as for the registration and fusion of the different modalities, so that the image processing is a productive area for the development of multidisciplinary applications. The aim of this chapter is to present different digital image processing algorithms using LabView and IMAQ vision toolbox.

IMAQ vision toolbox presents a complete set of digital image processing and acquisition functions that improve the efficiency of the projects and reduce the programming effort of the users obtaining better results in shorter time. Therefore, the IMAQ vision toolbox of LabView is an interesting tool to analyze in detail and through this chapter it will be presented different theories about digital image processing and different applications in the field of image acquisition, image transformations. This chapter includes in first place the image acquisition and some of the most common operations that can be locally or globally applied, the statistical information generated by the image in a histogram is commented later. Finally, the

use of tools allowing to segment or filtrate the image are described making special emphasis in the algorithms of pattern recognition and matching template

Image Acquisition

We generally associate the image to a representation that we make in our brain according to the light incidence into a scene (Bischof & Kropatsc, 2001). Therefore, there are different variables related to the formation of images, such as the light distribution in the scene. Since the image formation depends of the interaction of light with the object in the scene and the emitted energy from one or several light sources changes in its trip (Fig. 1). That is why theRadiance is the light that travels in the space usually generated by different light sources, and the light that arrives at the object corresponds to the



Irradiance. According to the law of energy conservation, a part of the radiant energy that arrives to the object is absorbed by this, other is refracted and another is reflected in form of radiosity

International Journal of
Information Technology & Computer Engineering
ISSN 2347–3657
Volume 9, Issue 3, 2021

Fig 1 light modification at image acquisition

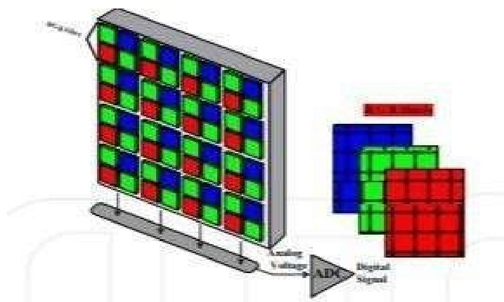


Fig .2 color image acquisition with ccd

In the case of the digital images, the acquisition systems require in the first place alight sensitive element, which is usually constituted by a photosensitive matrix arrangement obtained by the image sensor (CCD, CMOS, etc.). These physical devices give an electrical output proportional to the luminous intensity that receives in their input. The number of elements of the photosensitive system of the matrix determines the spatial resolution of the captured image. Moreover, the electric signal generated by the photosensitive elements is sampled and discretized to be stored in a memory slot; this requires the usage of an analogto-digital converter (ADC). The number of bits used to store the information of the image determines the resolution at intensity of the image.

A colour mask is generally used (RGB Filter) for acquisition of colour images. This filter allows decomposing the light in three bands, Red, Green and Blue. The three matrixes are generated and each one of them stores the light intensity of each RGB channel (Fig. 2). The next example (presented in Fig. 3) show to acquire video from a webcam using the NI Vision Acquisition Express. This block is located in

Vision/Vision Express toolbox and it is the easiest way to configure all the characteristics in the camera. Inside this block there are four sections: the first one corresponds to the option of ―select acquisition source which shows all the cameras connected in the computer.

The next option is called ―select acquisition type which determines the mode to display the image and there are four modes: single acquisition with processing, continuous acquisition with inline processing, finite acquisition with inline processing, and finite acquisition with post processing. The third section corresponds to the―configure acquisition settings which represents the size, brightness, contrast, gamma, saturation, etc. of the image and finally in the last option it is possible to select controls and indicators to control different parameters of the last section during the process. continuous acquisition with inline processing, this option will display the acquired image in continuous mode until the user presses the stop button.

BLOCK DIAGRAM

The block diagram consists of input, file path, IMAQ MASK, LabVIEW Software, image segmentation using MLT, and object 1, object 2…object n

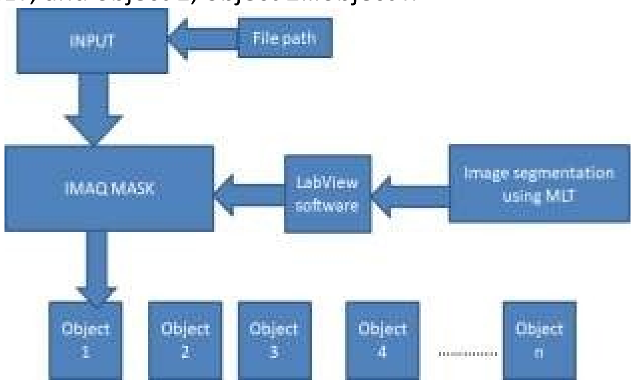


Fig .3 block diagramOF LabVIEW

Image segmentation using MLT using labview software is proposed technique In this technique digital image divided into multiple parts called segments .After we use labview software we write a graphical code using vision and motion and machine learning toolkit by using two tools palettetes create a graphical code to control the output.after run the code and output is displayed.

IV. SOFTWARE ASPECTS

LabVIEW Software

LabVIEW (Laboratory Virtual Instrument Engineering Workbench) is a graphical programming language that uses icons instead of lines of text to create applications. In contrast to text-based programming languages, where instructions determine the order of program execution, LabVIEW uses dataflow programming, where the flow of data through the nodes on the block diagram determines the execution order of the VIs and functions. VIs, or virtual instruments, are LabVIEW programs that imitate physical instruments.

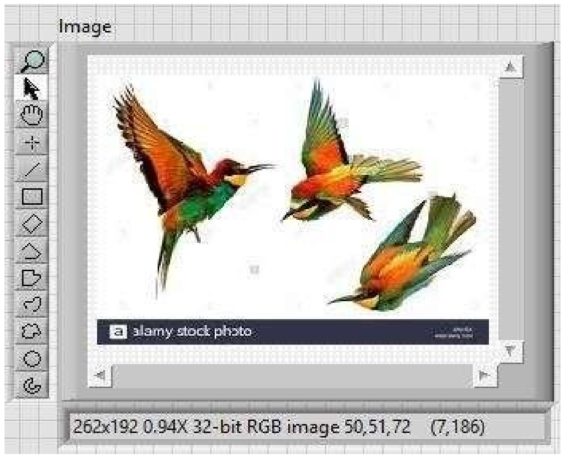
In LabVIEW, you build a user interface by using a set of tools and objects. The user interface is known as the front panel. You then add code using graphical representations of functions to control the front panel objects. This graphical source code is also known as G code or block diagram code. The block diagram contains this code. In some ways, the block diagram resembles a flowchart.

Use the LabVIEW VI templates, example VIs, and tools as a starting point to help you design and build VIsLabVIEW programs are called virtual instruments, or VIs, because their appearance and operation imitate physical instruments, such as oscilloscopes and multimeters. Every VI uses functions that manipulate input from the user interface or other sources and display that information or move it to other files or other computers.

International Journal of Information Technology & Computer Engineering
ISSN 2347–3657
Volume 9, Issue 3, 2021

VI contains the following three components:

- Front panel—Serves as the user interface.



•Block diagram—Contains the graphical source code that defines the functionality of the VI.
•Icon and connector pane—Identifies the interface to the VI so that you can use the VI in another within another VI is called a subVI. A subVI corresponds to a subroutine in text-based programming languages

V.**RESULT**

Here we create one memory to store the image as file path.Create means IMAQ create which we consider as storage memoryFile path means which takes the input as IMAQ read. By browsing on file path we get the storage location which we want to take as input imageThe input image has different colours of birds

INPUT IMAGE FOR IMAGE SEGMENTATION USING MLT

In image segmentation using MLT is same as image processing. First we have to create one memory using IMAQ create. Next we have to create one file path to create IMAQ read. Selectv file path for browsing the storage location of input image.Input image is satellite image. Satellite image which contains land , water , sand etc.

International Journal of Information Technology & Computer Engineering
ISSN 2347–3657
Volume 9, Issue 3, 2021

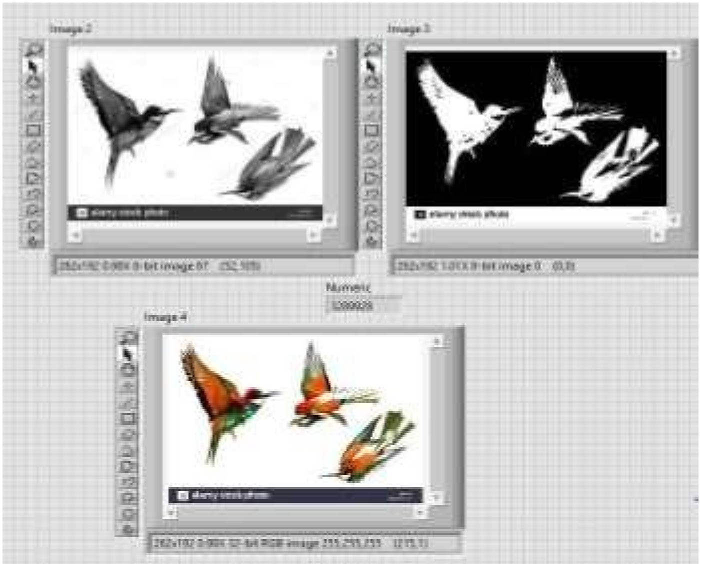


Fig.4 images of segmentations

In this output the first image is after converted to colorimage to array image is in gray scale colour I.e black and white After that image convertewd to array These two images are combined through for loops one for rows and one for coloumns After that the output displayed in final display it is not clear Because of this drawback we use Image segmentation using MLT

Fig 5. Image segmentations

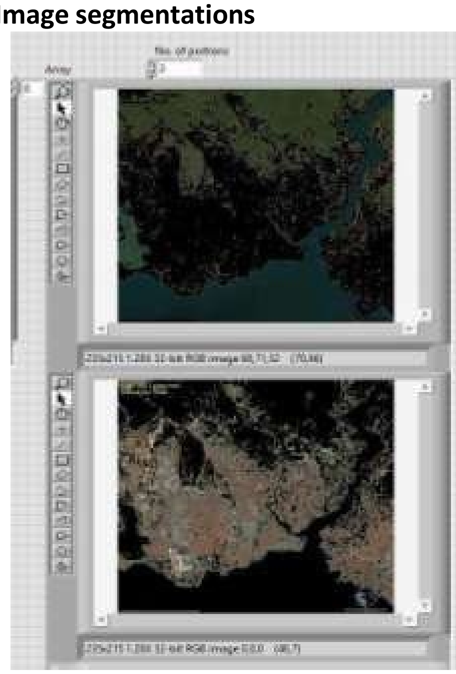


Fig 6. Image segmentations

By using fuzzy c mean clustering and IMAQ mask it converts pixels to data samples and image into different portions based on colors respectively. By selecting no of portions we get output in the array form having that number of image displays. Based on the number of portions the output image contains one color or region displayed in one display. For example in satellite image it contains different portions like grass, sand and water. Based on portions it displays grass in one portion, sand in one portion and water in another portion.

VI.CONCLUSION AND FUTURE SCOPE

LabVIEW method is cost effective. It is also low on maintenance so labVIEW program is easy to use. The drag and drop feature reduces the time to implement program. Many algorithm of moving objects detection achieves by image processing, but in this algorithm which is easy to be affected by light change of surround. So this project provides algorithm of moving object detection and based on tracking mean shift algorithm. Mean shift is an application, independent tool suitable for real data analysis. The experiment is performed on the moving vehicle, moving human, moving ball.

REFERENCES

*1+Ravi kumar A.V, Dnataraj .R , Dr. rekhka K, R. morphologica real time video edge detection in labVIEW IJCSIT, Val. 3(2),2012,3808-3811

*2+Ravi kumar A. —real time face selection and tracking based camera motion control system IJECE, vol 7, no 2(2014), pp.89- 97

*3+Ravi kumar A.V , sunil tiwari N, —multiple moving object detection and tracking using Harr features with smart video surveillence system IJERT, vol 3-issue 6(june 2014),2278-011

[4] Morris, B.T; Cuong transcora, G; Trivedi, M.M;Barth, M.J., Real-time video-based traffic measurement,—Intelligent Transportation system, IEEE Transactions on, vol.13, no.4, pp.1667,.1678,Dec.2012J.

[5] Wei zhan, xiaolong jialgorithm research on moving vehicles detection