Real Time Pattern Recognition and Identification of Co-ordinates with LabVIEW

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Abstract— Digital Image processing(DIP) is a theme of awesome significance basically for any task, either for essential varieties of photograph indicators or complex mechanical frameworks utilizing assumed vision. In this paperbasics of the image processing in LabVIEW have been described in brief. It involves capturing the image of an object that is to be analysed and compares it with the reference image template of the object by pattern matching algorithm. The co-ordinates of the image is also be identified by tracking of object on the screen. A basic pattern matching algorithm is modified to snap and track the image on real-time basis.

Keywords— LabVIEW, IMAQ, Pattern matching, Real-time tracking, .

I. INTRODUCTION

Numerous applications in image processing and PC vision require finding a specific pattern in an image. In this manner pattern coordinating is utilized. To be valuable by and by, pattern coordinating strategies must be programmed, generic, quick and robust[10],[11],[12].

DIP is a theme of awesome significance basically for any task, either for essential varieties of photograph indicators or complex mechanical frameworks utilizing assumed vision [14] It is a fascinating theme that offers to multimodal frameworks the ability to see and comprehend their condition keeping in mind the end goal to associate in characteristic and in a more proficient manner.[19]

Pattern matching is regularly done by filtering the full image, and assessing a distance measure between the local and pattern rectangular window [9], [10].The purpose of this area is to present particular DIP computations using LabVIEW and IMAQ vision tool stash. IMAQ vision tool compartment shows an aggregate course of action of DIP and Image acquisition works that upgrade the capability of the tasks and what's more lessening is the programming task of the customer getting improved performance in shorter timeframe.

Along these lines, the IMAQ vision tool compartment of LabVIEW is an intriguing instrument to observe in detail and through this part it will introduce diverse hypotheses about DIP and distinctive applications in the field of image processing and image transformations [19].

In this paper basics of the image processing in LabVIEW have been described in brief. It involves capturing the image of an object that is to be analysed and compares it with the reference image template of the object by pattern matching algorithm. The co-ordinates of the image are also identified by tracking of object on the screen. Basic pattern matching algorithm is modified to snap and track image on real-time basis.

II. METHODOLOGY:

With a specific end goal to decide a good set of trademark measurements a watchful investigation of the patterns under review is necessary. The investigation of pattern acknowledgment incorporates both the examination of pattern attributes detection and the plan of recognition systems. Fig 1 describes the flow of this paper in brief.

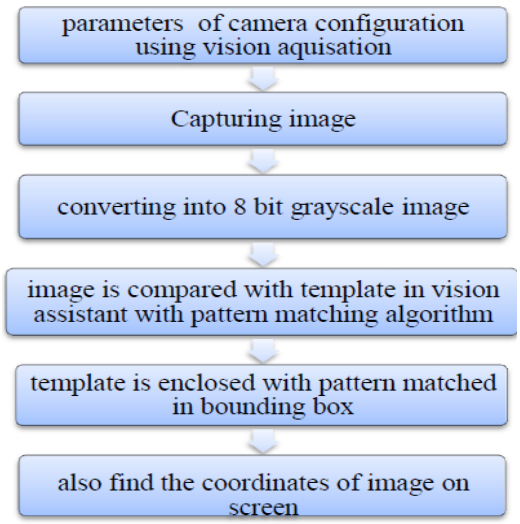

Fig 1 – Flow chart of pattern matching

Pattern matching is a methodof discovering areas in a RGB picture shown Fig 3 whichcompares the reference image pattern. The captured image has to be converted into grayscale image first if it is a color image as shown in Fig 5 for executing pattern matching. Its VI uses a template or reference picture to discover like pictures or patterns inside another picture within the image or template. At that point, we encase the coordinated template with bounding box and in this manner we remove the directions of the picture to track on screen.

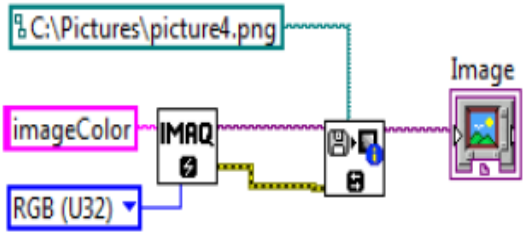

Fig 2 – RGB Image Acquisition blocks

Fig 3 – RGB Image Acquisition captured

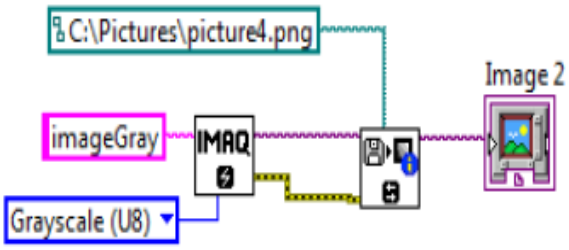

Fig 4 – Grayscale Image Acquisition blocks

Fig 5 -Grayscale Image Acquisition captured

Using Pattern Matching to Construct a Coordinate Transformation .Use the IMAQ Find Coord Sys (Pattern) 2 VI (Machine Vision » Coordinate Systems) to characterize a reference organize framework in light of the area of a reference property. We utilize this strategy when the target under review does not have straight, particular edges..

The pattern matching calculation disregards all image locales in which differentiate values fall beneath a set of least complexity value. Complexity is the distinction between the littlest and biggest pixel values in a locale. Set the Minimum Contrast control to marginally underneath the contrast value of search region with the most reduced contrast. Grayscale is a scope of shades of dark without evident shading. The darkest conceivable shade is dark, which is the aggregate nonattendance of transmitted or reflected light. . On the off chance that the initial picture source is a shading picture, the image should be changed over to grayscale first keeping in mind the end goal to utilize pattern matching. At that point the pattern is to be recognised.

Pattern recognition is a typical system that is executed for the identification and recognition of items. The thought is truly basic and comprises into discover a picture agreeing a template picture. The algorithm not simply wanders the right spectre of image furthermore and finds theparticular review of pattern varieties.

PATTERN MATCHING

This is a method for developing regions in a grayscale image that finds its match with a reference image template. If the initial image is a colored image, then it needs to be converted into a grayscale image first in order to use the pattern matching. The VI of pattern matching compares with the template image to detect image or pattern with a new image irrespective of rotation or location. Then, we encompass the matched template with bounding box and accordingly we extract the coordinates of the image to track on screen.

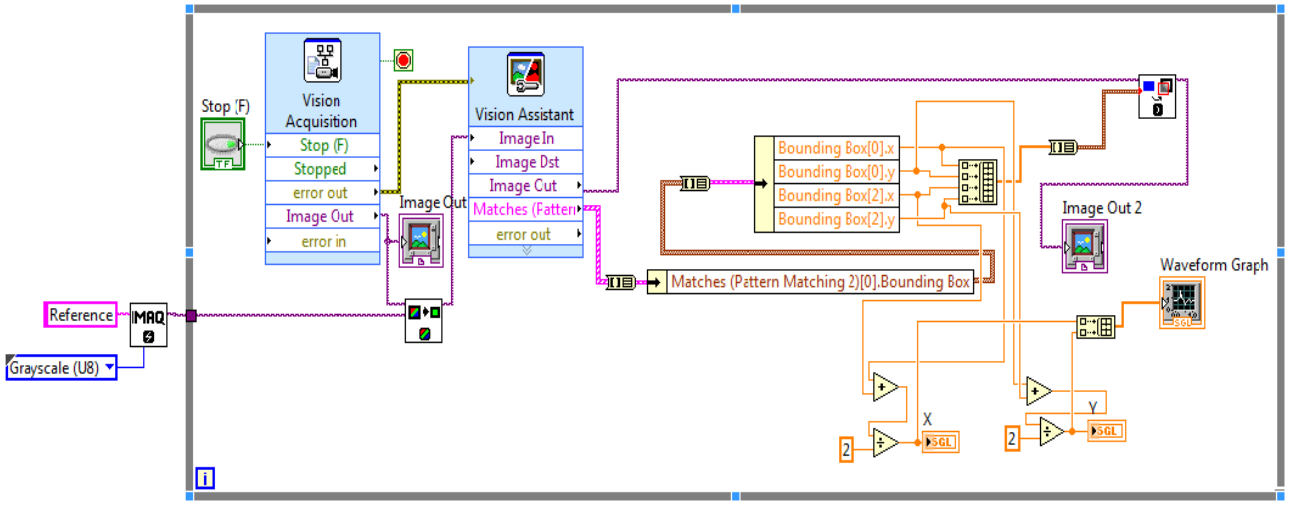

Fig 6 – Basic Pattern Matching

IMAGE PROCESSING AND RECOGNITION

The VI of pattern matching utilizes the reference template to detect image or pattern inside another image regardless of area or location of the template. Then, we encompass the matched template with bounding box and accordingly we extract the coordinates of the image to track on screen. Change images into different images, while the image recognition is the mapping of images into portrayals.

Image Recognition comprises of matching and feature identification of image. It recognizes the presence of a definite pattern (eg:- a specific shape, edge, a line and so on.) in an image includes coordinating the image with a "template," with reference to the pattern. Pattern recognition includes techniques for distinguishing and analysing it consequently.

In these years, pattern recognition has done important development which includes numerous methods which are impelling development of several applications in different field.

III. DEVELOPMENT OF MODEL IN LABVIEW

LabVIEW is a graphical programming dialect utilized as an intense and adaptable instrumentation and analysis programming framework in industry and the scholarly community. LabVIEW utilizes a graphical programming dialect - G to make programs called Virtual Instruments or VI in a pictorial shape called a piece chart, diminishing numerous grammatical details of other programming languages, for example, C and MATLAB which utilize a content based programming approach. It incorporates many devices for data acquisition, investigation and introduction of results. The changed over in to intensity, the image is then committed to the pattern recognition task.

The output matches is a group that contains distinctive data. Keeping in mind the end goal to acquire certain imperatives of the group it is important to put an index array block and the unbundle block situated in programming. Examination library involves a gathering of capacities in signal generation, signal processing, sifting and data. LabVIEW is available for all the significant platforms and is effortlessly versatile crosswise over platforms.

Preferred standpoint of LabVIEW is that it incorporates worked in applications, for example, the IMAQ Vision for image processing. IMAQ Vision contains more than 400 imaging capacities and intuitive imaging windows and capacities for showing and building imaging frameworks. IMAQ Vision allowed us to make cases for some imperative errands in image processing, and utilize them for instructive purposes.

Vision Express Block: It is located in Vision Express toolkit and is the simplest approach for arrangements for every component in the camera. This Block consists of four steps:

1. "Select acquisition source" which demonstrates every one of the cameras associated in the PC.

2."Select acquisition sort" which chooses the best approach to demonstrate the image and it consists of four modes: single acquisition, consistent inline processing acquisition, thirdly finite inline processing acquisition and the lastly is the finite post processingacquisition.

3."Configure acquisition settings" which means the size, brightness, contrast, saturation, and so forth of the picture.

4. Select pointers and controls for controlling the diverse parameters of the last section in the midst of the procedure.

PATTERN RECOGNITION

It is a system that is utilized for the recognition and acknowledgment of articles. The contemplation is fundamental and comprises to discover a picture as indicated by a format picture.

For consistent acquisition using webcam, inline processing is done, it also consists of a while loop in the video acquisition block and also in the pattern recognition structure.Intensity values are changed to RGB values with the help of IMAQ extract single color plane. Once the intensity of the image is changed,it is then used for pattern recognition task.

MODIFIED PATTERN MATCHING

An effective scheme for real-time tracking of pattern is proposed. In this process, we take a snap from the live feed then excerpt template from the snapped image.

Then we make the system familiar with the parameters of the pattern template, and this is called 'Learning of the Template' and then track the template factors in the live feed on real-time basis. Now, rendering to the template, the bounding box is drawn and we find the mid-point of the box in x-y co-ordinates.

IV. CONCLUSIONS:

Different strategies for DIP with the help of LabVIEW are illuminated in this paper. Initially, Some hypothetical ideas about generation of image were inspected for observing the effects of image acquisition framework and in the image processing arrangement. Then periods of a standard course of action of DIP were elaborated and also the devices of LabVIEW to suffice each stage, from image acquisition to the controlling of the convenient utilizing the pattern matching image.

Thus the pattern recognition area discloses the most effective method to utilize the image for the computer vision applications, by an instance of identification of object usingvarious LabVIEW functions which also recommends the help of the splendid platform of LabVIEW for making mechanical exercises and furthermore image and vision preparation for various vision applications.

The versatility given by the product LabVIEW and the limit of IMAQ tool kit increases the probability to improve the use of DIP in any application range.

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REFERENCES

[1] P. Zhao, H. Zhu, H. Li, and T. Shibata, "A Directional-Edge-Based Real-Time Object Tracking System Employing Multiple Candidate-Location Generation," IEEE Transactions On Circuits And Systems For Video Technology, Vol. 23, No. 3, 503-517, Mar. 2013.

[2] J. Huang, A Fast Image Matching Technique for the Panoramicbased Localization, Okayama, Japan: 2016.

[3] Y. Niu, S. Shao, S.B. Park, and C.Kao, "A Novel Speckle-Free Digital Image Correlation Method for In Situ WarpageCharacterization," IEEE Transactions On Components, Packaging and Manufacturing technology, Vol. 7, No. 2, Feb. 2017.

[4] Shuprajhaa,Subasree, Vaitheeshwari, Sivakumar, "A review on Image Processing techniques using Pattern matching in LabVIEW,"International Journal of Advanced Engineering Research and Applications (IJAERA) ISSN: 2454-2377 Vol. 1, Issue – 11, Mar. 2016.

[5] J. Houssineau, D. E. Clark, S. Ivekovic, C. S. Lee, and J. Franco, "A Unified Approach For Multi-Object Triangulation, Tracking and Camera Calliberation," IEEE Transactions on Signal Processing, Vol. 64, No. 11, Jun 01, 2016.

[6] M. S. Gururaj, M. H. Ramesh, J. A. Arvind, "A Review on Image Tracking Technique in Labview," ISSN: (2455-2631) IJSDR | Vol. 1, Issue 6. Jun. 2016.

[7] J. Yang, Z. X. Huang, Y. X. Gao, and H. T. Liu, "Dynamic Learning Style Prediction Method Based on a Pattern Recognition Technique," IEEE Transactions On Learning technologies, Vol. 7, No. 2, Apr-Jun. 2014.

[8] J. S. Bae and T. L. Song, "Image Tracking Algorithm using Template Matching and PSNF-m," International Journal of Control, Automation, and Systems, vol. 6, no. 3, pp. 413-423, June 2008.

[9] V. P. Reddy, K N. Sudha, B. Rajeswari,V. Amrutha, V. SravyaRao, "Pattern Matching For Tracking Applications," International Journal, Vol 2 Issue 5, 1463-1470. May, 2013.

[10] O. Pele and M. Werman. "Robust Real Time Pattern Matching using Bayesian Sequential Hypothesis Testing," O. Pele and M. Werman are with the The Hebrew University of Jerusalem e-mail: {ofirpele,werman}@cs.huji.ac.il

[11] D. C. Tkach, A. J. Young, L. H. Smith, E. J. Rouse, and L. J. Hargrove, "Real-Time and Offline Performance of Pattern Recognition Myoelectric Control Using a Generic Electrode Grid With Targeted Muscle Reinnervation Patients," IEEE Traansactions on Neural Systems, And Rehabilitation Engineering, Vol. 22, No. 4, Jul. 2014.

[12] M. Ortiz-Catalan, B. Håkansson, and R. Brånemark, Real-Time and Simultaneous Control of Artificial Limbs Based on Pattern Recognition Algorithms" , IEEE Transactions on Neural Systems and rehabilitation Engineering, Vol. 22, No. 4, Jul. 2014.

[13] O. Costilla-Reyes, P. Scully, and K. B. Ozanyan, "Temporal Pattern Recognition in Gait Activities Recorded With a Footprint Imaging Sensor System," IEEE Sensors Journal, Vol. 16, No. 24, Dec. 15, 2016.

[14] R. Kibria, L. Bui, A. Mitchell, and M. W. Austin, "HNLF-Based Photonic Pattern Recognition Using Remote Transmitter," IEEE Photonics Technology Letters, Vol. 26, No. 5, Mar 1, 2014.

[15] King-Sun-Fu et al, "Pattern recognition and Image Processing", IEEE Transactions on computers, volume c-25, December 1976.

[16] J. M. Gómez-de-Gabriel, A. Mandow, J. Fernández-Lozano, and A. García-Cerezo, "Mobile Robot Lab Project to Introduce Engineering Students to Fault Diagnosis in Mechatronic Systems," IEEE Transactions On Education, Vol. 58, No. 3, 187-193, Aug 2015.

[17] IMAQ vision for Labview user manual.

[18] K. J. S Lorraine, K. B. Teja, G. D. Devi, K. Harika, "Comparative Analysis of Various Edge Detection Techniques and Cancer Cell Detection using Sobel Algorithm," International Journal of Emerging Science and Engineering (IJESE), Vol.-2, Issue-8, June 2014.

[19] R. Posada-Gomez, O. Sandoval-Gonzalez, A. M. Sibaja, O. Portillo-Rodríguez and G. Alor-Hernandez "Digital Image Processing Using LabView" InstitutoTecnologico de Orizaba, Departamento de Postgrado e Investigacion, Mexico.