

Detection of Different Animal Species in the LabVIEW

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Abstract: The advancements in high speed image acquisition technologies help in the extraction and other techniques in the images taken from forests efficiently. The LabVIEW and the IMAQ vision toolbox takes the images and detect the features in far advanced methods of the new technologies than other methods. It helps in detecting the image features in less time and provides advanced results. This technique depends on the ID of comparing designs among locales and wanted pictures. Each creature has exceptional and particular example which is not the same as other creature species. The highlights like horns for Impihala, tusks for elephants, body designs for tiger, cheetah and shading for other creature species are the outstanding trademark highlights taken for recognizable proof. Background subtraction is used which improves the adaptive background mixture model and makes the system learn faster and more accurately, as well as adapt effectively to changing environments. The undertaking will profit to break down the ideal pieces of a picture viably and lessen the multifaceted nature of utilizing OpenCV and MATLAB to recognize the specific example in the images. This hand planned element uses to evacuate the challenges in checking and recognizing creature species. The environmental parity in creature appropriation can be very much characterized and distinguished for animals in forests.

Keywords: Detection of animal species, IMAQ, LabVIEW.

1. Introduction

There is no parity in the world's environment without the presence of differed creature species. Wild creatures assume an essential job in our condition. As of late, a few sorts of creatures are at the danger of eradication in the woods environment. There are incredible endeavors taken by both open and private elements to secure creature species. It is likewise indispensable to save and characterize the rich assorted variety among various creature gatherings. In around the world, there are a lot of creature animal categories living in fluctuated topographical areas. To process immense volumes of assets, a lot simpler and proficient technique is genuinely necessary one. There are a few different ways to perceive creature utilizing highlights like shape, design, shading, size etc.

The Labview software can be utilized for different purposes, for example, machine vision and so forth. The image processing

using block representation is simple method than doing complicated programming. Edge detection, object tracking, histogram, pattern matching can be done easily using Labview.

Utilizing National instruments apparatuses, for example, Labview and Vision assistant tool it detects the given creature species picture by coordinating with format picture.

For instance, if there is an image of Blackbuck picture among different gatherings of animals, then through this product it is anything but difficult to recognize the Blackbuck picture by format coordinating in the image.

2. Literature Review

In the Mohammad Sadegh Norouzzadeh's 'Automatically identifying, counting, and describing wild animals in camera-trap images with deep learning' by catching the pictures from movement sensor cameras in their common living spaces, they can ready to distinguish the creature species tally, populace, conduct in their condition. With the utilization of deep neural networks and OpenCV, several information tests are prepared with the desire for expanding exactness. In Aswin's Self Induced Warning System for Wild Animal Trespassing, the given creature species is recognized by coordinating the caught picture with format picture.

The intruding of elephant is distinguished by preparing its particular highlights like ivory, trunk, and ear. Nonetheless, there is no particular work for distinguishing proof of gathering of changed creature species in backwoods biological system. In Mirji Sairaj Gurura 'A Review on Image Tracking Technique in Labview', the ideal circle design is followed among the three different examples by preloading the standard example prior.

The vision assistant tool is utilized for handling and stacking the layout pictures in Labview. This work portrays the following and perceiving the shapes in the picture information tests. These are titanic errands when we process the pictures with the goal of expanding exactness in recognizable proof.

These undertakings include a lot of human exertion and time utilization is more noteworthy. In any case, with the assistance of Labview programming with assistance of vision colleague module, the pictures are prepared in lesser time in a greatly

improved way.

3. Methodology

The species identification and classification is done in two ways. In the first approach, the input images are fed into the LabVIEW software and the identical pixel values are processed using Vision toolbox. The repetitive values are separated and accumulated in another image.

By using unsupervised machine learning techniques, the different set of animal species like horned species, patterned species, dotted species are identified. The images are analyzed based on the pixel values. Instead of processing the complete set of images, desired features are extracted from the given user data. Therefore, the complexities in a huge set of images are reduced greatly when the initial image is represented in a reduced format. Then, pattern matching is performed in the second approach. The animal to be identified is loaded as a template image earlier in the file path of this software. The template may be a known feature to user before processing the images from the web camera.

Once the acquisition via web camera is initiated, the notable species can be identified successfully without any interruptions.

4. Block Diagram

The overall diagram for species identification is,

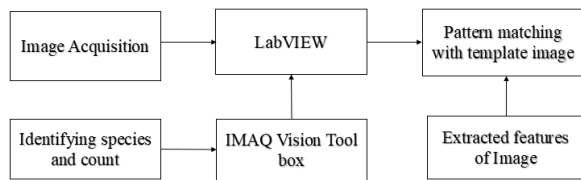


Fig. 1. Block diagram

5. Software Required

The Required Software and additional toolboxes for image processing are,

- LabVIEW Software
- MYDAQ Driver
- Vision Software (IMAQ vision Toolbox)
- Machine Learning Toolkit.
- Vision Assistant module.

6. Tool Description

A. IMAQ Create VI

The IMAQ Create VI block in the Image management palette of the NI Vision development module is used to allocate the memory locations of the data set images. We can create different names to the input images.

But each and every name must be different and unique from the other images.

We must specify the image type as Grayscale (U8, U16, SGL), Complex (CSG), RGB (U32), HSL (U32) or RGB (U64)

However the created image memory location is temporary and subject to modify based on the preferences of the user in future.

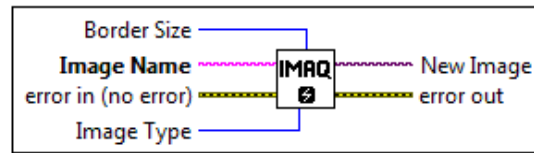


Fig. 2. IMAQ Create VI

B. IMAQ Read File

The IMAQ ReadFile VI block in the Files palette of the NI Vision Development Module is used to read the various types of the input images stored in the desired location of the file path. The standard formats can be used as a file format. We should define the entire pathname in the file path which includes the image name and drive name in the desktop. Hence the image to be processed can be read by the IMAQ ReadFile palette.

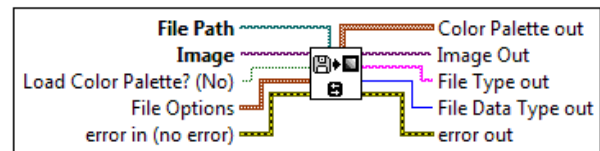


Fig. 3. IMAQ ReadFile

C. IMAQdx Open Camera VI

The IMAQdx Open Camera VI block of the NI Vision acquisition software allows us to configure the camera for capturing the images. This block is responsible for opening the web camera with the target computer once the Front panel run button is switched. The camera has been controlled by the Camera Control mode.

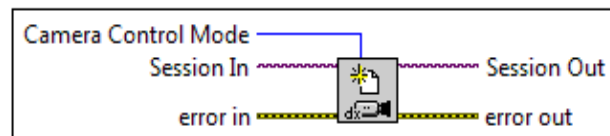


Fig. 4. Open Camera VI

D. IMAQdx Configure Grab VI

The IMAQdx Configure Grab VI palette is used for the continuous acquisition of the images from the camera with the specified number of buffers. It performs the looping functions continuously to grab information via images from the camera. Session in and session out are channelized input and output parts of the blocks in the NI Vision acquisition software respectively.

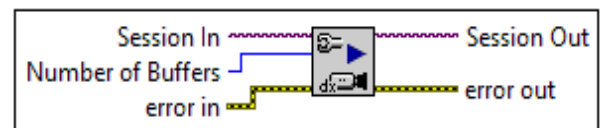


Fig. 5. IMAQdx Configure Grab VI

E. IMAQ learn pattern

The vision development module learns the template using

three varied kinds of pattern matching algorithms.

1) *Low discrepancy sampling algorithm*

Low discrepancy sampling algorithm is used to extract the important attributes of the image for better representation.

2) *Grayscale value pyramid algorithm*

Grayscale value pyramid algorithm is used when there is an absence of information in structured format in the image. The features in this algorithm are the normalized grey values for template identification in the run-time camera. The detailed information such as perceived surface or the outward dimensions in dense edges are well processed by this algorithm.

3) *Gradient pyramid algorithm*

Gradient pyramid algorithm is limited to smaller edge pixel features and it fails to give desired values when the surrounding brightness level or intensity changes. However due to smaller data, the processing speed of this algorithm is very faster. Unlike grayscale value method, it is advisable to use the data samples of higher resolution in gradient pyramid algorithm. In lower resolutions, the actual quality and colour accuracy cannot well identified in this algorithm.

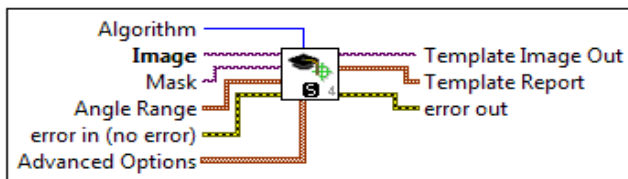


Fig. 6. IMAQ Learn pattern VI

F. *IMAQ match pattern*

IMAQ match pattern template identifies the template based on the prior learning of images using the IMAQ learn pattern palette.

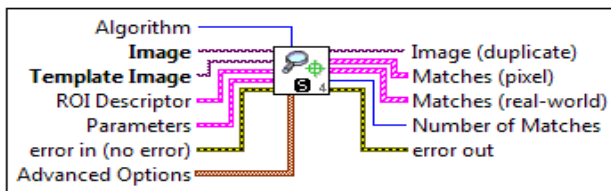


Fig. 7. IMAQ match pattern

Region of Interests (ROI) in the animal species are well described in the template descriptor. The template descriptor knows the parameters, parts, edges and dimensions of the specified template. With this learning, while performing pattern matching, it identifies the desired portion of the image which will be extracted from the animal species image. Then, the notable species is detected in the forest environment.

G. *IMAQ get color pixel value*

The image to be processed is fed as an input to the Color Pixel Value palette of color utilities. X coordinate and Y Coordinate represents the pixel values in the horizontal and vertical coordinates of the loaded image respectively. Image Src and Image Dst Out are the input and output parts for the source and destination images respectively. The colour pixel values

can be calculated by using the parameters of source and destination blocks in the get colour pixel value template.

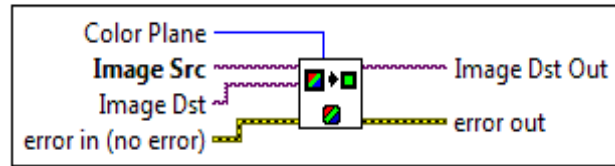


Fig. 8. IMAQ Get Color Pixel Value

H. *IMAQ Mask VI*

Masking is a process in which desired image is filtered from the background image.

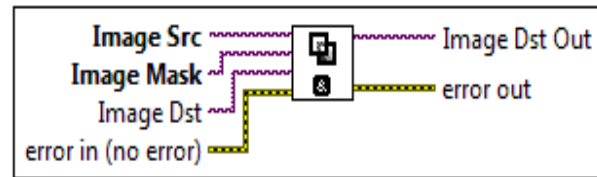


Fig. 9. IMAQ Mask VI

This proves that analyses of multiple images from the camera trap images is possible by eliminating the undesired features from the known or wanted features by matching with the nearest clusters.

I. *K-Means Clustering*

The k-means clustering is an unsupervised machine learning technique. The partition of different groups is carried out using K-means clustering. The clustering algorithm K means is used to group the input image or test samples into different k-sets or clusters. Each cluster has same number or nearest neighboring values. Therefore, the nearest mean values are grouped together. It initializes the hyper parameters of the K-Means algorithm. We can either directly set the hyper parameters or specify multiple values for each hyper parameter. K-means clustering algorithm splits the data image into different clusters. Each cluster has image pixel values of nearest values or neighboring cluster sets.

Based on the class values, K-means algorithm with the help of Machine Learning Toolkit embedded in the LabView software.

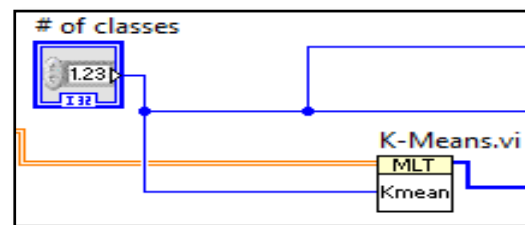


Fig. 10. K-Means Clustering

Thus, it symbolizes the presence of identical pixel values from the desired parts of the image. Hence by using K-means clustering, the image pixels with similar traits are segregated into separate groups in a more convenient manner when

compared to large sets of accumulated data.

J. IMAQ Extract Single Color Plane VI:

This IMAQ Extract Single Color Plane VI block in the colour utilities palette of NI vision development module is used to extract the single colour plane from the input image.

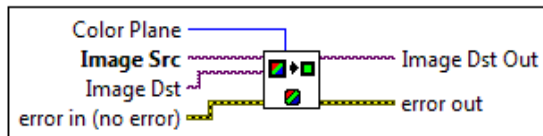


Fig. 11. IMAQ Extract Single Color Plane VI

7. Working

The image frames are processed by Labview program to extract the image features. NI Labview vision development module and NI vision assistant module is used to detect the features of an image. After detecting the images from the web camera or camera trap, the image features can be extracted and classified according to the need of the user for further processing. The characteristic features of an animal is taken as a template image for processing. These characteristic features may be facial features, body patterns or distinguished parts like horns, colour and shapes. The image features are the original characteristics or attributes of the image. These operations are of two kinds like punctual operations and group operations can be done for processing and image transformation.

K-means clustering techniques, image thresholding, masking and thresholding is done for processing the image.

The technique of pattern matching is used to detect the image frames in the interactive environment. The movement of the animal or any other particular specials must be well defined in the template image. The template image must be a unique image of the specified animal species. The template parameters can be initialised in the front panel of the Labview environment. The minimum match score and the number of matches to be identified must be declared initially before processing the control panel itself. IMAQ overlay rectangular palette is used to segment the images from the web camera.

8. Results and the Discussions

The creature species to be recognized from backwoods biological system is taken format picture. The layout picture can be substance of creature, horns for deer, rhinoceros and some body parts or facial pieces of different creatures. This method can be executed effectively for different purposes.

The living beings of marine biological system can be distinguished and characterized dependent on k-implies bunching of living beings by sequencing with closest groups of the picture. The botanical species grouping can likewise be accomplished by classifying informational collections of different blossoms with appropriate information in design coordinating.

There are restrictions in recognizing the specific creature species mean some recognized creatures because of their

shading complexities and disappointment in foundation adaption with the web camera.



Fig. 12. Original cow image



Fig. 13. Identification of cow



Fig. 14. Identification of dog

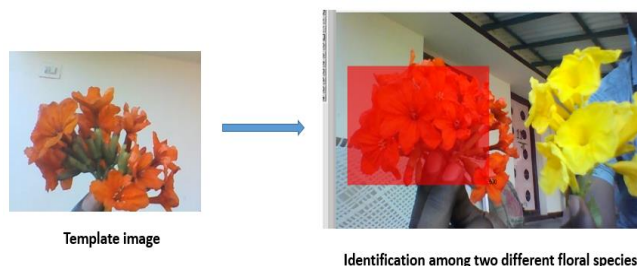


Fig. 15. Identification of floral species

The orange coloured flower is taken as template image. It is classified from the two different animal species. The orange coloured flower is distinguished from the yellowish flower. The colour of the species is taken as pattern.

9. Conclusion

The location and recognizable proof of various creature species in its regular environment is broke down in a greatly improved when the Labview methods and AI strategies are joined. The joined use brings about a superior arrangement of people from shifted types of creatures. In this manner, it assists with distinguishing and perceive the designed individual species and components productively.

These methods make ready for dispensing with complexities in tallying jeopardized species and for social occasion data over wide territory like India for Tiger populace and species distinguishing proof. The subsequent framework vigorously recognizes wanted highlights, dismissing foundation and concentrates them over a particular timeframe.

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