Solving Bird Image Overlapping for Automatic Population Counts of Birds Using Image Processing

M.Tech. Embedded Systems

16ES603 Signal and Image processing

Mini Project Report

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ABSTRACT

We believe it is now more important than ever that our natural environment is taken into account and protected. Birds count in their own right, and the health of our bird populations provides a way of knowing whether our natural environment is properly protected and whether development is sustainable. In this project we try to solve bird image overlapping for counting population of birds using image processing. There are 4 main methods for doing so. Firstly we do the Gray scale conversion where the input image is converted into gray image. Secondly, Thresholding operation which is used in removing the background. Thirdly, Noise removal where the unwanted noise spots are removed and finally boundary tracing where the counting and labelling of birds occur.

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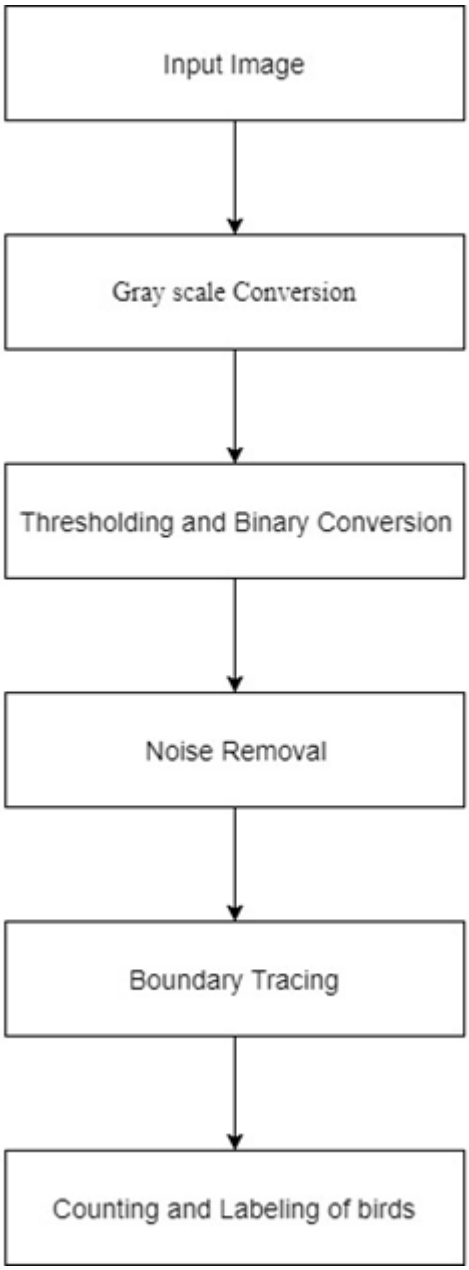
INTRODUCTION

Birds are sensitive indicators of biological richness and environmental trends and fulfil many key ecological functions; they contribute to our understanding of natural processes. That makes counting bird population for assessment of the abundance of ecosystem very important. We try to use the method of image processing to count the number of birds. Bird survey can be made easy to a large extend if we are able to accurately find the number of birds in an image. The factor that severely affect the accuracy of the method is the efficiency in differentiating the overlapped birds. In this project we propose a simple method for automatically determining the number of birds in an image including the overlapped ones. The proposed system involves converting the input image into a format such that the number of birds can be calculated through a series of steps based on the connected components present in the image.

BLOCK DIAGRAM



METHODOLOGY

In this project we have devised mainly 4 steps to solve the issue of counting the number of birds namely Gray scale conversion, Thresholding and binary conversion, noise removal and boundary tracing.

1. Gray scale conversion :

   The input images of different resolution and size is obtained from the internet and is converted into gray scale using the inbuild function in mat lab rgb2gray and the resulting gray scale image is given to the next stage for thresholding operation.

2. Threshold operation:

   Thresholding of image is the process of converting gray level information of the image to two-level information. We use otsu's method to find the threshold value of the whole image and the threshold value is used to separate the background from the foreground and converting the image to binary image. All the values less than the found threshold value is assigned to be '1' and higher values to '0'. Thus obtaining complemented binary image. This image is fed to the next stage.

3. Noise removal :

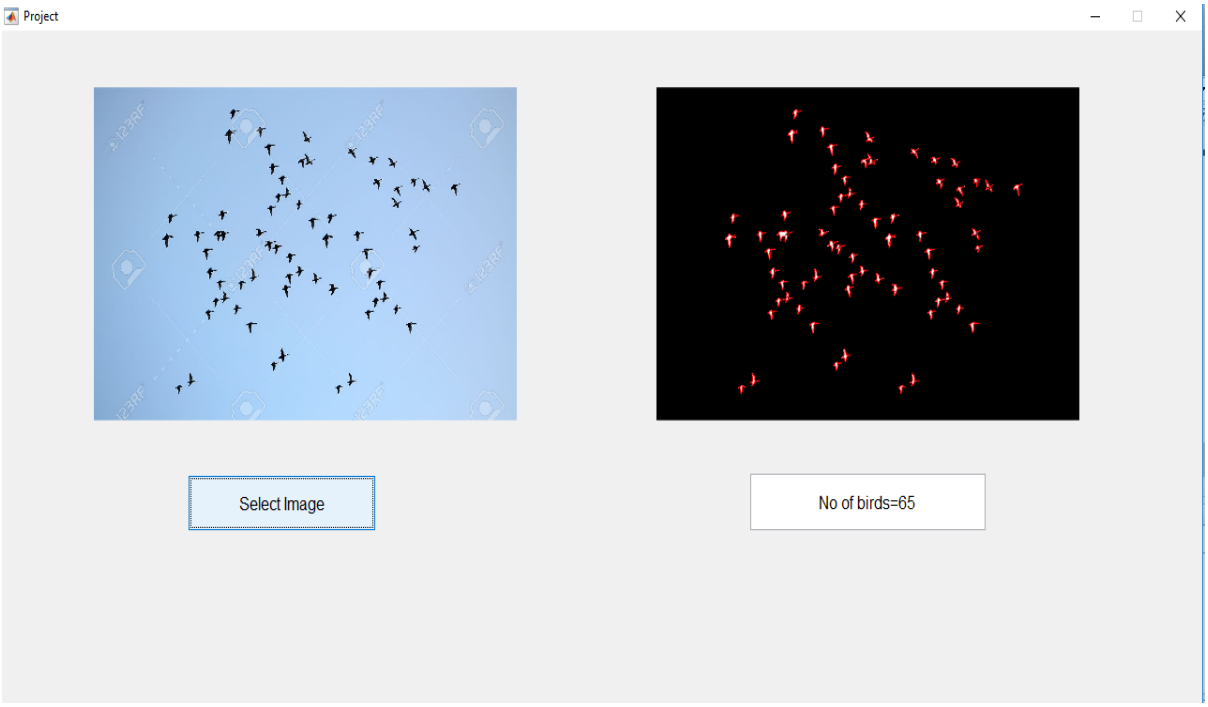
   The input complemented binary input may contain unnecessary black dots which should be removed from the image which is taken care by this stage. We removed all connected area whose diameter is less than 5 pixel using the function bwareaopen and then removed the holes within the birds image using imfill.

4. Boundary Tracing:

Boundary of each bird was traced using the function bwboundary and each bird was labelled at their centre of mass by using regionprops (to find the centroid).

After performing the above explained process the image is now ready to be counted. They are fed to the process of counting and the result is displayed in the GUI.

SIMULATION RESULTS



CONCLUSION

This project proposes a methodology for detection, tracking and counting of birds an image. A background subtraction technique based thresholding gives fast and accurate results for the foreground object detection task.For obtaining the best precision we removed the unwanted noise spots present in the image.Yet this system has not been able to fully eliminate the false detections.

REFERENCES

1. Lilli, 12 November 2011. Retrieved December 26 2015, from krautrosen.de/Thread-Vogelgschichten?page=4

2. Wallpaperup,8 Jan 2014. Retrieved December 26 2015, from www.wallpaperup.com/219273/Flock_of_Birds_sky_bokeh_(12).html

3. MGR Online, Find Red duck birds Thousands of Chiang Mai bird-watch enumeration indicates the environment is also good. Retrieved December 26 2015, from www.manager.co.th/asp-bin/viewgallery.aspx?newsid=9560000013008&imageid=2543851

4. Ayuwat Jearwattanakanok, 7 January 2009. Crane Watching at Izumi. Retrieved December 26 2015, from www.unravel-photo.blogspot.com/2009/01/crane-watching-at-izumi.html

5. S. Arora,J. Acharya,A. Verma,Prasanta K. Panigrahi, Multilevel thresholding for image segmentation through a fast statistical recursive algorithm, Pattern Recognition Letters, Elsevier, vol. 29, pp. 119-125, January 2008.