CSc 8980 - Project Report

Bird detection and tracking from stationery camera videos

S M Towhidul Islam

Abstract

Realtime bird detection is important in several important applications such as aviation safety, wildlife surveillance, agricultural bird control and so on. In this project, I aim to detect birds from stationery camera videos and track the movement. To achieve this goal, First, I have extracted foreground from input video frame. Then, I filtered shapes which can potentially represent birds. Then, I have estimated motion using Kalman filter and visualized the tracking results on original video frames.

Problem Statement

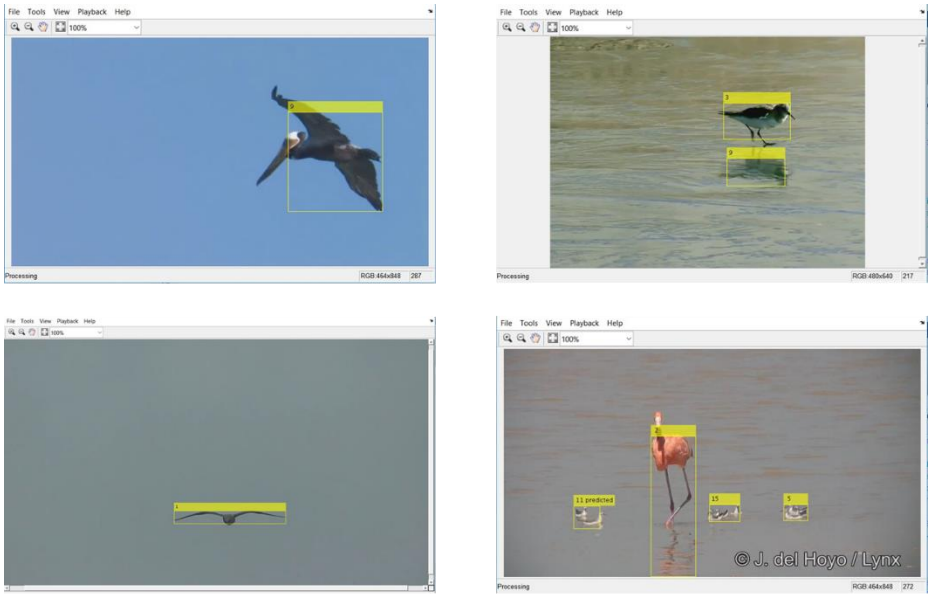
The goal of this project is to detect birds from a stationery camera video and track the detected regions.

Approach

- First, I have applied gaussian mixture model-based foreground extraction
- Then, I find out group of connected pixel regions which represent different moving objects. Also, I computed different properties of each region such as area, bounding box etc.
- Then I filtered out the shapes which are not a potentially a bird shape. The filtering is based on criteria such as area of a detected region, height to width ration, shape of the connected region etc.
- Then, I estimated the motion of each region using Kalman filter and saved different information for each tracked region.
- Finally, I visualized detection and tracking results on original video frame.

Results

I tested the system with different input videos containing moving birds. The videos contain different types of birds moving/flying in different outdoor environments. A few of the detection and tracking results is shown in the figure below –



Results based on different input videos

**Link to code and presentation materials:*

https://github.com/sislam9/cv-project-fall-2018

References

1. Qunyu Xu and Xiaofeng Shi (2014). A simplified bird skeleton based flying bird detection. Proceeding of the 11th World Congress on Intelligent Control and Automation.

2. Li, Y., Yin, Y. and Xu, B. (2009). Bird Objects Detection and Tracking on the Wild Field Circumstance. 2009 WRI World Congress on Computer Science and Information Engineering.

3. Zhang, X., Wu, X., Zhou, X., Wang, X. and Zhang, Y. (2008). Automatic Detection and Tracking of Maneuverable Birds in Videos. 2008 International Conference on Computational Intelligence and Security.

4. Shakeri, M. and Zhang, H. (2012). Real-time bird detection based on background subtraction. Proceedings of the 10th World Congress on Intelligent Control and Automation.

5. Motion-Based Multiple Object Tracking, https://www.mathworks.com/help/vision/examples/motion-based-multiple-object-tracking.html

6. VB100 Video Bird Dataset, http://arma.sourceforge.net/vb100/