Infrared Segmentation

Presentation By:
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Dataset:

- Dataset used in this assignment for training is

  Dataset 01: OSU Thermal Pedestrian Database

- Training Directory: 00010.zip (24 images)
- Test Directory: 00004.zip (18 images)

Objective

- Segmentation based on Thresholding.
- Find a method to only detect required objects without any clutter.
- Try to maximize the detected object.
- Try to minimize the False positive.
- Tabulation of detected object vs actual objects.

Method for thresholding

- Global Thresholding
- Local Thresholding
- Adaptive thresholding

Challenges

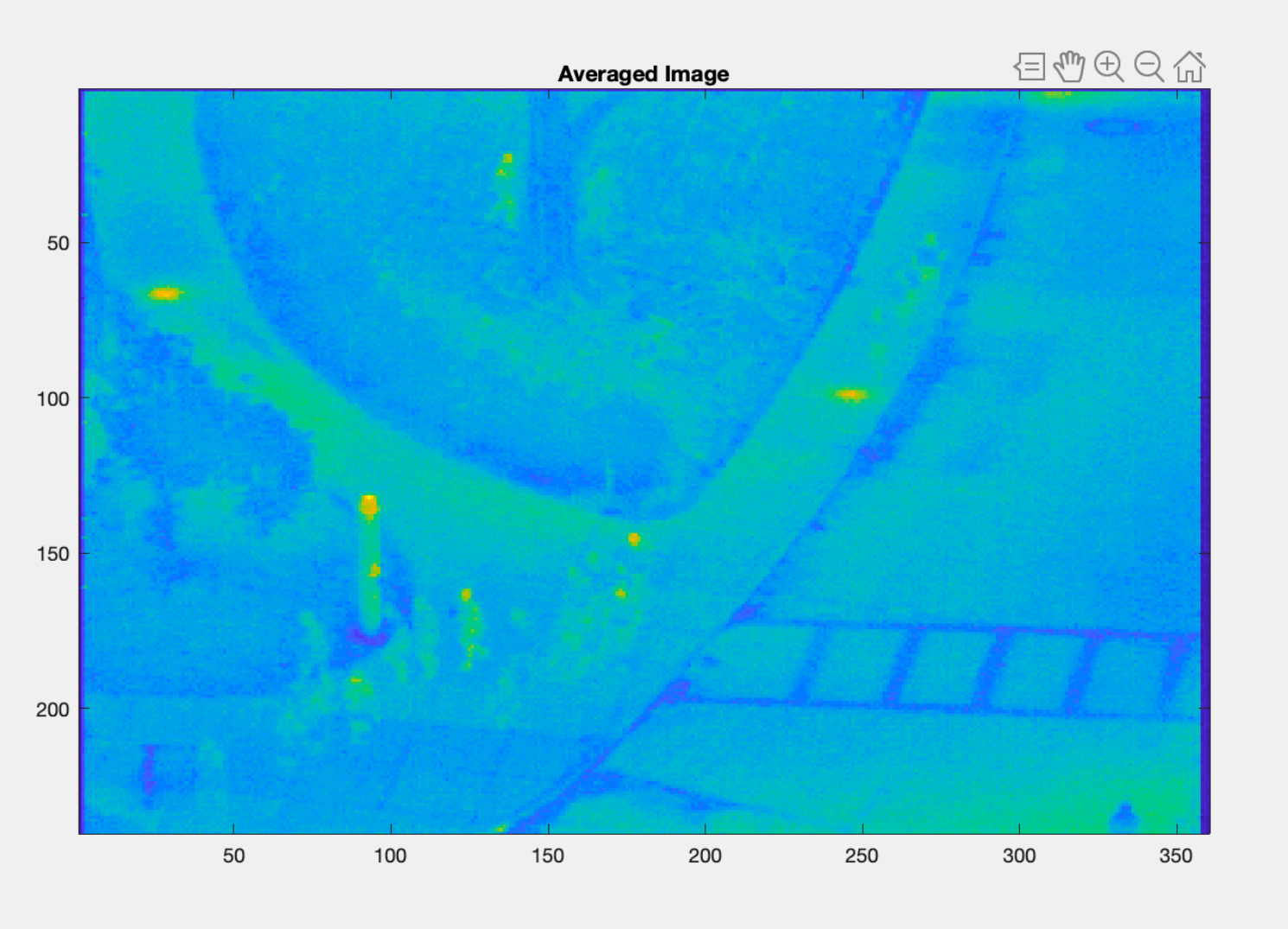
- Lightening condition.
- Grouped object.
- Unnecessary objects reflecting ir light.
- Part of the body not showing in infrared image.

Method used

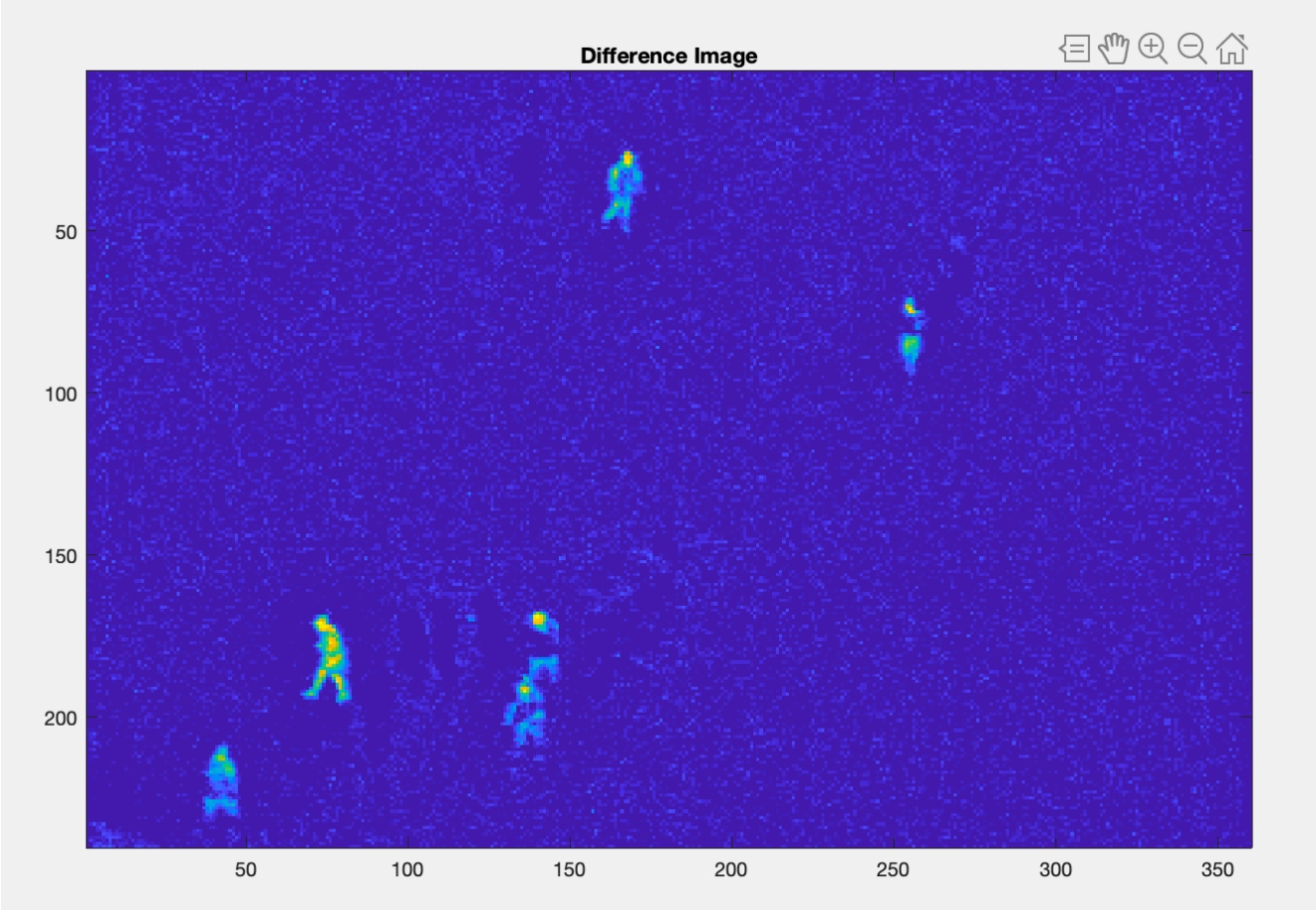
1. Use the images from training directory to learn the scene.
2. Use image averaging to get the background.
3. Use this background image and subtract it from each image having that background.
4. Get the Difference Image.
5. Get the Histogram and set the threshold value at 30 (Based on Histogram).
6. Get the Binary image based on threshold value of 30.
7. Use Dilation and erosion to treat an object.
8. Get all the Labels for the object and show them.
9. Once trained use this algorithm for testing on another directory.

Original Image #5 of training directory

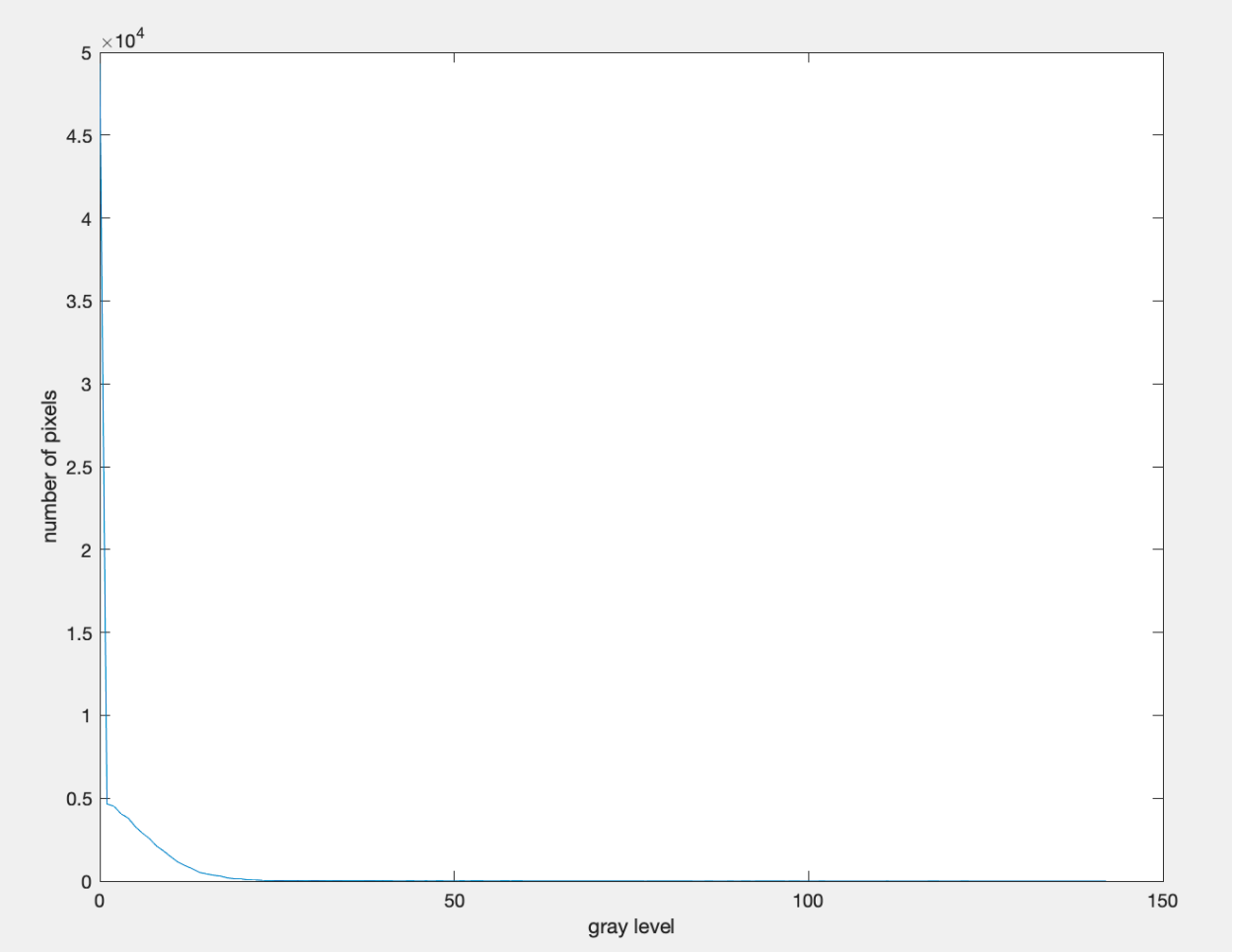
Results (Average image of 5 images)



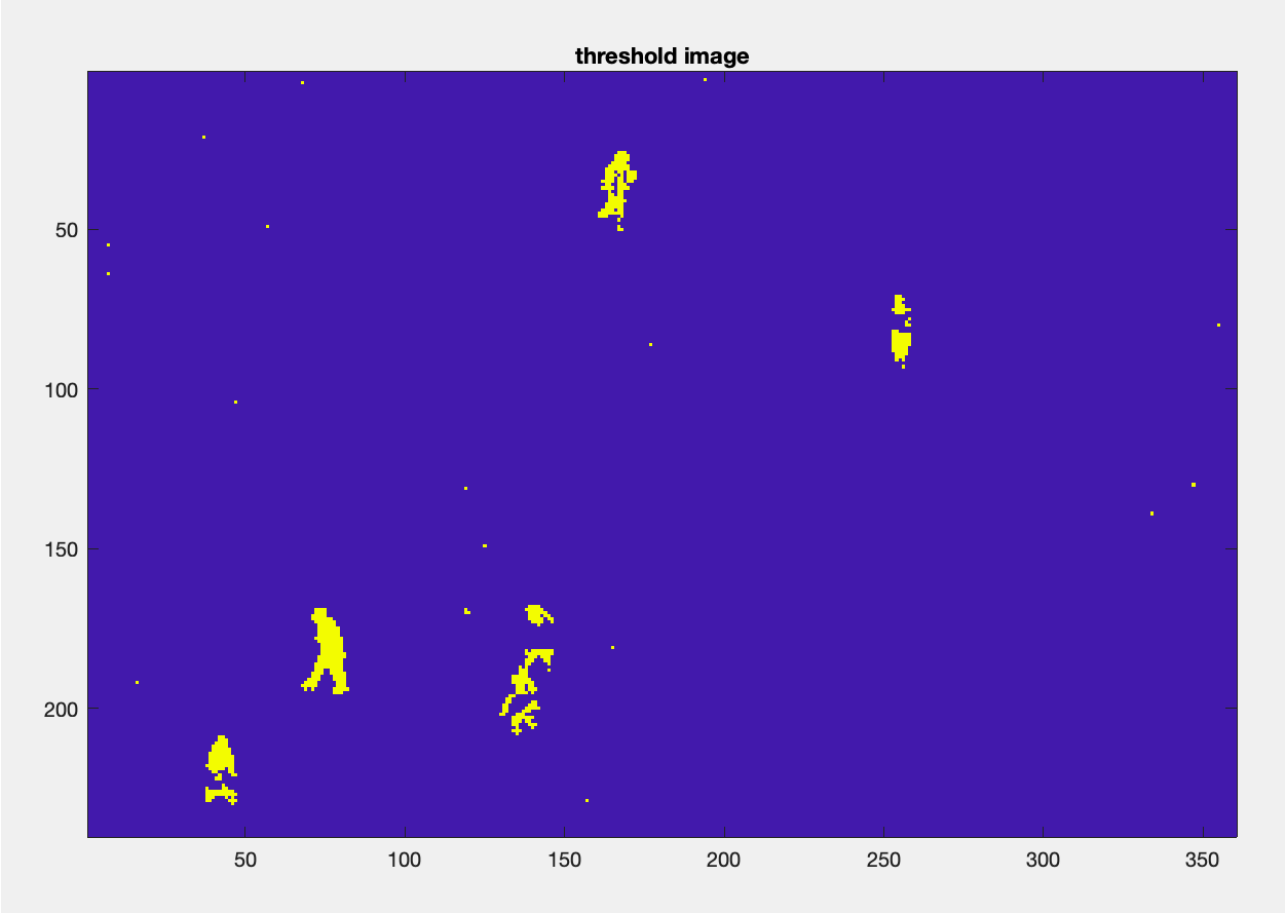
Difference image



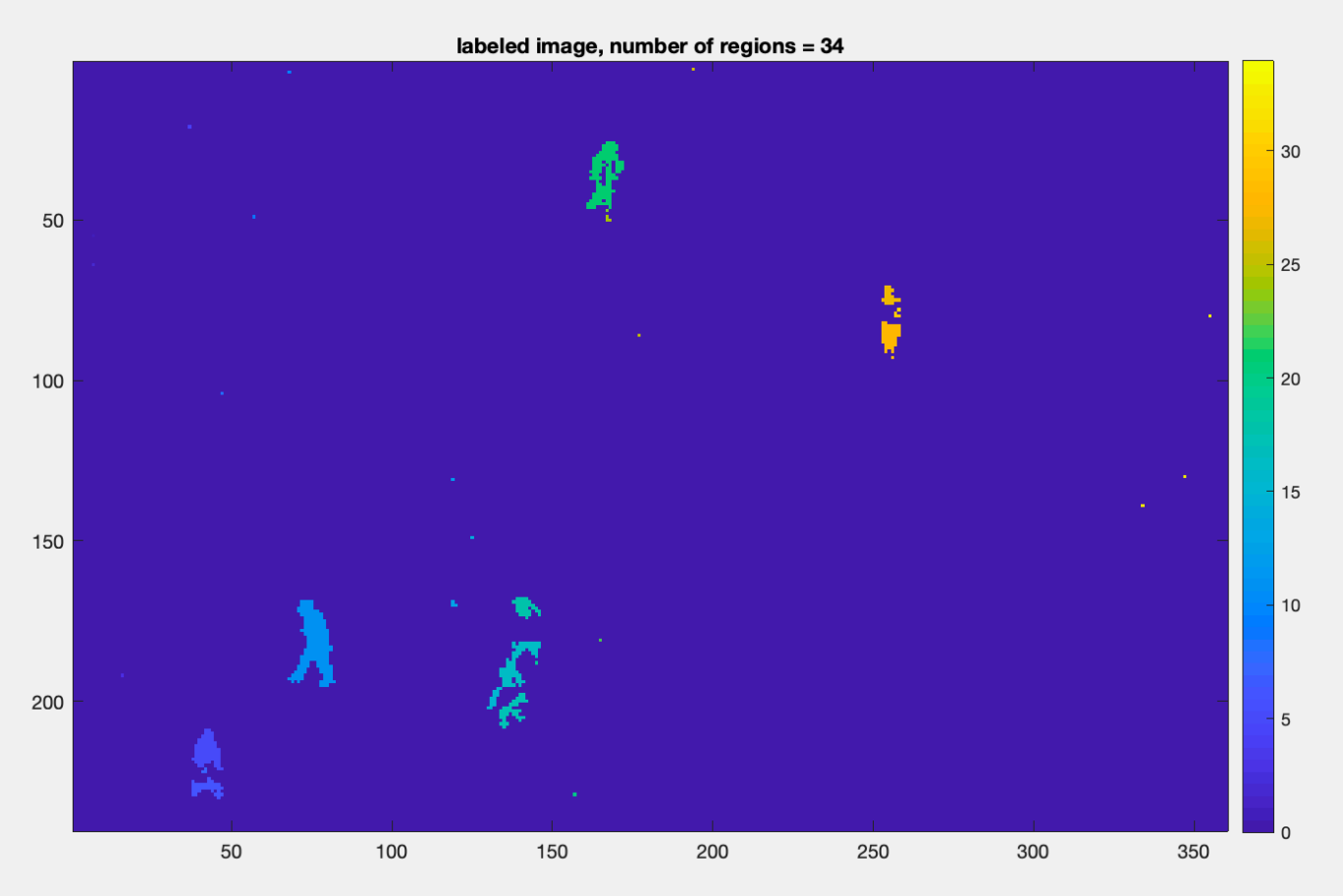
Histogram of difference image



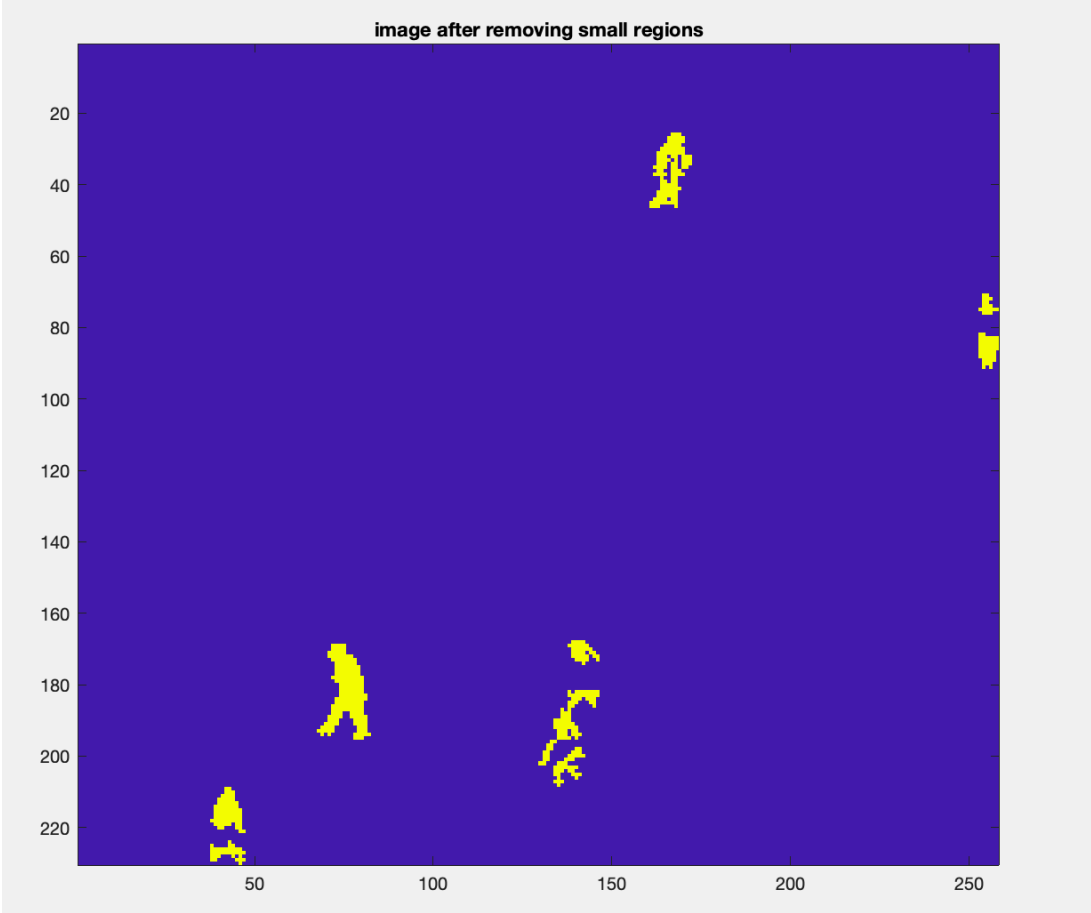
Threshold image



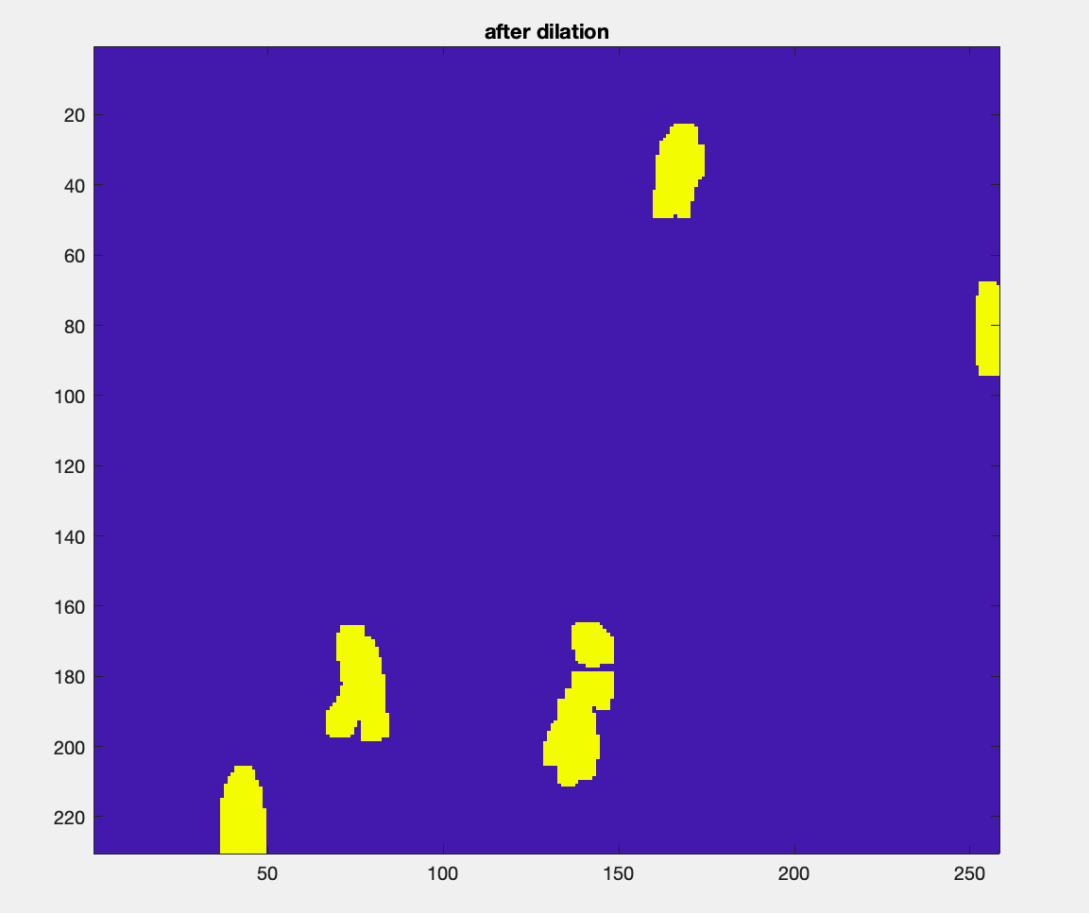
Labeled image



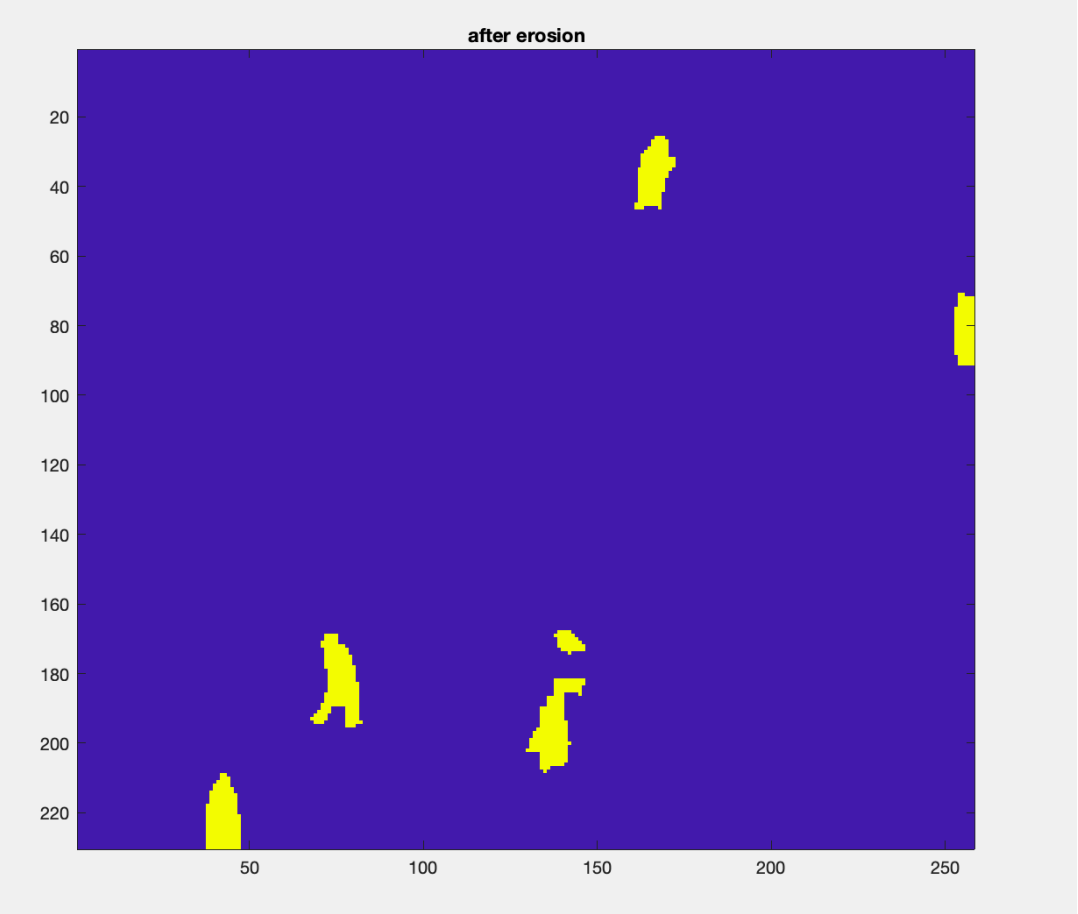
Remove small region (need to be cautious)



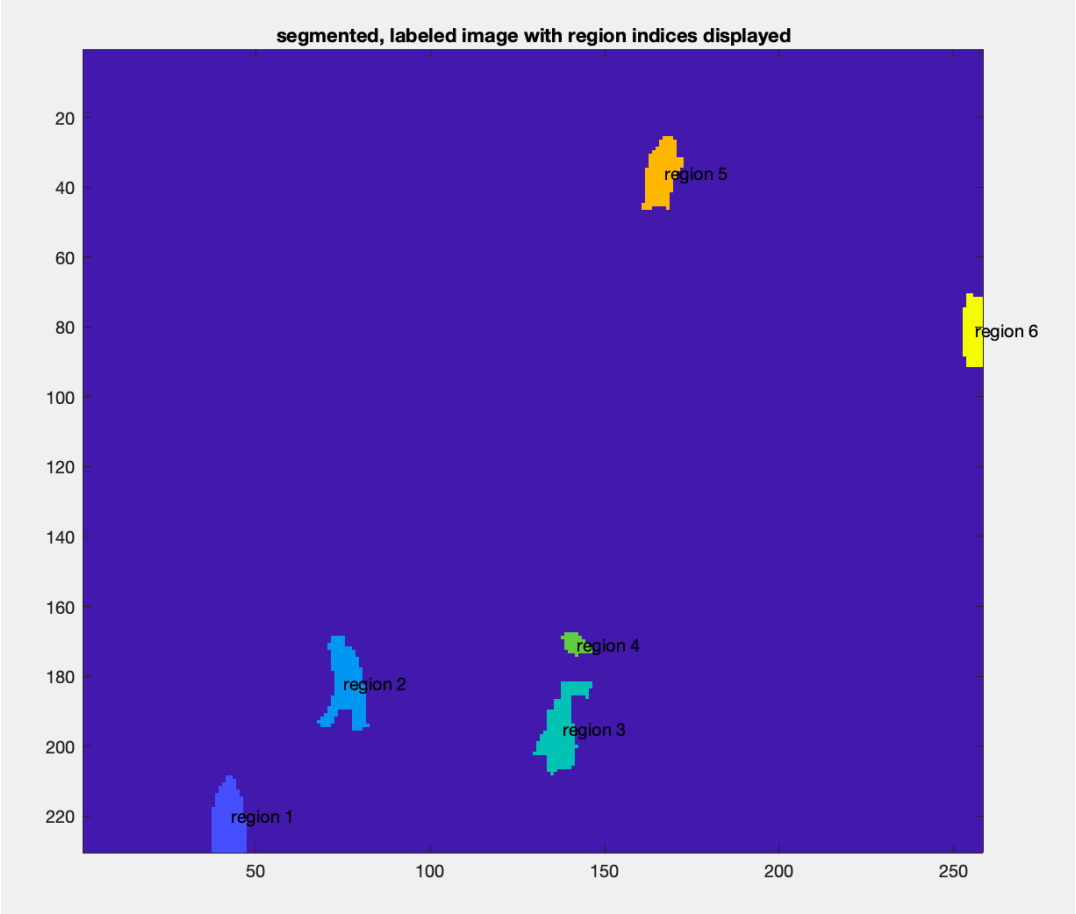
Dilation


after dilation
20
40
60
80
100
120
140
160
180
200
220
50
100
150
200
250

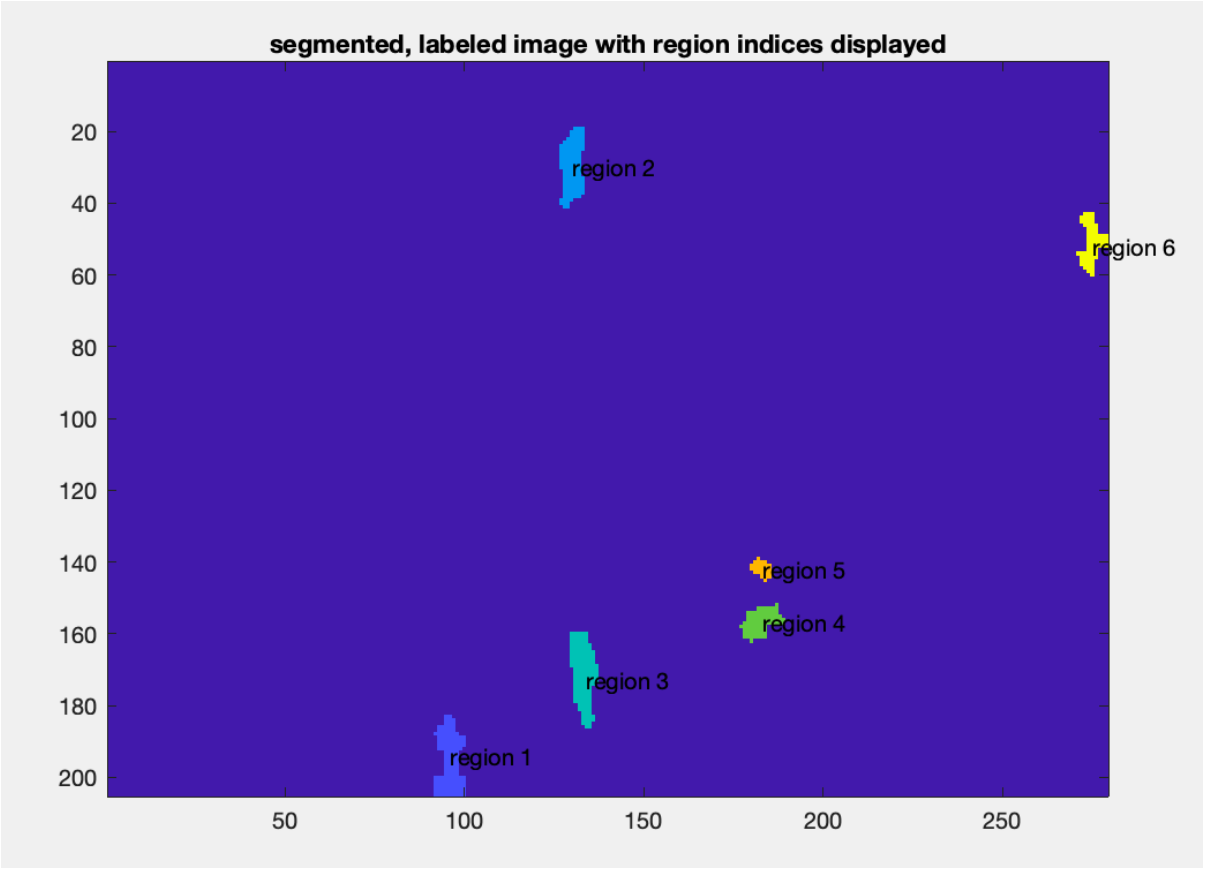
Erosion


after erosion
20
40
60
80
100
120
140
160
180
200
220
50
100
150
200
250

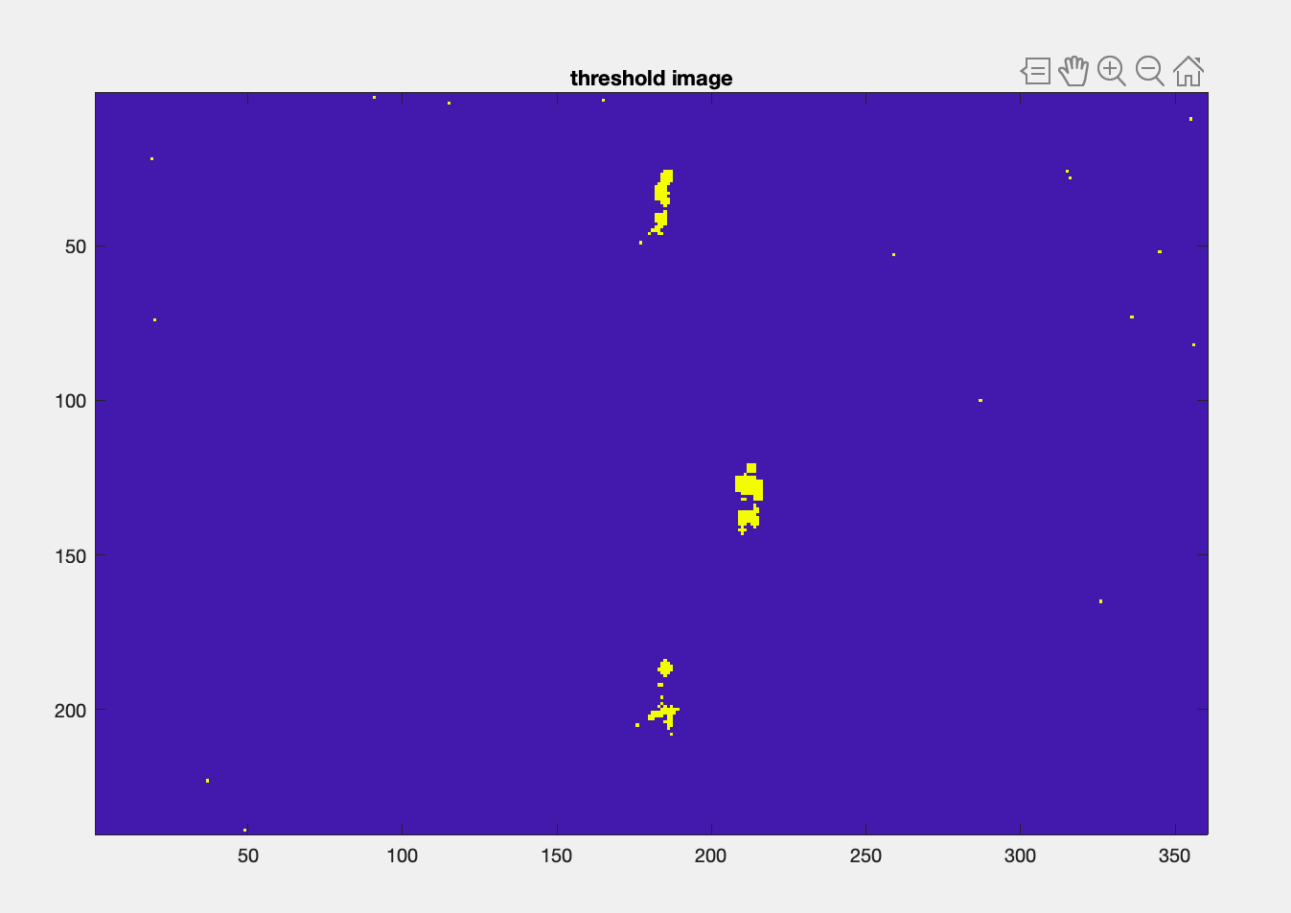
Labeled image



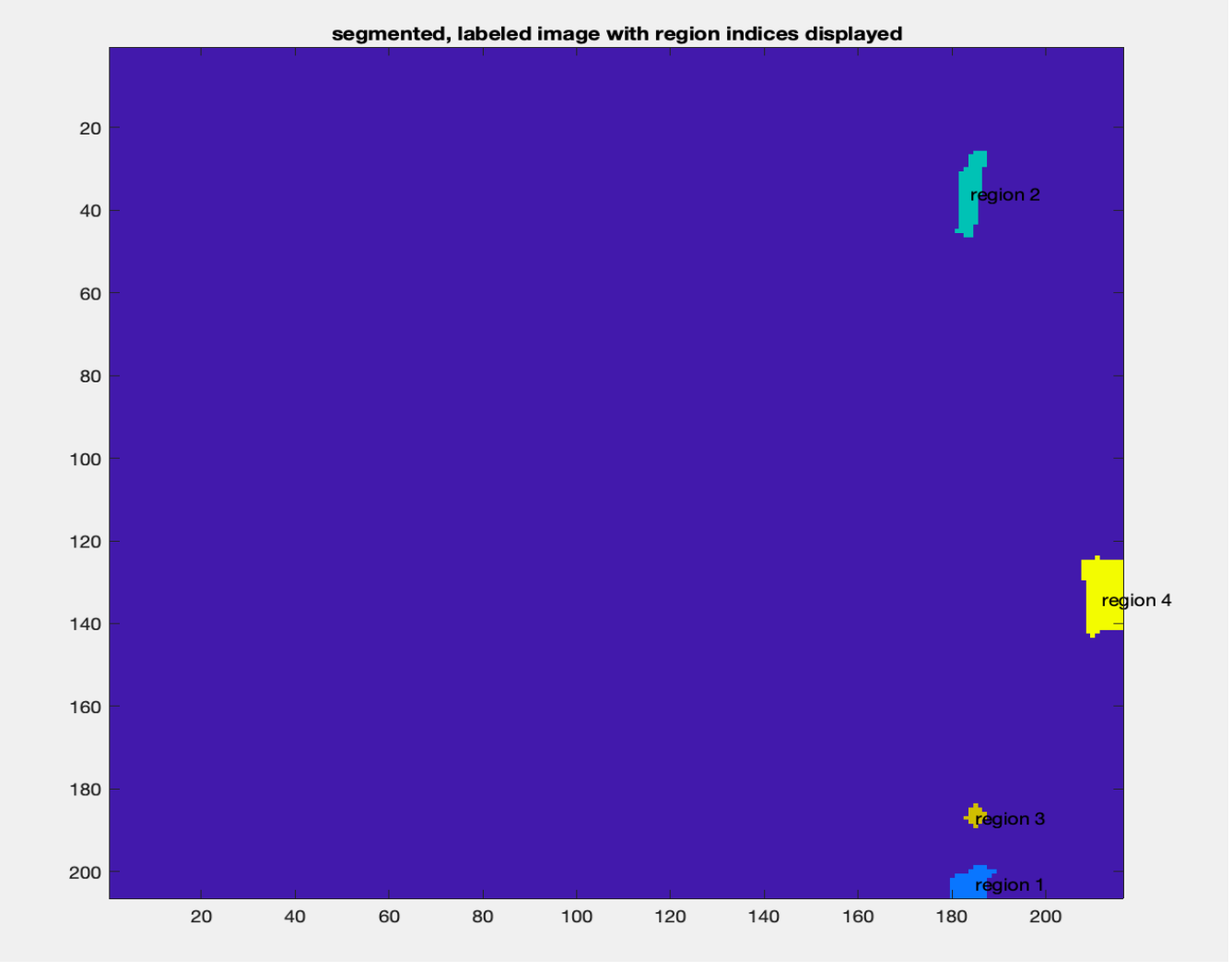
Two people passing by (Output)



A case of over detection:

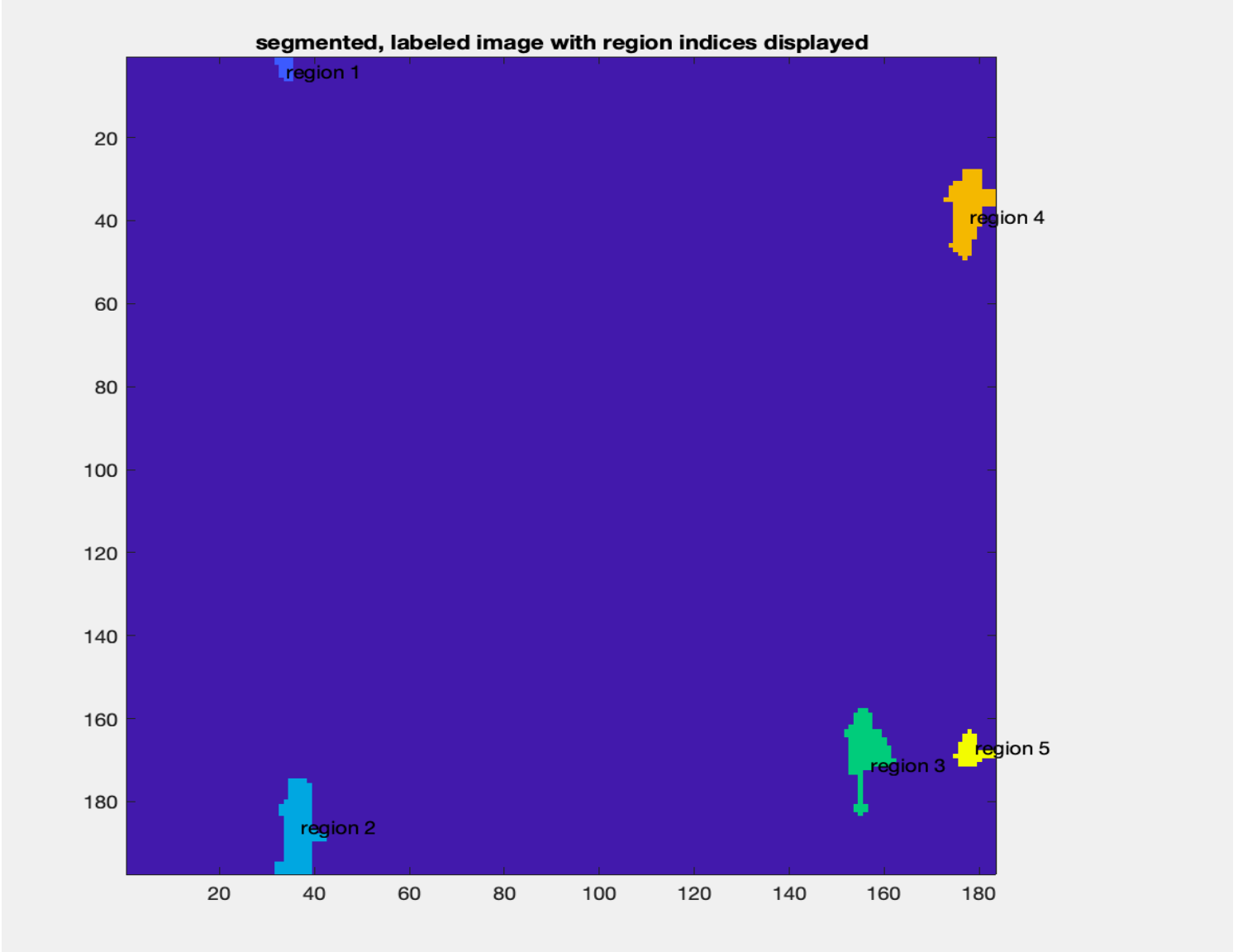


A case of over detection:



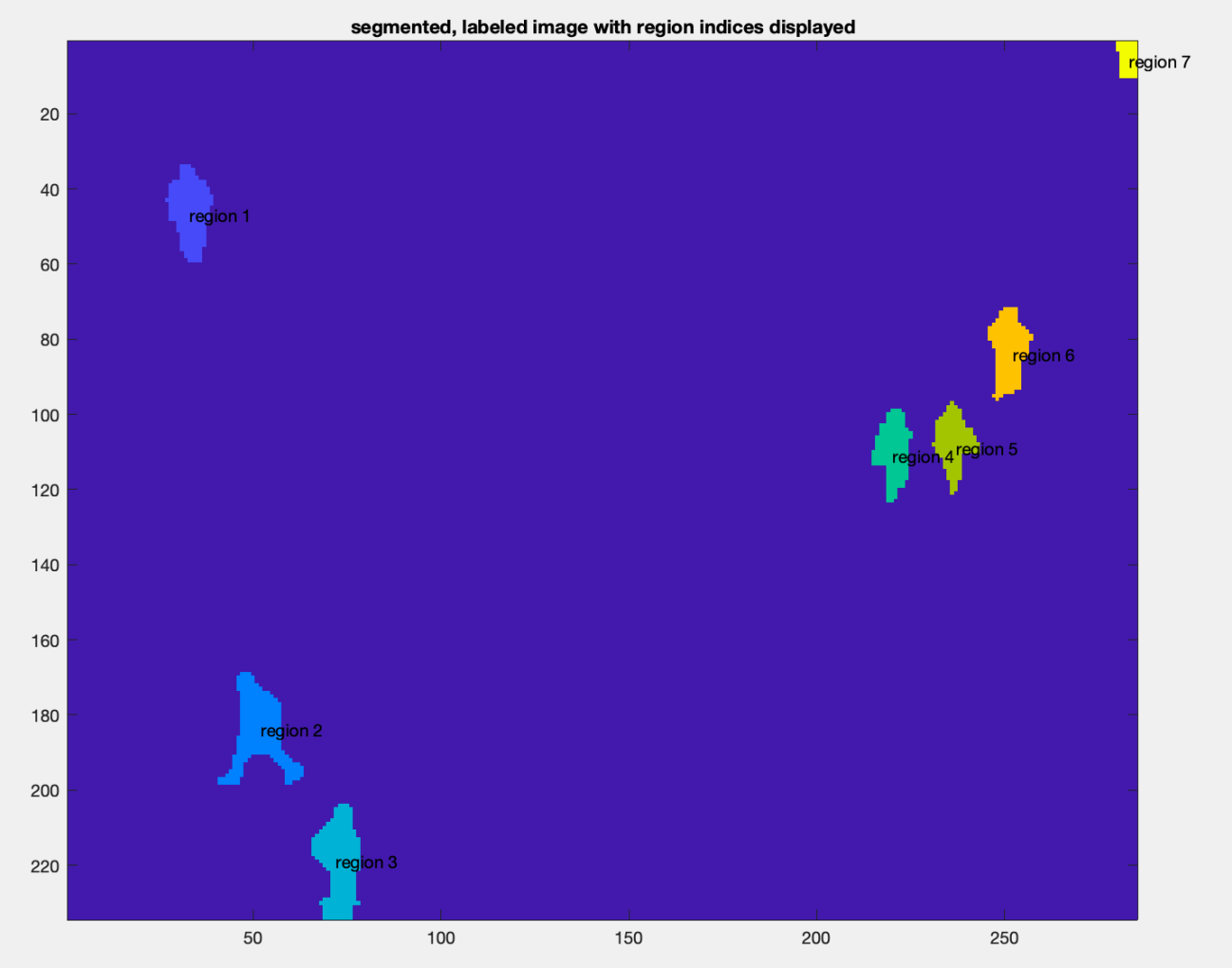
Interesting case

Detected region 5:



Test Directory

Result for image 15 (test directory)



No False positive but needed better dilation

Image	Detected	Actual
1	6	6
2	6	6
3	5	5
4	5	5
5	6	6
6	6	6
7	4	4
8	3	3
9	3	3
10	2	2
11	4	3
12	4	3
13	4	3
14	4	3
15	4	3
16	5	3
17	5	4
18	3	3
19	5	5
20	5	5
21	5	5
22	4	4
23	5	5
24	5	5

Conclusion

- Achieved around full accuracy in Test directory properly finding perfect object detection.
- No false positive detected at all.
- Seven cases were there which had over detection for the same object because of the less IR body reflectance. (Need better dilation and erosion structuring element).