CV5330 Project3

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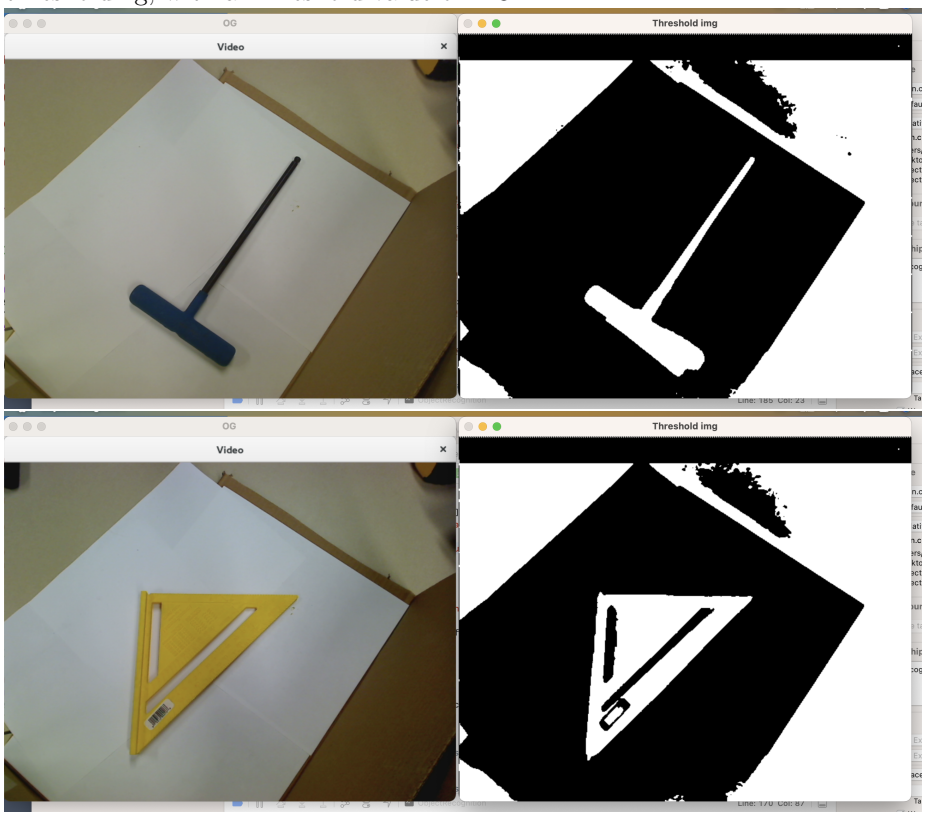
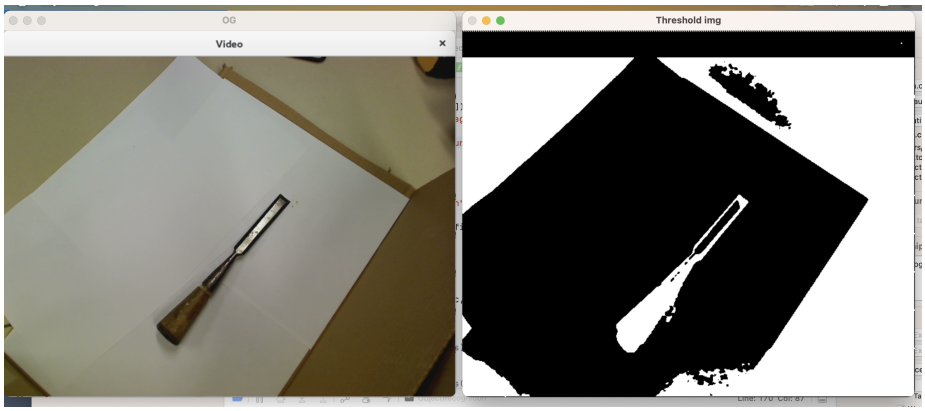
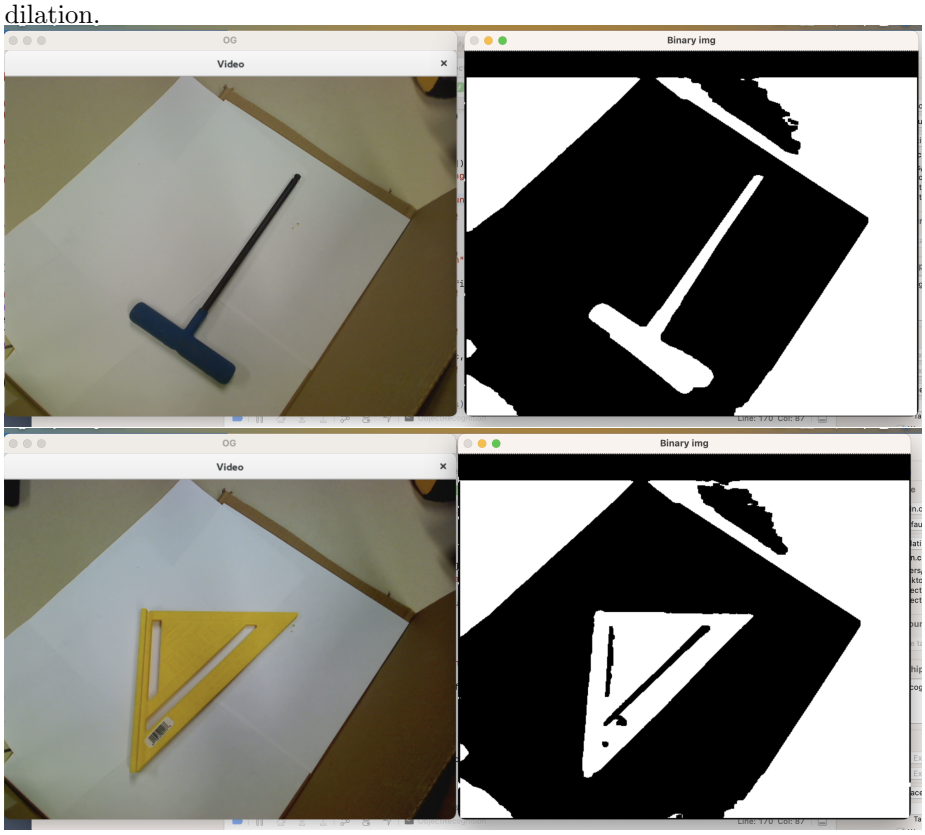
Task 1 : Threshold

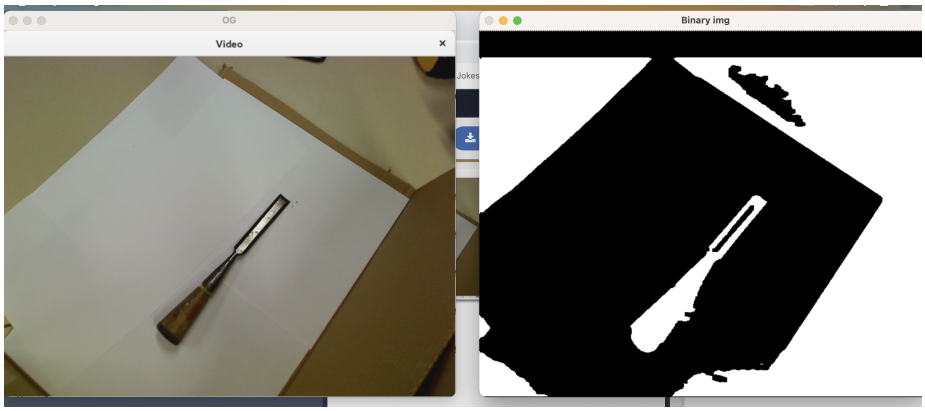
I've performed thresholding by first increase intensity of the backgroung, and then saturation of every pixel. I've then applied a Gaussian filter, perfomed thresholding, with a Threshold value of 128.



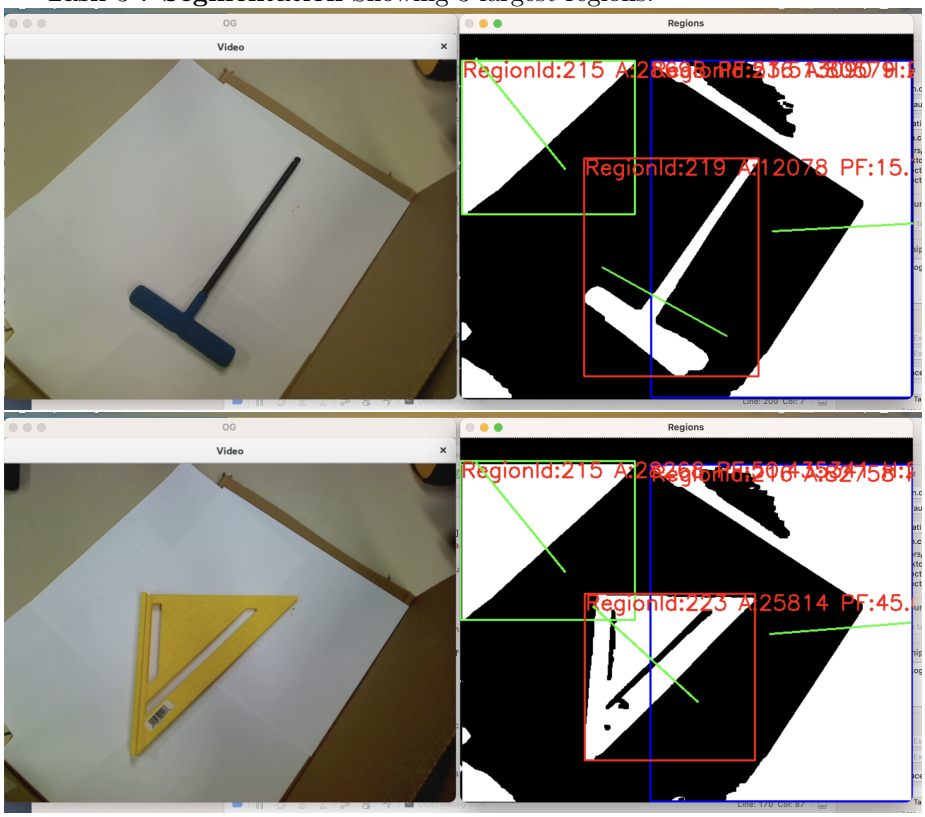


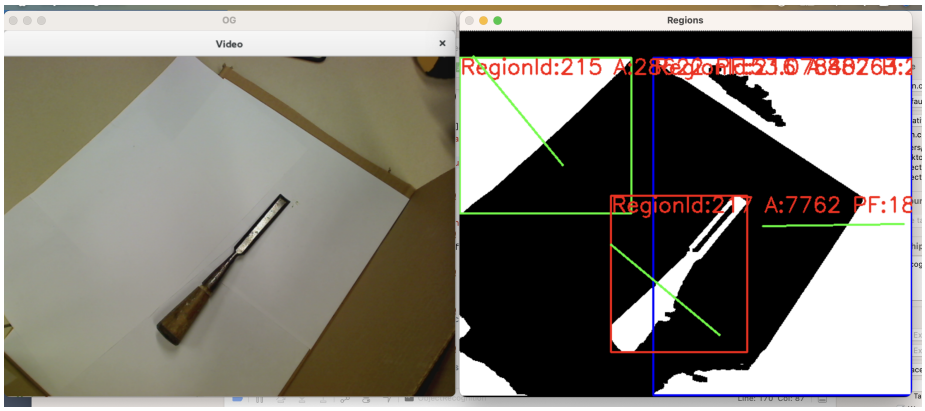
Task 2 : Binary image Performed 4−connect erosion and a 8−connect dilation.



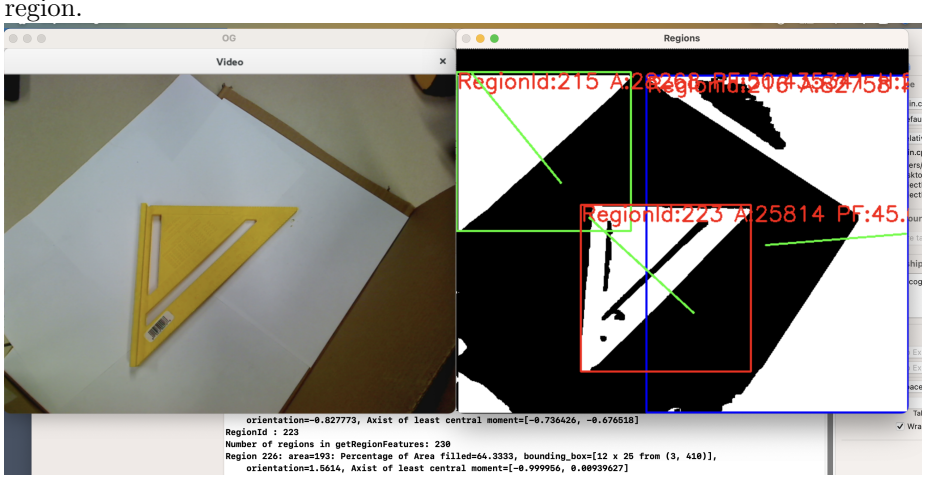


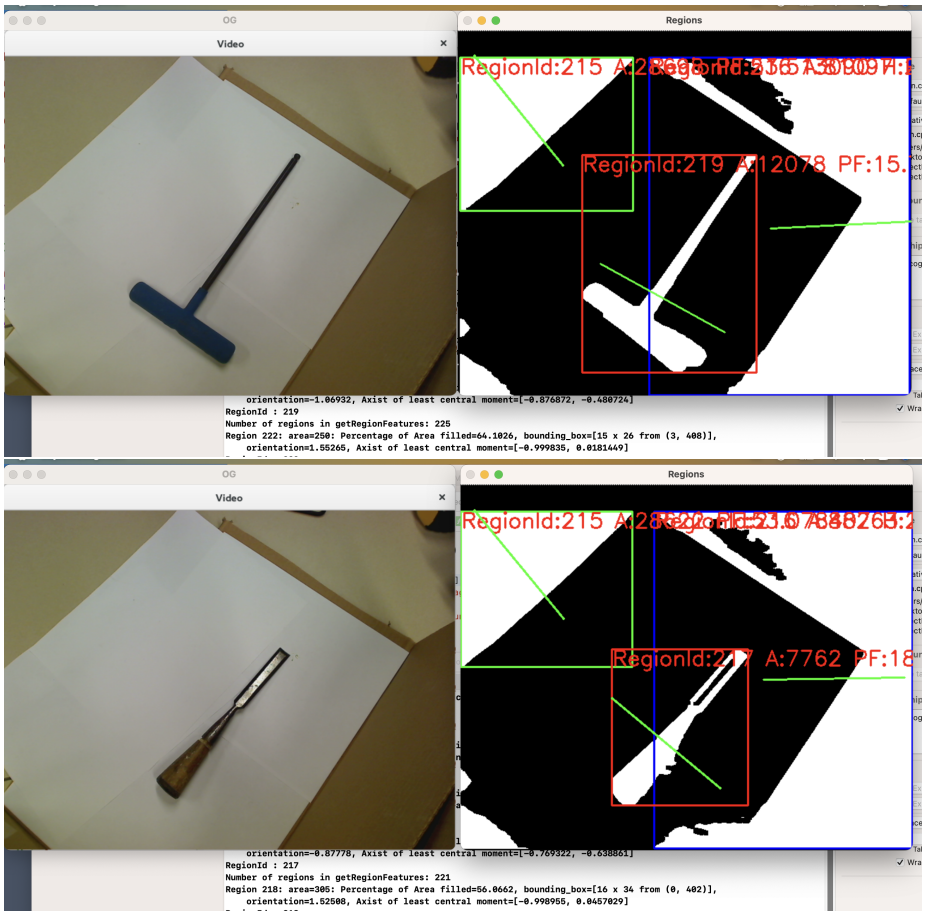
Task 3 : Segmentation Showing 3 largest regions.





Task 4 **: Compute features** Features i've computed are Area or region, percentage filled, Height, Width, Moments NU02,NU20. The region id and features are written on each region.Please note the features computed are show at the bottom of each image. The axis of least central moment is shown on each region.

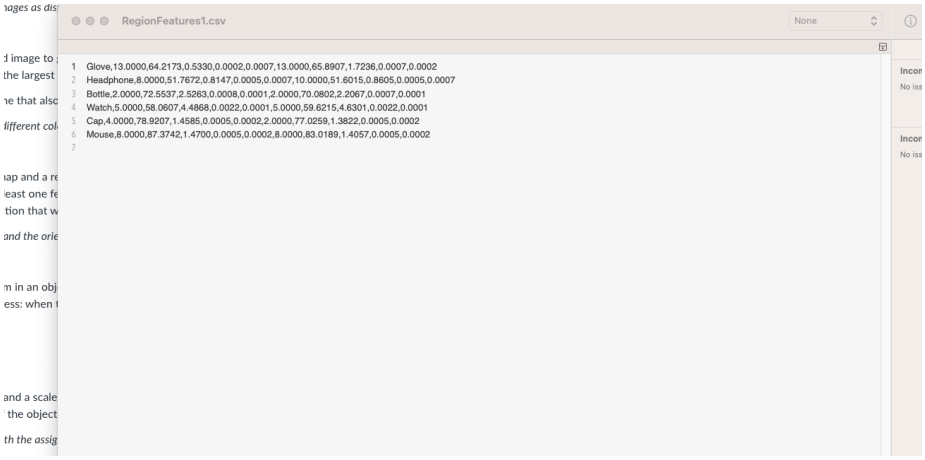




Task 5 : Collecting training data i've used a Bottle, Mouse, Watch, Cap, Headphones and a glove to create training data. With different orientations of each of these objects, i've created multiple features of the same object. The features i'm using to compare objects are

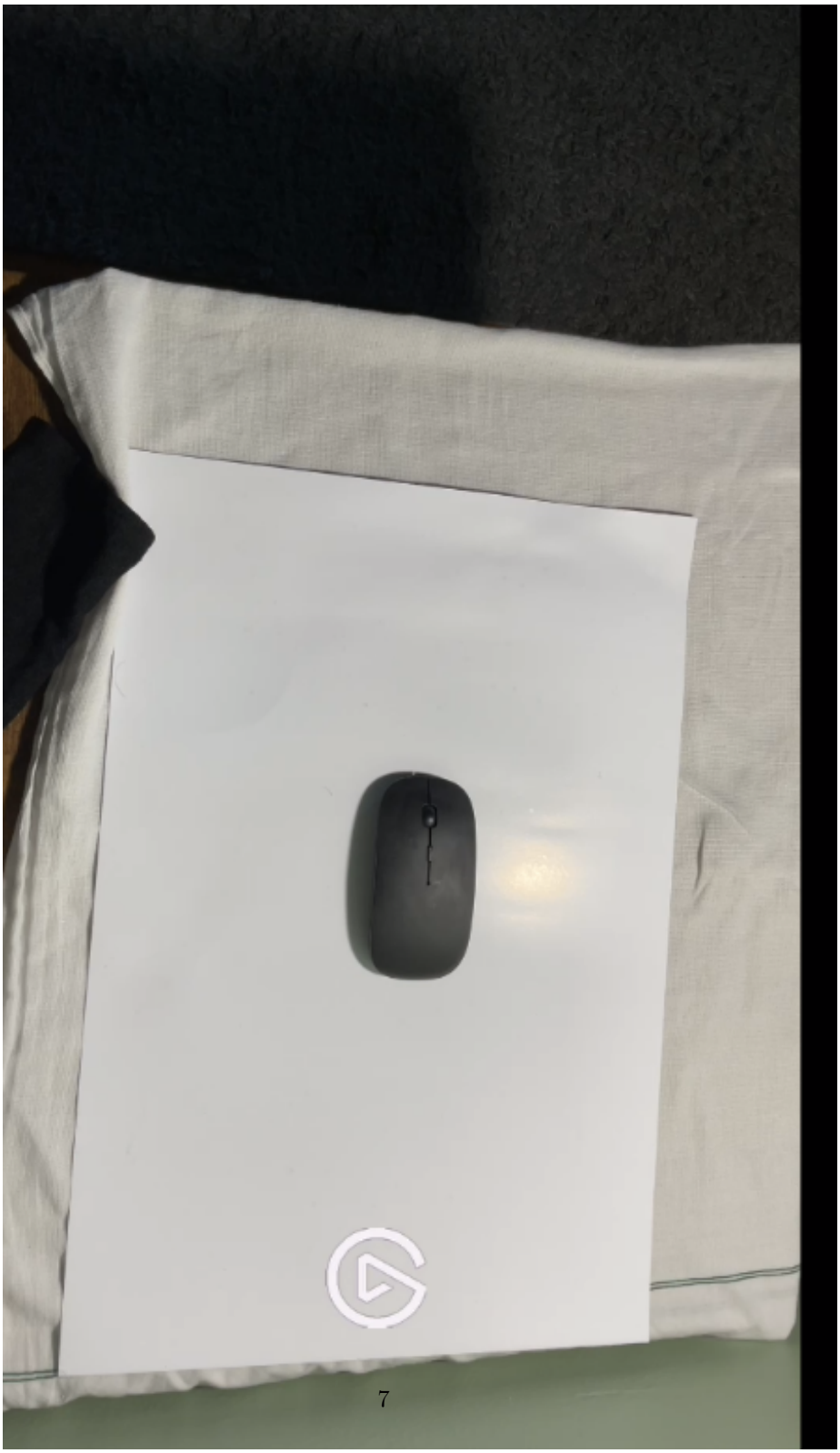
- Percentage of area filled
- Ratio of height and width
- Normalised Moments.MU02
- Normalised Moments.MU20

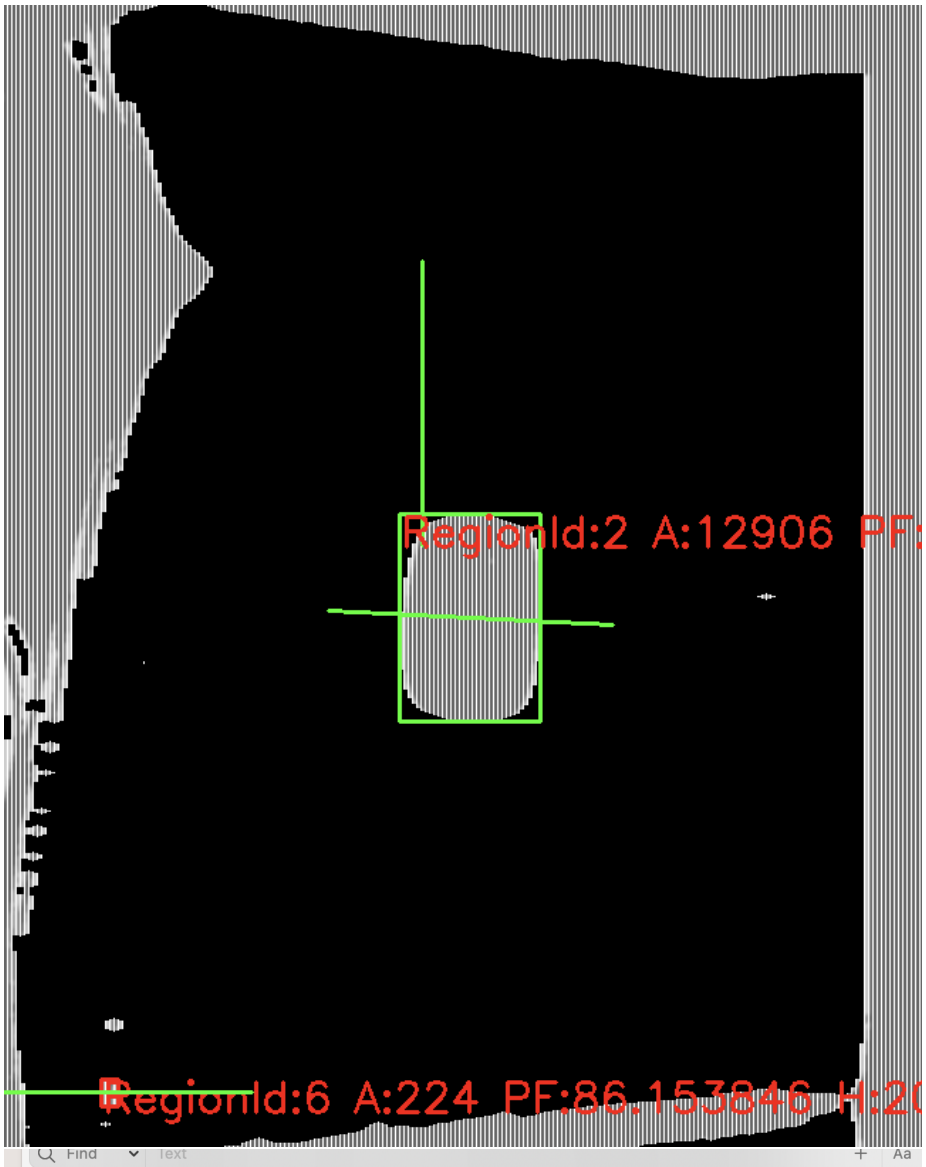
Here's a csv with features saved.



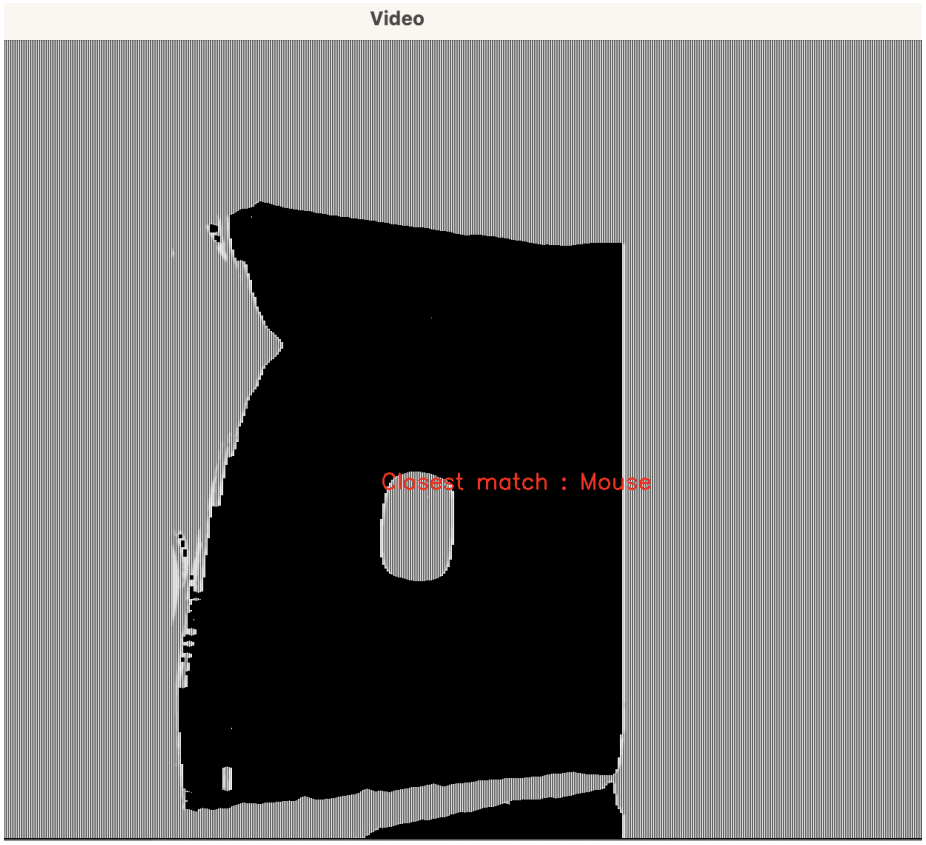
Here you can see two instances of each object.

Task 6 **: Classify new images** I've calculated the absolute euclidean distance of a new object with every object in training data. I've then classified the object to the training data with least distance. Following is how a mouse is classified.





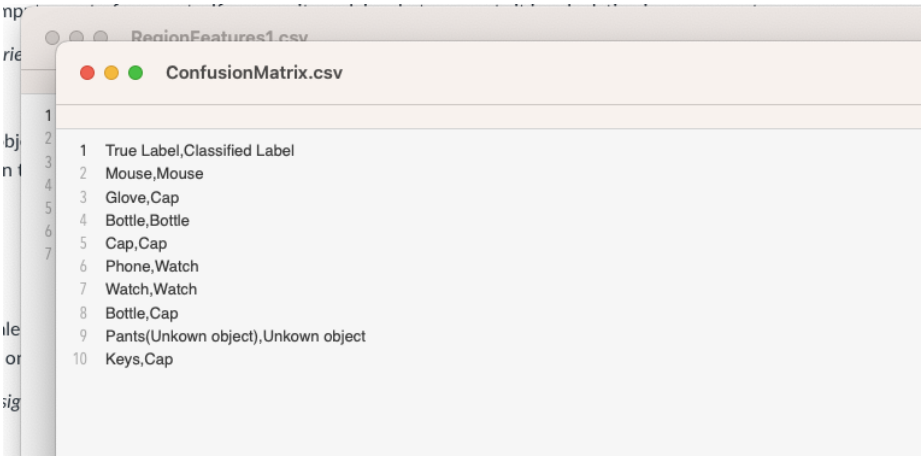

```
Target compared to Cap, distance : 8.6146
Label:2.000000,PF:77.025902,H/W:1.382200,MU02:0.000500,MU20:0.000200
Target compared to Cap, distance : 10.5857
Mouse : Label:8.000000,PF:87.374199,H/W:1.470000,MU02:0.000500,MU20:0.000200
Target compared to Mouse, distance : 0.1496
Label:8.000000,PF:83.018898,H/W:1.405700,MU02:0.000500,MU20:0.000200
Target compared to Mouse, distance : 4.5692
closest Match : Mouse Distance : 0.1496
Write text parameters. (x,y) = (936,583)
```



Task 7 : Different Classifier I've implemented a KNN, where K=5. I've done this by getting the five closest neighbors of a new image, and then classified the output to the mojority in five closest neighbours.Here's the console output of KNN and image output.

```
closest Match : Mouse Distance : 0.3204
KNN: Printing first 5 closest images.
Key: Bottle, Value: 2
Key: Cap, Value: 2
Key: Mouse, Value: 2
Reading /Users/venkysundar/Desktop/CV5330/Project3/RegionFeatures1.csv
```

Task 8 : Evaluate results Here's the confusion matrix. The classifier isn't accurate. I dont see it being reliable, since the output isn't always as expected. I suspect a better distance metric, or better features may improve the classifier.



Task 9 **: Video** Video : https://youtu.be/rTOzEXsQsY4

Task 10 **: Extension** I've added logic to compare distances while clawebssifying images. When the distance of a new object is farther than sum of all features, then i classify the object as Unkown. The true image used here is a ski pant.