Activity 13 Perceptron

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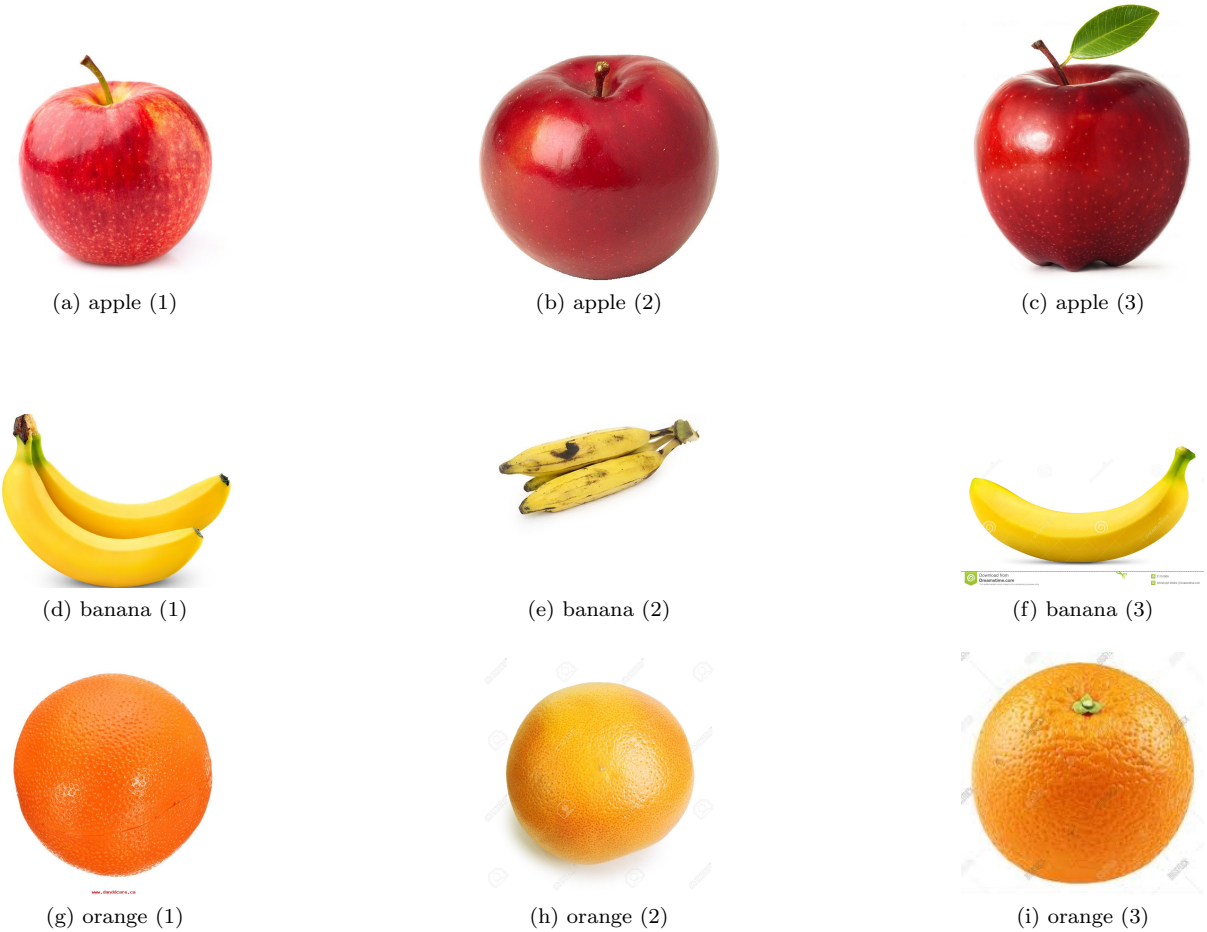
Objective(s)

1. Plot fruit feature data points into the feature space.
2. Compute for a decision surface between two classes and overlay the decision line onto the feature plot.



(a) apple (1) (b) apple (2) (c) apple (3)

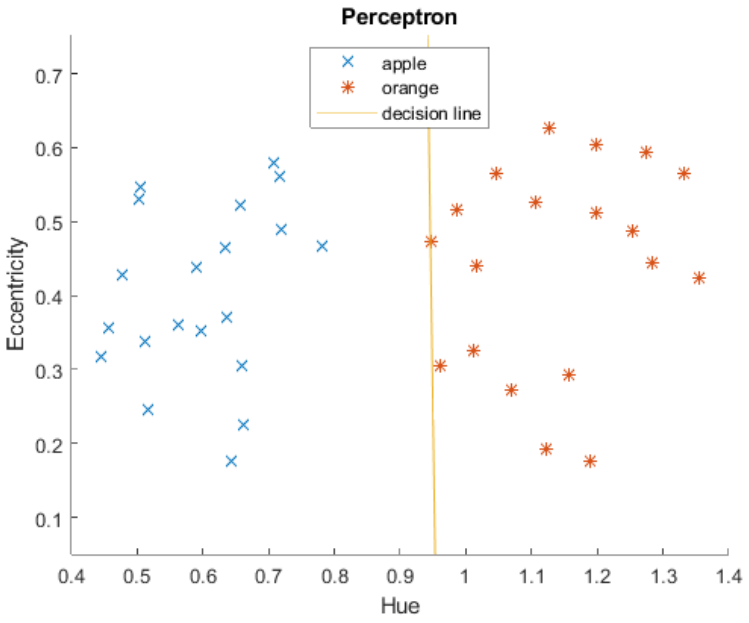
(d) banana (1) (e) banana (2) (f) banana (3)

(g) orange (1) (h) orange (2) (i) orange (3)

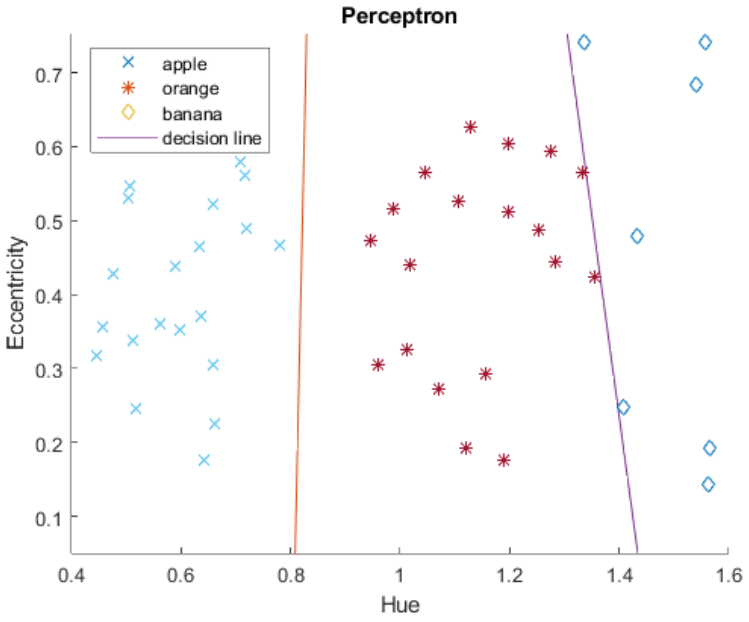
Figure 1: Sample of the test Images used [1]

Results

Figure 2: Sample of post processing and feature extraction of data. [2]



(a) 2 Classes (Apple and Orange)



(b) 3 Classes (Apple, Orange, and Banana)

Figure 3: Decision from fruit feature data.

Comment(s)

Post Processing. Figure 2 shows a brief preview of the post processing that occurs for one image. The main tools used were regionprops and non-parametric segmentation which was used for the blob analysis. The L*a*b* values of the image were also obtained to determine its hue for an accurate measure of the object's color. The feature data points were obtained from post processing such that the eccentricity and hue of the object can be extracted from the image. These data points were then used for the perceptron algorithm.

Decision Line. Figure 3 shows the feature space and the respective feature data points obtained from the image data sets. The decision line was obtained by adjusting each weight for each class feature and it was calibrated such that the labels assigned to each class can be predicted perfectly. The error was minimized such that it is below 0.01 and then the weights are then converted into an alternative form of the equation of the decision line [3, 4].

Self-Evaluation

I would rate myself a 10. The objectives for this activity was met. The image data sets were properly processed such the each of the image's features are extracted via regionprops and hue values from its L*a*b values. The decision line was successfully plotted onto the feature space such that it gave a clear division between each class found on the feature space. Things I would like to improve on the activity is the accuracy of the segmentation such that the image is perfectly segmented such that the blob obtained is 100% without any loss from the segmentation.

Acknowledgement(s)

I would like to thank my friends who I asked for help regarding the activity if what I was doing was correct. In particular, I would like to thank Rhei Juan and Kenneth Domingo who helped clear out some confusions I had in the activity. Specifically in helping me to understand how to properly do the perceptron algorithm and pointing out the syntax errors in my code.

References

[1] G. Search, Google images (2019), last accessed 29 October 2019, https://www.google.com/search?q=images.

[2] TheMathWorksInc., regionprops (2006), last accessed 10 October 2019, https://www.mathworks.com/help/images/ref/regionprops.html.

[3] M. Soriano, A13-perceptron.pdf.

[4] M. Soriano, Machine learning intro.pdf.