Activity 14 - Perceptron for Logistic Regression

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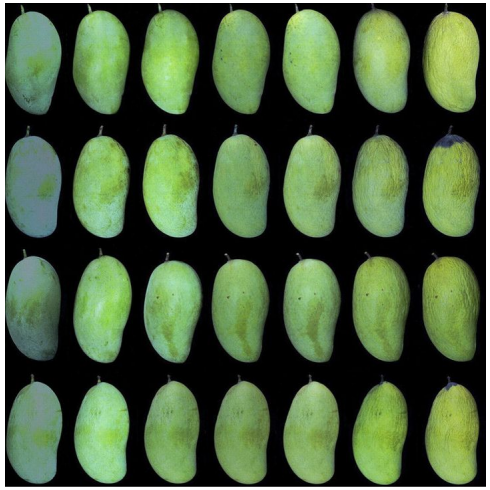
Images of ripe and unripe mangoes

ripe mangoes



unripe mangoes

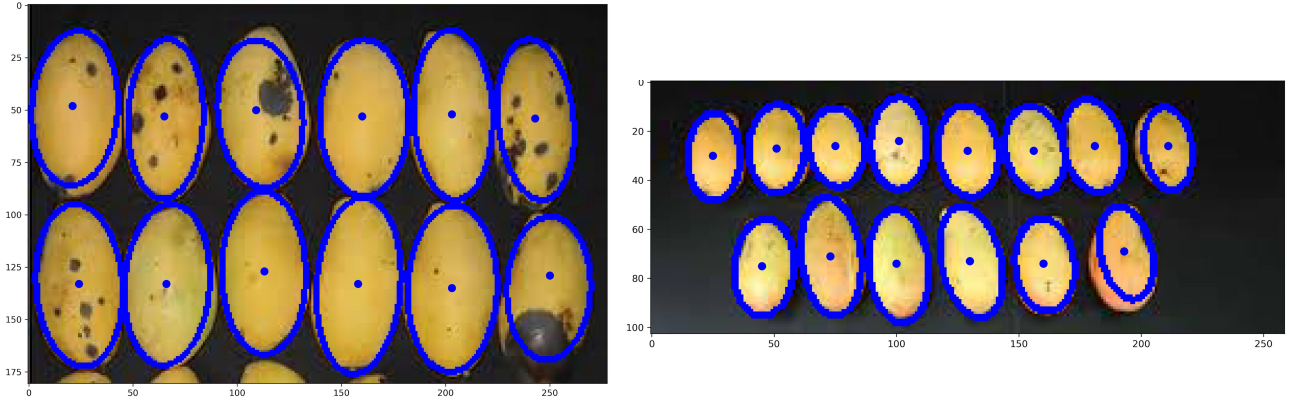
I focused on mangoes typically found in the Philippines (green to yellow). I didn't include mango variations found in other countries (green to red-yellow).

Test Images

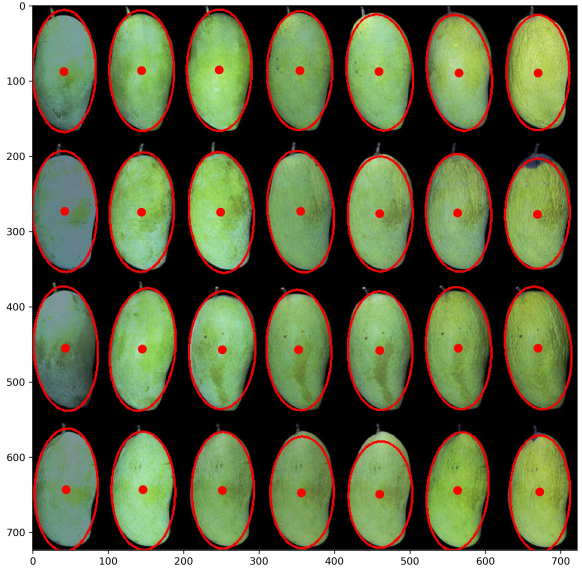
unripe mangoes → ripe mangoes

These are my test images. I arranged them by ripeness based on just visual inspection.

Feature extraction: Training data set



ripe mangoes

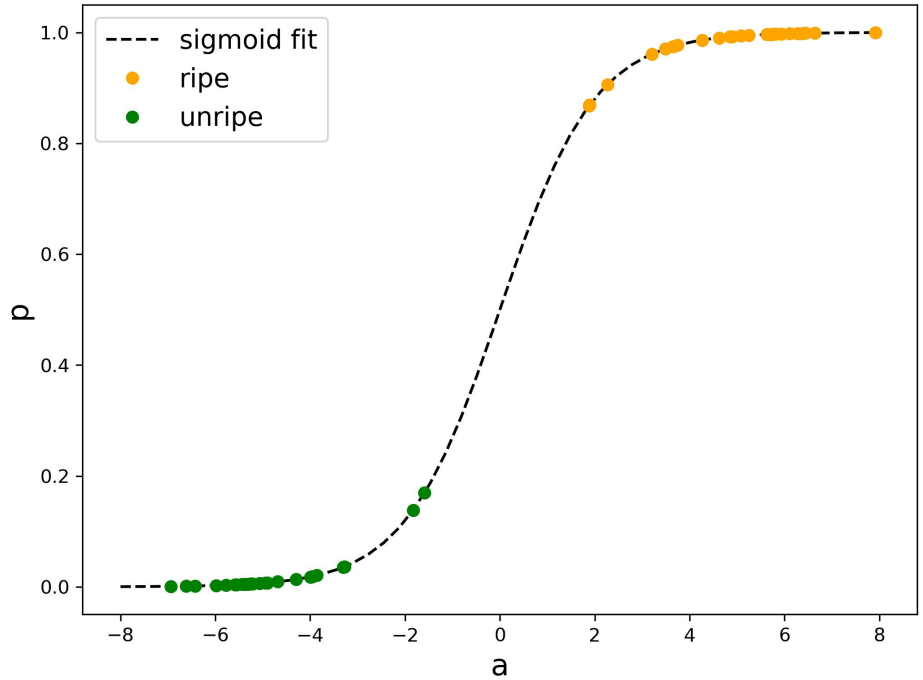


unripe mangoes

I applied the same techniques I used in the previous activity on feature extraction. I followed these steps: (1) nonparametric segmentation, (2) morphological operations, (3) *findContours*, (4) *fitEllipse*, (5) calculating location and NCC of centroids. I saved the NCC and eccentricity of each mango in a *csv* file. I also performed feature extraction on the test images.

Perceptron for Logistic Regression

I performed the same steps as our previous activity on the Perceptron. The only difference is that instead of using a step function as my threshold function, I used a sigmoid function. The sigmoid function is given by:



$$\phi(a)=\frac{1}{1+\exp(-a)}=p$$

η = 0.1
error threshold = 0.1

The plot of the sigmoid function using the training data set is shown above. I applied the calculated weights on the trial images to obtain their probabilities.

Applying Perceptron to Test Images

After calculating *a* and the probabilities of the test images, I obtained the following plot. Based on this plot, my initial guess through visual inspection is a little wrong. Besides the second and third mangoes, I guessed everything right. Increasing probability means increasing ripeness.