ML3: Logistic Regression

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AP 186

objectives

The main objective of this activity is to **apply logistic regression** to train an artificial neuron to give the degree of ripeness of a fruit.

Results

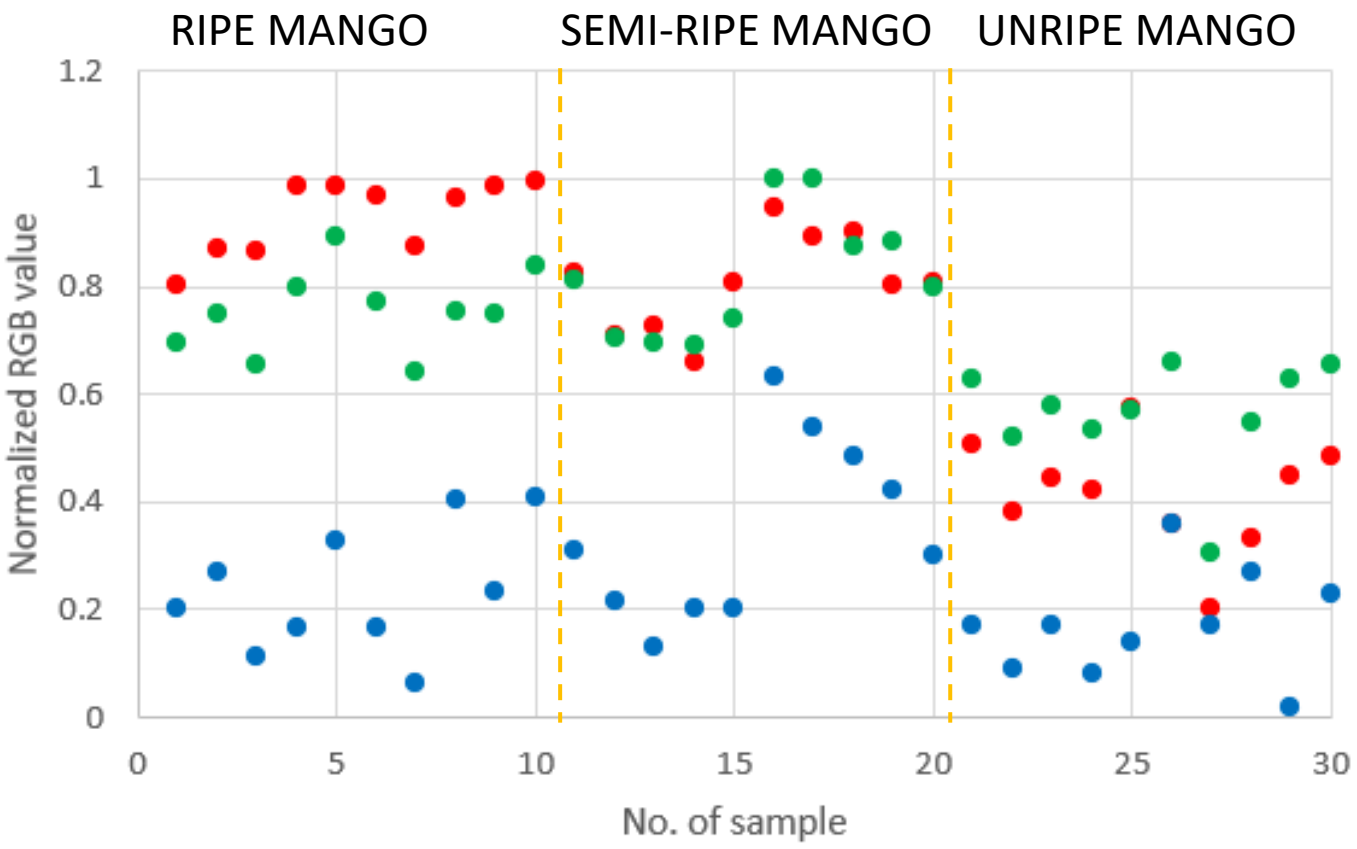


Figure 1. Scatter plot of RGB values of different mangoes

Figure 1 shows the data set used for this activity. The software GIMP was used to obtain the RGB values of the mangoes. There are 10 samples each for ripe, semi-ripe, and unripe mangoes.

Logistic Regression Algorithm

(very similar to Perceptron! An activation function was just added)

```
weights1 = [0,0,0,0]

rate= 0.5

def function(a):
    return scipy.special.expit(a)

for i in range(100):
    for j in range(30):
        if j < 10:
            d = 1
        else:
            d = 0
        a = weights1[0] + x[j]*weights1[1] + y[j]*weights1[2] + w[j]*weights1
        z = function(a)


        weights1[0] += rate*(d-z)
        weights1[1] += rate*(d-z)*x[j]
        weights1[2] += rate*(d-z)*y[j]
        weights1[3] += rate*(d-z)*w[j]



w0 = weights1[0]
w1 = weights1[1]
w2 = weights1[2]
w3 = weights1[3]


print(w0,w1,w2,w3)

```

```
-6.754344221360569 14.02556846149546 -6.597826347737361 -5.39593083203024
```

Figure 2. Logistic Regression Algorithm done in Python

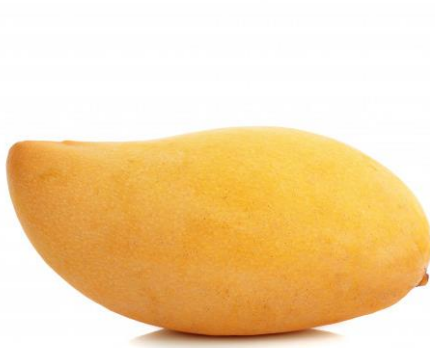
Results

The initial weight used was 0 while the learning rate was 0.5. Using the logistic regression algorithm, the final weights I obtained are:

- W0=-6.754
- W1= 14.026
- W2= -6.597
- W3= -5.396

Results

The degree of ripeness can now be predicted using the calculated final weights.



0.97428

0.92132

0.2157

0.1921

0.7769

0.9441

Figure 3. Images of mangoes with their predicted degree of ripeness

Analysis

Logistic regression was successfully used to train an artificial neuron to give the degree of ripeness of a fruit.

While the algorithm produced agreeable results, it would be best if the sample size was at least 50 in order to increase the accuracy. Moreover, in choosing the sample images, make sure to account all color variations of mangoes. I had a hard time choosing samples for ripe mangoes since most of the time, the RGB colors are almost equal.

Reflection

Rating: 10/10

This activity was quite similar with ML 2! I was able to successfully create a logistic regression algorithm that provides agreeable results.

References

Soriano, M. (2020). ML3 – Logistic Regression.