MACHINE LEARNING: PERCEPTRON AND LINEAR REGRESSION

FEATURE EXTRACTION FOR PERCEPTRON

Submitted by: Jonabel Eleanor B. Baldres

App Physics 157 WFY FX 2

```
%Reading Apple
cd('~/Documents/MATLAB/Apple');
fileList = dir('*.jpg');
numImages_apple = numel(fileList);
images_apple = cell(numImages_apple, 1);

for i = 1:numImages_apple
    images_apple{i} = imread(fileList(i).name);
end
```

```
%Reading Banana
cd('~/Documents/MATLAB/Banana');
fileList = dir('*.jpg');
numImages_banana = numel(fileList);
images_banana = cell(numImages_banana, 1);

for i = 1:numImages_banana
    images_banana{i} = imread(fileList(i).name);
end
```

```
% Initializing matrices
hsv_values_banana = zeros(numImages_banana, 1);
hsv_values_apple = zeros(numImages_apple, 1);
eccentricity_values_banana = zeros(numImages_banana, 1);
eccentricity_values_apple = zeros(numImages_apple, 1);


% Applying banana_hsv() to each image and storing results
for i = 1:numImages_banana
    hsv_values_banana(i) = banana_hsv(images_banana{i});
end

%  Applying apple_hsv() to each image and storing results
for i = 1:numImages_apple
    hsv_values_apple(i) = apple_hsv(images_apple{i});
end
```

```
% Apply eccentricity_banana() to each image
for i = 1:numImages_banana
    props = eccentricity_banana(images_banana{i});
    eccentricity_values_banana(i) = props(1).Eccentricity;
end

% Apply eccentricity_apple() to each image
for i = 1:numImages_apple
    props = eccentricity_apple(images_apple{i});
    eccentricity_values_apple(i) = props(1).Eccentricity;
end

%disp(eccentricity_values_apple);
```

```
Fruit_Label = zeros(100, 1);
Fruit_Label(1:50) = 1; %Banana
Fruit_Label(51:100) = -1; %Apple
```

```
%Getting all the hsv and eccentricity values of the images
total_hsv_values = [hsv_values_banana; hsv_values_apple];
total_eccentricity_values = [eccentricity_values_banana;
eccentricity_values_apple];
```

```
bias = ones(100,1);

%concatenating all the data to be used for perceptron
Fruit_Properties = [bias total_eccentricity_values total_hsv_values
Fruit_Label];
```

```
save("Fruit_Properties.mat", "Fruit_Properties", "-mat");
```

```
%All the necessary functions
function hsv_value = banana_hsv(image)
    bw = rgb2gray(image);
    bw = and(bw < 250, bw > 50);
    bw = imfill(bw, 'holes');
    bw = imopen(bw, strel('disk',2));

    hsv_image = rgb2hsv(image);
    hsv = hsv_image(:,:,1);
    hsv_value = mean(mean(hsv(bw)));
end

function prop = eccentricity_apple(image)
    image_gray = rgb2gray(image);
    binary_image = image_gray < 220 & image_gray > 0;
```

```
    binary_image = imfill(binary_image, 'holes');
    prop = regionprops(binary_image, 'Eccentricity');
end

function prop = eccentricity_banana(image)
    image_gray = rgb2gray(image);
    binary_image = image_gray < 250 & image_gray > 50;
    binary_image = imfill(binary_image, 'holes');
    binary_image = imopen(binary_image, strel('disk',2));
    prop = regionprops(binary_image, 'Eccentricity');
end



function hsv_value = apple_hsv(image)
    bw = rgb2gray(image);
    bw = and(bw < 220, bw > 0);
    bw = imfill(bw, 'holes');
    bw = imopen(bw, strel('disk',3));

    hsv_image =rgb2hsv(image);
    hsv = hsv_image(:,:,1);
    hsv_value = mean(mean(hsv(bw)));
end
```