Image Processing 3

Prepared by

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Codes

```matlab
% Clear workspace
clear all
close all

% Load the original image
myimg = imread('images.jpg');
figure; imshow(myimg); title('Initial Image');

% Convert the image to grayscale
gray_img = rgb2gray(myimg);

% Visualize the grayscale image and its histogram
figure;
subplot(2, 1, 1); imshow(gray_img); title('Gray Scale Image');
subplot(2, 1, 2); imhist(gray_img); title('Gray Scale Histogram');

% Define histogram equalization parameters
slow = 10; % Slow threshold
shigh = 10; % High threshold

% Calculate the histogram of the grayscale image
[counts, ~] = imhist(gray_img);
totalPixels = sum(counts);

% Find the alow value according to the slow threshold
sumPixels = 0;
alow = 0;
for i = 1:numel(counts)
sumPixels = sumPixels + counts(i);
if sumPixels >= slow * totalPixels / 100
alow = i - 1;
break;
end
end

% Find the ahigh value according to the high threshold
sumPixels = 0;
ahigh = 0;
for i = 1:numel(counts)
sumPixels = sumPixels + counts(numel(counts) - i + 1);
if sumPixels >= shigh * totalPixels / 100
ahigh = numel(counts) - i;
```

```matlab
break;
end
end
% Set the amin and amax values for the new image
amin = 0; % Minimum pixel intensity
amax = 255; % Maximum pixel intensity

% Calculate the new pixel values
new_pixel_vals = zeros(256, 1);
for a = 1:256
if a <= alow
new_pixel_vals(a) = amin;
elseif a >= ahigh
new_pixel_vals(a) = amax;
else
new_pixel_vals(a) = amin + (a - alow) * ((amax - amin) / (ahigh - alow));
end
End

% Create the new image
[rows, cols] = size(gray_img);
new_img = zeros(rows, cols, 'uint8');
for i = 1:rows
for j = 1:cols
intensity = gray_img(i, j) + 1; % MATLAB indices start from 1
new_img(i, j) = new_pixel_vals(intensity); % Create the new image using the new
pixel values
end
End

% Visualize the new image and its histogram
figure;
subplot(2, 1, 1); imshow(new_img); title(['New Image (slow = ' num2str(slow) ',
shigh = ' num2str(shigh) ')']);
subplot(2, 1, 2); imhist(new_img); title('New Histogram');
```

Description

Modified Contrast Adjustment Method

This report illustrates the implementation of the modified contrast adjustment method on a given image and examines the results for different (slow, shigh) percentage values.

The code loads a given image and converts it to grayscale initially.

It visualizes the initial histogram by creating the histogram of the grayscale image.

The slow and shigh values are determined as histogram equalization parameters. These values are crucial for the contrast adjustment process.

The histogram of the grayscale image is obtained, and the total number of pixels is calculated.

Alow and ahigh threshold values are determined based on the slow and shigh values. These threshold values determine which pixel values will be adjusted by partitioning the histogram.

Amin and amax values determine the range of the new pixel values.

New pixel values are calculated, and a new image is generated.

The newly generated image and histogram are visualized for specific (slow, shigh) values.

Results obtained when different (slow, shigh) values are tried are compared.

The algorithm's time complexity is evaluated as $O(f(n))$. This provides insights into the efficiency of the algorithm.
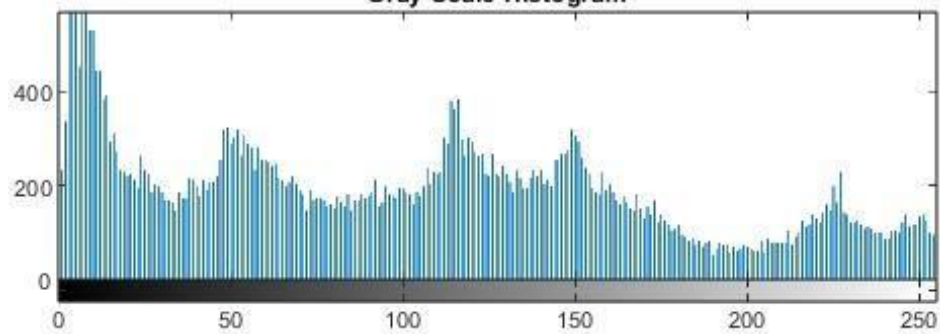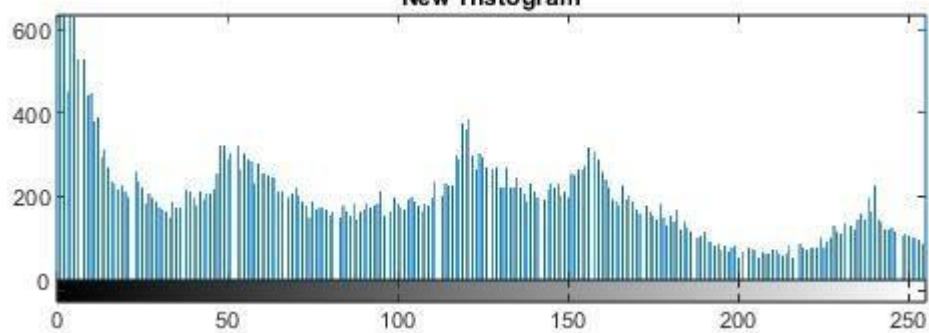
Output

Initial Image

Gray Scale Image

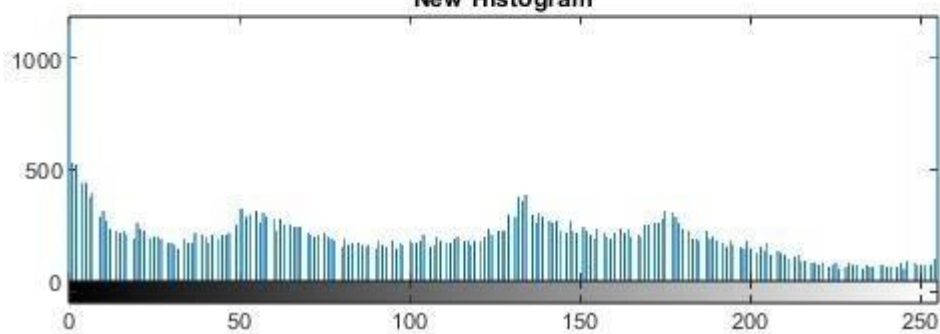
Gray Scale Histogram

New Image (slow = 3, shigh = 3)

New Histogram

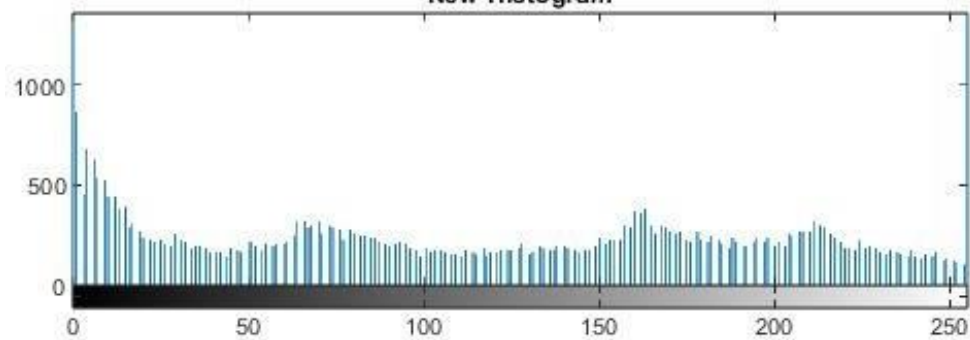**New Image (slow = 10, shigh = 10)**

New Histogram

New Image (slow = 5, shigh = 15)

New Histogram

New Image (slow = 5, shigh = 30)

New Histogram