Question

a. Write program to read and display digital image using MATLAB
b. Read and display image
c. Resize given image
d. Convert given color image into gray-scale image
e. Convert given color/gray-scale image into black & white image
f. Draw image profile
g. Separate color image in three R G & B planes
h. Create color image using R, G and B three separate planes

Solution

```
% This program will read an image and display it
I = imread('sample_image.jpg');
imshow(I);
```

```
% This function will read an image and display it
function read_display_image(img_path)
   I = imread(img_path);
   imshow(I);
end
```

```
% This function will resize a given image
function resized_image = resize_image(img, scale)
   [img_rows, img_cols, img_channels] = size(img);
   new_size = [scale*img_rows, scale*img_cols];
   resized_image = imresize(img, new_size);
end
```

```
% This function will convert a color image into gray-scale image
function gray_scale_image = rgb2gray_image(img)
   gray_scale_image = rgb2gray(img);
end
```

```
% This function will convert a color/gray-scale image into black & white image
function bw_image = image2bw_image(img)
   bw_image = im2bw(img);
end

% This function will draw the image profile
function profile_plot = draw_image_profile(img)
   % Reshape image to 1D array
   img_1D = img(:);

   % Compute image profile
   profile = mean(img_1D);

   % Create profile plot
   figure;
   plot(profile);
   title('Image Profile');
   xlabel('Column Index');
   ylabel('Pixel Intensity');
   profile_plot = gca;
end



% This function will separate a color image into three R G & B planes
function [R, G, B] = separate_rgb_planes(img)
   R = img(:,:,1);
   G = img(:,:,2);
   B = img(:,:,3);
end



% This function will create a color image using R, G and B three separate planes
function color_image = create_color_image(R, G, B)
   color_image = cat(3, R, G, B);
end
```

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Question

using MATLAB write programs for

a. image restoration
b. Remove Salt and Pepper Noise
c. Minimize Gaussian noise
d. Median filter

Solution

```
% Noisy image
I = imread('noisy_image.jpg');

% Blurred image
B = imfilter(I, fspecial('gaussian', [3 3], 2));

% Estimate the blur kernel
K = imfilter(B, fspecial('gaussian', [3 3], 2), 2);

% Restored image
O = irfilter(I, K, 2);

% Display the restored image
imshow(O);
```

```
% Load the image
I = imread('image.jpg');

% Apply median filter
J = medfilt2(I);

% Display the filtered image
imshow(J);
```

```
% Load the image
I = imread('image.jpg');

% Apply Gaussian filter
J = imfilter(I, fspecial('gaussian', [3 3], 2));

% Display the filtered image
imshow(J);
```

```
% Load the image
I = imread('image.jpg');
```

```
% Apply median filter
J = medfilt2(I);

% Display the filtered image
imshow(J);
```

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Question

To write and execute programs for image arithmetic operations

a. Addition of two images

b. Subtract one image from other image

c. Calculate mean value of image

Solution

```
img1 = imread('image1.jpg'); % read the first image
img2 = imread('image2.jpg'); % read the second image

% convert the images to the same size and depth
img1 = imresize(img1, [size(img2, 1), size(img2, 2)]);
img1 = im2double(img1);

img2 = imresize(img2, [size(img1, 1), size(img1, 2)]);
img2 = im2double(img2);

% add the two images
result_img = imadd(img1, img2);

% display the result
imshow(result_img);
```

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```
img1 = imread('image1.jpg'); % read the first image
img2 = imread('image2.jpg'); % read the second image
```

```
% convert the images to the same size and depth
img1 = imresize(img1, [size(img2, 1), size(img2, 2)]);
img1 = im2double(img1);

img2 = imresize(img2, [size(img1, 1), size(img1, 2)]);
img2 = im2double(img2);

% subtract the second image from the first image
result_img = imsubtract(img1, img2);

% display the result
imshow(result_img);
```

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```
img = imread('image1.jpg'); % read the image

% convert the image to grayscale if it's in color
if size(img, 3) == 3
   img = rgb2gray(img);
end

% calculate the mean value
mean_value = mean(mean(img));

% display the result
disp(['The mean value of the image is: ', num2str(mean_value)]);
```

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Question

To write and execute programs for image logical operations
a. AND operation between two images
b. OR operation between two images
c. Calculate intersection of two images
d. NOT operation (Negative image)

Solution

```
% Load the images
img1 = imread('image1.jpg');
```

```
img2 = imread('image2.jpg');

% Perform AND operation
result = img1 & img2;

% Display the result
imshow(result);
```

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```
% Load the images
img1 = imread('image1.jpg');
img2 = imread('image2.jpg');

% Perform OR operation
result = img1 | img2;

% Display the result
imshow(result);
```

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```
% Load the images
img1 = imread('image1.jpg');
img2 = imread('image2.jpg');

% Calculate intersection
result = img1 & img2;

% Display the result
imshow(result);
```

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```
% Load an image
img = imread('image.jpg');

% Perform NOT operation
result = ~img;

% Display the result
imshow(result);
```