EXPT. NO:1
DATE: 29.01.2024

IMPLEMENTATION OF BASIC IMAGE PROCESSING TECHNIQUES USING MATLAB

AIM:

To implement the following image processing techniques using MATLAB:

1. Display of types of images
2. Display of images in subplots and montage
3. Extraction of color components

SOFTWARE USED:

MATLAB version 2014a.

THEORY:

Display of types of images:

- Grayscale images convey intensity information using a single channel, with pixel values ranging from 0 (black) to 255 (white).
- RGB color images consist of three channels—red, green, and blue—contributing to overall color perception.
- Binary images simplify representation with two pixel values, typically 0 and 1, representing black and white.

MATLAB simplifies image display using the `imshow` function, accommodating various image types and allowing colormap specification or individual channel display for RGB images.

Display of images in subplots and montage:

Subplots organize multiple images within a single figure, aiding comparative analysis or storytelling.

- MATLAB's `subplot` function facilitates grid layout organization by specifying rows and columns.
- Montage arranges images in a grid format, offering customization options such as padding and borders.
- The `montage` function in MATLAB streamlines grid arrangement, supporting visual clarity and presentation customization.

Extraction of color components:

RGB images in MATLAB are represented as three-dimensional arrays, with distinct channels for red, green, and blue color information. Array indexing enables the isolation of specific color channels for deeper analysis or manipulation.

OUTPUT:

1. DISPLAY OF TYPES OF IMAGES

[Image type: Gray Scale image Format: .jpeg image Size: 1204x1880]

1A. DISPLAY OF IMAGE IN GRAYSCALE:

MATRIX:

149	152	156
157	159	161
165	167	168

FUNCTIONS:

- imread: Read images into MATLAB workspace from files.
- imshow: Display images in MATLAB figures.
- rgb2gray: Convert RGB images to grayscale.

1B. DISPLAY AS BINARY IMAGE:

[Image type: Binary Scale image Format: .png image Size: 200x140]

MATRIX:

0	1	0
0	0	0
0	0	0

FUNCTIONS: im2bw: Convert images to binary format.

1C. DISPLAY AS RGB IMAGE

[Image type: RGB Scale image Format: .jpg image Size: 159x954]

MATRIX:

162	157	153
168	162	157
174	169	163

FUNCTIONS: imfinfo: Get information about image files.

PROGRAM:

1. DISPLAY OF TYPES OF IMAGES

1A. DISPLAY OF IMAGE IN GRAYSCALE

```
clc;
clear all;
close all;
a=imread('grayscale.jpeg');
[r,c]=size(a)
info=imfinfo('grayscale.jpeg')
imshow(a);
```

1B. DISPLAY AS BINARY IMAGE

```
clc;
clear all;
close all;
a=imread('binary.png');
[r,c]=size(a)
info=imfinfo('binary.png')
imshow(a);
```

1C. DISPLAY AS RGB IMAGE

```
clc;
clearall;
closeall;
a=imread('IMG.jpg');
[r,c]=size(a)
info=imfinfo('IMG.jpg')
imshow(a);
```

2. DISPLAY OF IMAGES IN SUBPLOTS AND MONTAGE

[Image type: RGB image Format: .jpg image
Size:148x277]

2A. DISPLAY IN MONTAGE

FUNCTIONS: imshowpair: Display two images for comparison (like a montage view).

- 2B. DISPLAY IN SUBPLOTS

FUNCTIONS:
subplot: Divide figure into grid of subplots.

2. DISPLAY OF IMAGES IN SUBPLOTS AND MONTAGE

2A. DISPLAY IN MONTAGE

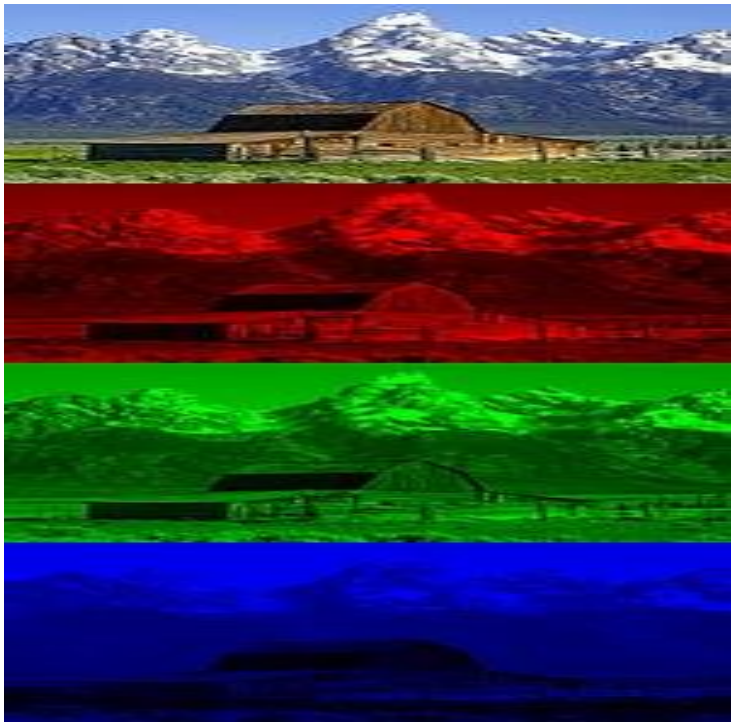
```
clc;
clear;
close all;
x=imread('Photo.jpg');
y=rgb2gray(x);
figure,imshowpair(x,y,'Montage alignment')
```

2B. DISPLAY IN SUBPLOTS

```
clc;
clear;
close all;
x=imread('Photo.jpg');
subplot (1,2,1);
imshow(x);
y=rgb2gray(x);
subplot(1,2,2);
imshow(y);
sgtitle('Subplots');
titlePos = [0.5, -0.05, 0.5];
title('SubplotAlignment','Position',titlePos,'HorizontalAlignment',
'center');
```

3.EXTRACTION OF COLOR COMPONENTS

[Image type: RGB image Format: .jpg image Size: 159x954]



FUNCTIONS:

- red_img(:,:,2:3) = 0;: Remove green and blue channels.
- green_img(:,:,1) = 0;: Remove red channel.
- green_img(:,:,3) = 0;: Remove blue channel.
- blue_img(:,:,1:2) = 0;: Remove red and green channels

3. EXTRACTION OF COLOR COMPONENTS

```
Clc;
Clear all;
Close all;
img = imread('housemountains.jpg');
subplot(2,2,1),
imshow(img),
title ('Original image')
red = img(:,:,1);
green = img(:,:,2);
blue = img(:,:,3);
a = zeros(size(img, 1),
size(img, 2));
just_red = cat(3, red, a, a);
subplot(2,2,2),
imshow(just_red),
title('red channel');
just_green = cat(3, a, green, a);
subplot(2,2,3),
imshow(just_green),
title('green channel');
just_blue = cat(3, a, a, blue);
subplot(2,2,4),
imshow(just_blue),
title('blue channel');
```

RESULT:

Image processing techniques of Display of types of images, Display of images in subplots and montage, Extraction of color components has been implemented successfully using MATLAB.