Bit Plane Slicing

Anubhav Rathore

Input: Image

Output: Compressed/Watermarked Image (can do encryption also for transmission purpose)

Contents

Defaults

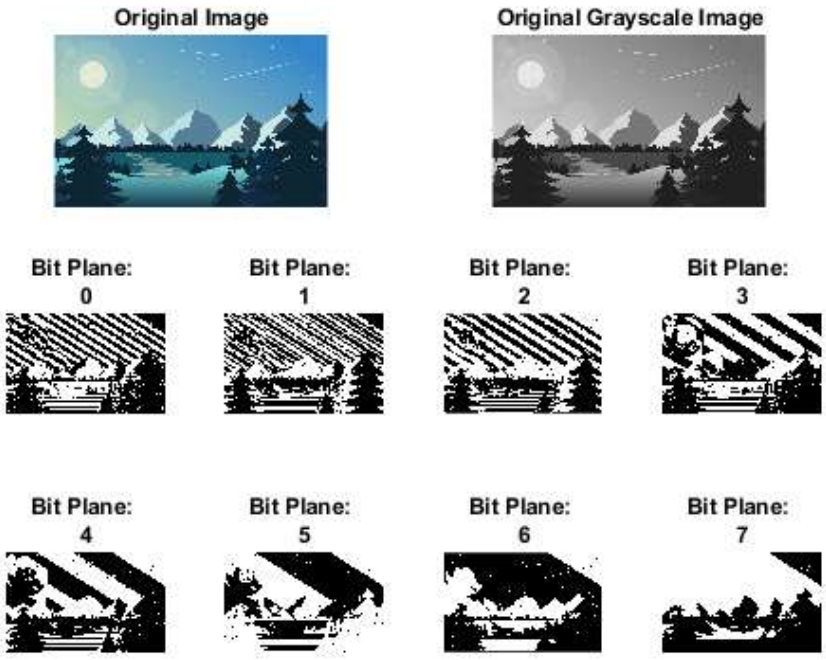
```
clear all;
close all;
clc;
```

Image

```
I = imread("landscape.jpg");
figure, subplot(3,4, [1 2]), imshow(I), title("Original Image");
Ig = rgb2gray(I);
subplot(3,4, [3 4]), imshow(Ig), title("Original Grayscale Image");
```

Bit Plane Slicing

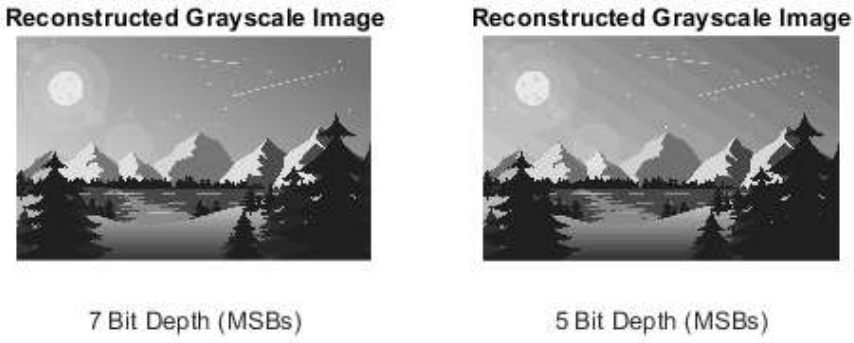
```
bitPlanes = zeros(size(Ig,1), size(Ig, 2), 8); %L x W x Levels
for k = 1:8
    bitPlanes(:,:,k) = bitget(Ig,k);
    subplot(3,4,k+4), imshow(bitPlanes(:,:,k)), title(["Bit Plane: ", num2str(k-1)]);
end
```



Reconstruction

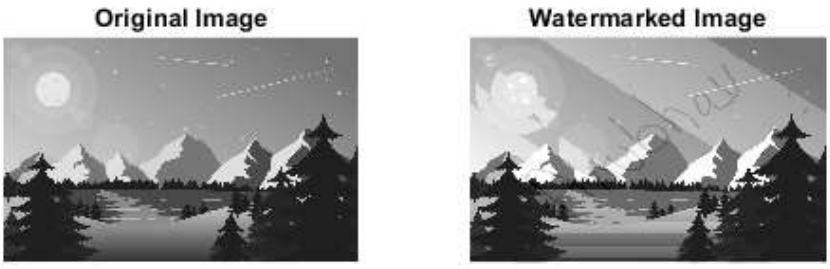
```
reconstructedImage1 = zeros(size(Ig));
for planes = 8:-1:2
    reconstructedImage1 = reconstructedImage1 + ...
        bitPlanes(:,:,planes) * 2^(planes-1);
end
reconstructedImage1 = uint8(reconstructedImage1);

reconstructedImage2 = zeros(size(Ig));
for planes = 8:-1:4
    reconstructedImage2 = reconstructedImage2 + ...
        bitPlanes(:,:,planes) * 2^(planes-1);
end
reconstructedImage2 = uint8(reconstructedImage2);


figure; subplot(2,2,[1 2]), imshow(Ig), title("Original Grayscale Image"), xlabel("8 Bit Depth")
subplot(2,2,3), imshow(reconstructedImage1), title("Reconstructed Grayscale Image"), xlabel("7 Bit Depth (MSBs)");
subplot(2,2,4), imshow(reconstructedImage2), title("Reconstructed Grayscale Image"), xlabel("5 Bit Depth (MSBs)");
```

8 Bit Depth



Watermarking

```
watermark = imread("Watermark.png");
W = rgb2gray(watermark);
W = imbinarize(W);
W = imresize(W, size(Ig));
I_watermarked = bitset(Ig, 6, W);
figure, subplot(1,2,1), imshow(Ig), title("Original Image");
subplot(1,2,2), imshow(I_watermarked), title("Watermarked Image");
```



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