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% Name : Nenavath Dhanush Rathod
% BT23ECE120

% Bit Plane Slicing in Digital Image Processing with Reconstruction
close all;
close all;
clc;

% Read the input image
I = imread('Prabhas.jpg'); % You can use any grayscale image

% Convert to grayscale if image is RGB
if size(I,3) == 3
    I = rgb2gray(I);
end

I = uint8(I); % Ensure uint8 format

% Display original image
figure;
subplot(4,3,1);
imshow(I);
title('Original Image');

% Store bit planes
bit_planes = zeros(size(I,1), size(I,2), 8);

% Bit plane slicing
for k = 1:8
    % Extract kth bit plane
    bit_planes(:,:,:,k) = bitget(I, k);

    % Display bit plane
    subplot(4,3,k+1);
    imshow(bit_planes(:,:,:,k));
    title(['Bit Plane ', num2str(k)]);
end

% Reconstruction (MSB only)

% Reconstruct using higher bit planes (5 to 8)
reconstructed = ...
    bit_planes(:,:,:5)*2^4 + ...
    bit_planes(:,:,:6)*2^5 + ...
    bit_planes(:,:,:7)*2^6 + ...
    bit_planes(:,:,:8)*2^7;

reconstructed = uint8(reconstructed);

% Display reconstructed image
subplot(4,3,10);
imshow(reconstructed);
title('Reconstructed Image (Bits 5-8)');

% Full Reconstruction
full_reconstruction = zeros(size(I));

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for k = 1:8
    full_reconstruction = full_reconstruction + bit_planes(:, :, k)*2^(k-1);
end
full_reconstruction = uint8(full_reconstruction);

subplot(4,3,11);
imshow(full_reconstruction);
title('Reconstruction (All Bits)');
```

