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function main()
    % MAIN FUNCTION: reads image, applies histogram equalization,
    % displays result

    % Try reading image from file
    try
        img = imread('carl.png');
    catch
        % If image not found, use a sample 8x8 grayscale image
        disp('carl.png not found. Using 8x8 test image.');
        img = uint8(randi([50 150], 8, 8));
    end

    % Apply custom histogram equalization
    output_img = customHistEq_Process(img);

    % Display results
    figure;
    subplot(1,2,1), imshow(img), title('Original Image');
    subplot(1,2,2), imshow(output_img), title('Equalized Image');
end

function output_img = customHistEq_Process(img)
    % Handles both RGB and grayscale images

    if ndims(img) == 3 && size(img,3) == 3
        % Convert RGB to YCbCr and equalize luminance only
        ycbcr = rgb2ycbcr(img);
        ycbcr(:,:,1) = perform_he(ycbcr(:,:,1));
        output_img = ycbcr2rgb(ycbcr);
    else
        % Grayscale image
        output_img = perform_he(img);
    end
end

function equalized = perform_he(I)
    % HISTOGRAM EQUALIZATION FOR GRAYSCALE IMAGE

    I = uint8(I);
    [rows, cols] = size(I);
    num_pixels = rows * cols;

    % Step 1: Compute histogram
    counts = zeros(1,256);
    for i = 0:255
        counts(i+1) = sum(I(:) == i);
    end

    % Step 2: Compute cumulative distribution function (CDF)

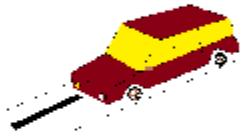
```

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cdf = cumsum(counts);
cdf_min = min(cdf(cdf > 0));

% Step 3: Create intensity mapping
map = round((cdf - cdf_min) / (num_pixels - cdf_min) * 255);
map(map < 0) = 0;
map(map > 255) = 255;

% Step 4: Apply mapping to image
equalized = map(double(I) + 1);
equalized = reshape(equalized, rows, cols);
equalized = uint8(equalized);
end
```

Original Image



Equ



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