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% Program 1 - RGB Image Read and Channel Separation (MATLAB Online)

% 1. Read in-built RGB image
img = imread('peppers.png');

% 2. Convert to matrix form
img_matrix = double(img);

% 3. Split into R, G, B components
R = img(:,:,1);
G = img(:,:,2);
B = img(:,:,3);

% 4. Reconstruct RGB visualization for each channel
red_img   = cat(3, R, zeros(size(R)), zeros(size(R)));
green_img = cat(3, zeros(size(G)), G, zeros(size(G)));
blue_img  = cat(3, zeros(size(B)), zeros(size(B)), B);

% ----- Display Section -----
figure('Name','RGB Channel Visualizations','NumberTitle','off');

% Centered original image
subplot(3,3,2);
imshow(img);
title('Original RGB');

% RGB channel images
subplot(3,3,4); imshow(red_img);   title('Red (RGB)');
subplot(3,3,5); imshow(green_img); title('Green (RGB)');
subplot(3,3,6); imshow(blue_img);  title('Blue (RGB)');

% Grayscale channel views
subplot(3,3,7); imshow(R); colormap(gca, gray); title('Red (Gray)');
subplot(3,3,8); imshow(G); colormap(gca, gray); title('Green (Gray)');
subplot(3,3,9); imshow(B); colormap(gca, gray); title('Blue (Gray)');
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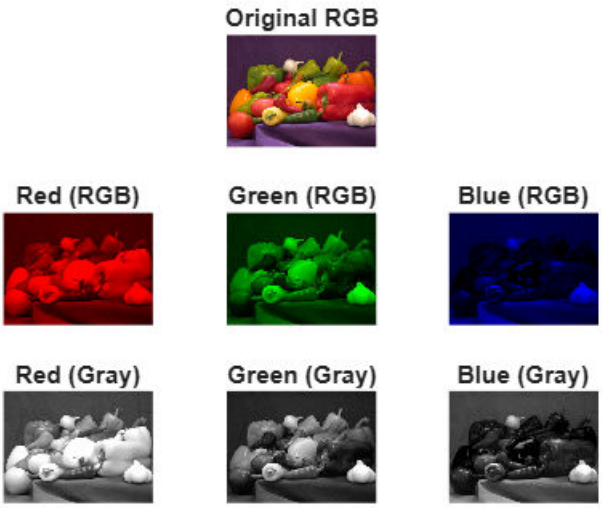
Original RGB
Red (RGB)
Green (RGB)
Blue (RGB)
Red (Gray)
Green (Gray)
Blue (Gray)