```
MAX_VAL = 15000;
MIN_VAL = 2047;
slope = 1/(MAX_VAL - MIN_VAL);
intercept = -MIN_VAL*slope;

img = imread('data/banana_slug.tiff');
class(img)

img = double(img);
class(img)

img = (slope*img) + intercept;
img = min(1, max(0, img));


sub_img_1 = img(1:2:end, 1:2:end);
sub_img_2 = img(1:2:end, 2:2:end);
sub_img_3 = img(2:2:end, 1:2:end);
sub_img_4 = img(2:2:end, 2:2:end);


pattern_1 = cat(3, sub_img_2, sub_img_1, sub_img_3);
%figure;
%imshow(pattern_1*10);
%title('Pattern 1');


pattern_2 = cat(3, sub_img_1, sub_img_2, sub_img_4);
%figure;
%imshow(pattern_2*10);
%title('Pattern 2'); % correct one


pattern_3 = cat(3, sub_img_4, sub_img_2, sub_img_1);
%figure;
%imshow(pattern_3*10);
%title('Pattern 3');


pattern_4 = cat(3, sub_img_3, sub_img_1, sub_img_2);
%figure;
%imshow(pattern_4*10);
%title('Pattern 4');



R = img(1:2:end, 1:2:end);
G1 = img(1:2:end, 2:2:end);
G2 = img(2:2:end, 1:2:end);
B = img(2:2:end, 2:2:end);

R_avg = mean(R(:));
G_avg = (mean(G1(:)) + mean(G2(:)))/2;
B_avg = mean(B(:));
```

```
R_max = max(R(:));
G_max = max(max(G1(:)) , max(G2(:)));
B_max = max(B(:));


R_gw = R*G_avg/R_avg;
B_gw = B*G_avg/B_avg;

img_gw = zeros(size(img));
img_gw(1:2:end, 1:2:end) = R_gw;
img_gw(1:2:end, 2:2:end) = G1;
img_gw(2:2:end, 1:2:end) = G2;
img_gw(2:2:end, 2:2:end) = B_gw;
% figure; imshow(img_gw*10); title('Gray World Assumption');


R_ww = R*G_max/R_max;
B_ww = B*G_max/B_max;

img_ww = zeros(size(img));
img_ww(1:2:end, 1:2:end) = R_ww;
img_ww(1:2:end, 2:2:end) = G1;
img_ww(2:2:end, 1:2:end) = G2;
img_ww(2:2:end, 2:2:end) = B_ww;
% figure; imshow(img_ww*10); title('White World Assumption');



img = img_ww;

[Y, X] = size(img);


% red demosaic
[rows, cols] = meshgrid(1:2:X, 1:2:Y);
red_pix = img(1:2:end, 1:2:end);
img_red = zeros(size(img));
img_red(1:2:end, 1:2:end) = red_pix;

img_red(2:2:end, 1:2:end) = demosaic(rows, cols, red_pix, 1, 2, 2, 2, Y,
X);
img_red(1:2:end, 2:2:end) = demosaic(rows, cols, red_pix, 2, 1, 2, 2, Y,
X);
img_red(2:2:end, 2:2:end) = demosaic(rows, cols, red_pix, 2, 2, 2, 2, Y,
X);


% blue demosaic
[rows, cols] = meshgrid(2:2:X, 2:2:Y);
blue_pix = img(2:2:end, 2:2:end);
img_blue = zeros(size(img));
img_blue(2:2:end, 2:2:end) = blue_pix;
```

```
img_blue(1:2:end, 1:2:end) = demosaic(rows, cols, blue_pix, 1, 1, 2, 2,
Y, X);
img_blue(1:2:end, 2:2:end) = demosaic(rows, cols, blue_pix, 2, 1, 2, 2,
Y, X);
img_blue(2:2:end, 1:2:end) = demosaic(rows, cols, blue_pix, 1, 2, 2, 2,
Y, X);


% green demosaic
[rows1, cols1] = meshgrid(1:2:X, 2:2:Y);
green_pix_1 = img(1:2:end, 2:2:end);


[rows2, cols2] = meshgrid(2:2:X, 1:2:Y);
green_pix_2 = img(2:2:end, 1:2:end);

img_green = zeros(size(img));
img_green(1:2:end, 2:2:end) = green_pix_1;
img_green(2:2:end, 1:2:end) = green_pix_2;

img_green(1:2:end, 1:2:end) = (demosaic(rows1, cols1, green_pix_1, 1, 1,
2, 2, Y, X) + demosaic(rows2, cols2, green_pix_2, 1, 1, 2, 2, Y, X))/2;
img_green(2:2:end, 2:2:end) = (demosaic(rows1, cols1, green_pix_1, 2, 2,
2, 2, Y, X) + demosaic(rows2, cols2, green_pix_2, 2, 2, 2, 2, Y, X))/2;


img = cat(3, img_red, img_green, img_blue);
%figure; imshow(img); title('Demosaic-ed image');


img_bw = rgb2gray(img);
max_pix_val = max(img_bw(:));
img = img*max_pix_val*5;
img_final = zeros(size(img));
indices = (img < 0.0031308);
img_final(indices) = 12.92*img(indices);
img_final(~indices) = real(1.055*img(~indices).^(1/2.4)-0.055);

figure; imshow(img_final); title('Final Image');
imwrite(img_final, 'data/output.jpg');


function f = demosaic(rows, cols, pix, rows_start, cols_start, rows_step,
cols_step, rows_end, cols_end)
    [rows_interp, cols_interp] = meshgrid(cols_start:cols_step:cols_end,
rows_start:rows_step:rows_end);
    f = interp2(rows, cols, pix, rows_interp, cols_interp);
end
```