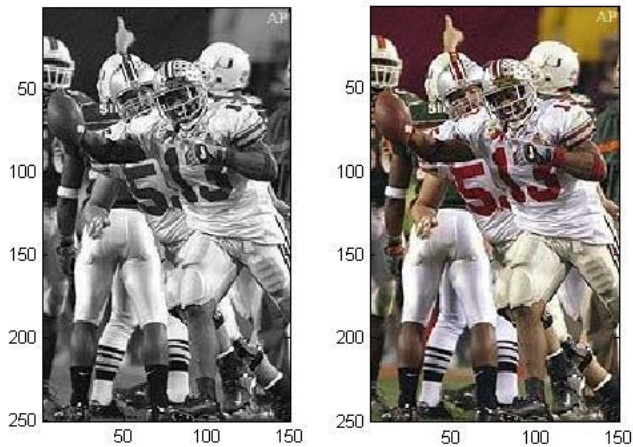1) Test the MATLAB image functions to read, display, and write images. Use buckeyes_gray.bmp and buckeyes_rgb.bmp from the class webpage.

- For displaying, tried other functions – imshow() and imtool() as well.
- imtool() allows to access each pixel and look at the values at that location.

Output

2) Read and convert buckeyes_rgb.bmp to grayscale using the NTSE conversion formula via the MATLAB function rgb2gray. Display your image to verify the result.
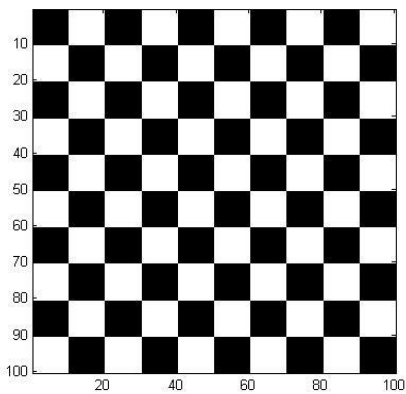
- rgb2gray() uses standard conversion formula where Y = 0.2989 * R + 0.5870 * G + 0.1140 * B
- R=red, B=blue, G=green, Y=luminosity

Output

3) Test MATLAB more fully by creating, writing, and reading a checker-board image.

Output

4) Perform Gaussian smoothing on face.bmp. Try with multiple sigma values, starting with larger values (e.g., from 20 – .5). When does the face become recognizable?

 Face.bmp (Tried with a few friends)

- Most of the people recognized him at sigma=6.5
- One of my friends who is a big fan recognized him at sigma=8

Output

Guess the movie(Tried with a friend)

Fastest guesses were at sigma values listed below -

- Pirates of the Caribbean - 8
- The Blind Side - 5
- Inception - 2
- Saving Private Ryan - 3.5
- Black Swan- 14
- Harry Potter and The Deathly Hallows Part 2 - 17
- Alien - 8
- Shutter Island- 2
- Good Will Hunting - 8
- Independence Day - 0.5

Output

- Attached a video file in the soft copy

CODE

```matlab
% Manjari Akella
% CSE5524 - HW1
% 09/02/2013

mkdir('Output');
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% Question 1

% clear workspace, command window and close all windows

refresh();
grayIm = imread('given_pics/buckeyes_gray.bmp');
figure('Name','Question 1','NumberTitle','off'), subplot(121),
imagesc(grayIm);
% Set axis to 'image' type(upper right corner is {0,0})
axis('image');
% Sets color map to gray
colormap('gray');
% Write back to disk in jpg fromat
imwrite(grayIm, 'Output/Q1_buckeyes_gray.jpg');
pause;
rgbIm = imread('given_pics/buckeyes_rgb.bmp');
subplot(122),imagesc(rgbIm);
axis('image');
imwrite(rgbIm, 'Output/Q1_buckeyes_rgb.jpg');
pause;

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% Question 2

refresh();
% Read rgb image
rgbIm = imread('Output/Q1_buckeyes_rgb.jpg');
% Apply conversion formula
grayIm = rgb2gray(rgbIm);
% Show rgb image
figure('Name','Question 2','NumberTitle','off'), subplot(121),imshow(rgbIm);
% Show converted grayscale image
subplot(122),imshow(grayIm);
pause;

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% Question 3

refresh();
% block of black pixel
zBlock = zeros(10,10);
% block of white pixels
oBlock = ones(10,10)*255;
```

[4]

```matlab
% pattern of black and white blocks
% chess board by repeating the pattern
pattern = [zBlock oBlock; oBlock zBlock];
checkerIm = repmat(pattern, 5, 5);
% write file to disk
imwrite(uint8(checkerIm), 'Output/Q3_checkerIm.bmp');
Im = imread('Output/Q3_checkerIm.bmp');
figure('Name','Question 3','NumberTitle','off'), imagesc(Im);
% Display in grayscale
colormap('gray')
axis('image');
pause;


%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% Question 4

% face.bmp given on the website

refresh();
faceIm=double(imread('given_pics/face.bmp'));
i=1;
figure('Name','Question 4: Sigma values Variation','NumberTitle','off');
for sigma=20:-1.5:0.5
    G = fspecial('gaussian', 2*ceil(3*sigma)+1, sigma);
    gIm = imfilter(faceIm, G, 'replicate');

% Follow each transition of sigma

%   sigma
%   colormap('gray');
%   imagesc(gIm);
%   pause(0.5);

% Display in single window

    subplot(4,4,i), imagesc(gIm);
    colormap('gray');
    imagesc(gIm);
    i=i+1;
end
pause;

% Identify the movie poster !

refresh();
pics = dir('my_pictures/*.jpg');
figure('Name','Question 4: Sigma values
Variation(My_pictures)','NumberTitle','off');
% loop for each picture in directory
for i = 1:size(pics,1)
    Im = double(imread(strcat('my_pictures/', pics(i).name)));
        %loop for each sigma
        for sigma=20:-1.5:0.5
            G = fspecial('gaussian', 2*ceil(3*sigma)+1, sigma);
            gIm =(imfilter(Im, G, 'replicate'));
```

[5]

```matlab
            imshow(uint8(gIm));
            pause(0.5);
        end
end

%%%%%%%%%%%%%%%%%%%%%%% END %%%%%%%%%%%%%%%%%%%%%%%%
```