Worksheet on Color Models

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I. "imshow" versus "imagesc"

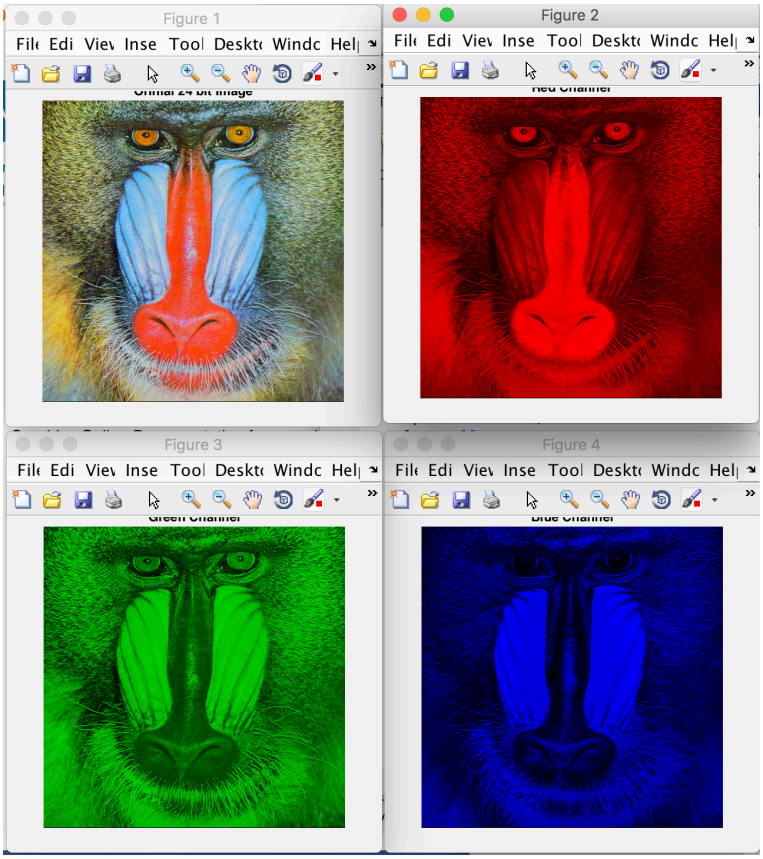
What is the difference between the predefined Matlab functions imshow and imagesc? Give a code example to show the display of an image using both methods. Point out the difference.

II. Display RGB channels

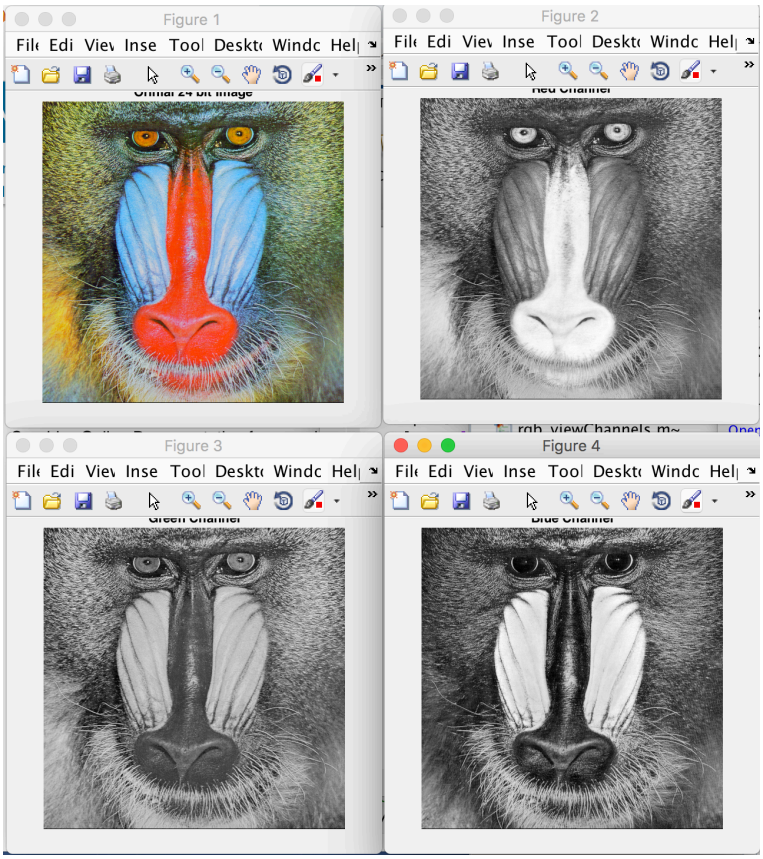
```
im=imread('MANDRILL.BMP');
im_r= im(:,:,1);
im_g= im(:,:,2);
im_b= im(:,:,3);

v=0:1/255:1;
z=zeros(1,256);
mapR=[v' z' z'];
mapG=[z' v' z'];
mapB=[z' z' v'];
close all;

figure(1);  imshow(im);          title('Orinial 24 bit Image');
figure(2);  imshow(im_r,mapR);   title('Red Channel');
figure(3);  imshow(im_g,mapG);   title('Green Channel');
figure(4);  imshow(im_b,mapB);   title('Blue Channel');
```



we have created a custom made colormap to view each channel instead of getting this



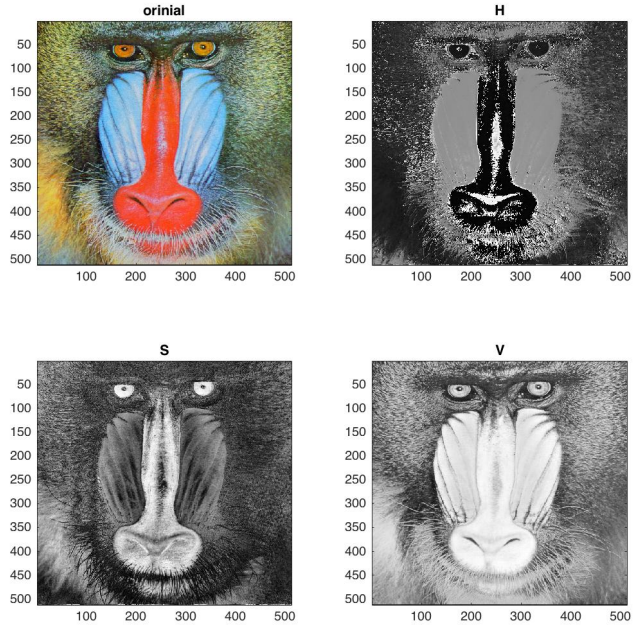
I. Color Model Transformation rgb2hsv

```
im=imread('MANDRILL.BMP');
im_rgb=im;

im_hsv=rgb2hsv(im);
figure(1);

h=im_hsv(:,:,1);
s=im_hsv(:,:,2);
v=im_hsv(:,:,3);

subplot(2,2,1); imagesc(im);    title('originial');
subplot(2,2,2); imagesc(h);     title('H');colormap(gray);
subplot(2,2,3); imagesc(s);     title('S');
subplot(2,2,4); imagesc(v);     title('V');
```

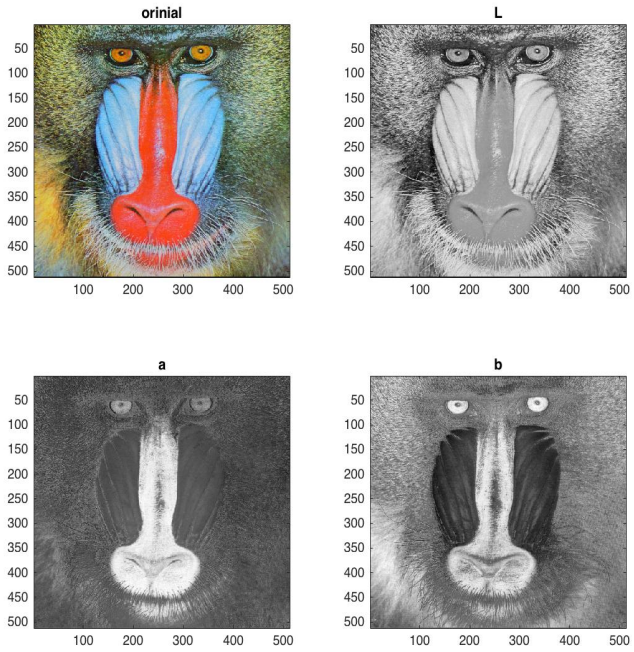


II. Color Model Transformation rgb2lab

```
im_lab=rgb2lab(im);
figure(2);

L=im_lab(:,:,1);
a=im_lab(:,:,2);
b=im_lab(:,:,3);

subplot(2,2,1); imagesc(im);    title('originial');
subplot(2,2,2); imagesc(L);     title('L');colormap(gray);
subplot(2,2,3); imagesc(a);     title('a');
subplot(2,2,4); imagesc(b);     title('b');
```



III. Color Model Transformation rgb2ntsc

Same as before

IV. Write your own Color Model Transformation function rgb2ycbcr

- Write your own functions that apply a transformation from RGB color space to YCrCb and vice versa
- my_rgb2ycbcr.m
- my_ycbcr2rgb.m
- Reversible Color Transform as defined in Jpeg 2000
- From RGB to YCbCr
- Y= (R+2G+B)/4
- Cb=B-G
- Cr=R-G
- From YCbCr to RGB
- G=Y-(Cb+Cr)/4
- R=G+Cr
- B=G+Cb

V. Try you functions to transform to YCbCr and back!

- MANDRILL.BMP
- apply the my_rgb2ycbcr transform
- view the 3 plans Y, Cb and Cb each apart
- use the gray palette (color table)
- transform the image back to RGB color space using your function my_ycbcr2rgb
- view it to make sure your work in correct
- you have to see mandrill again with no perception of change