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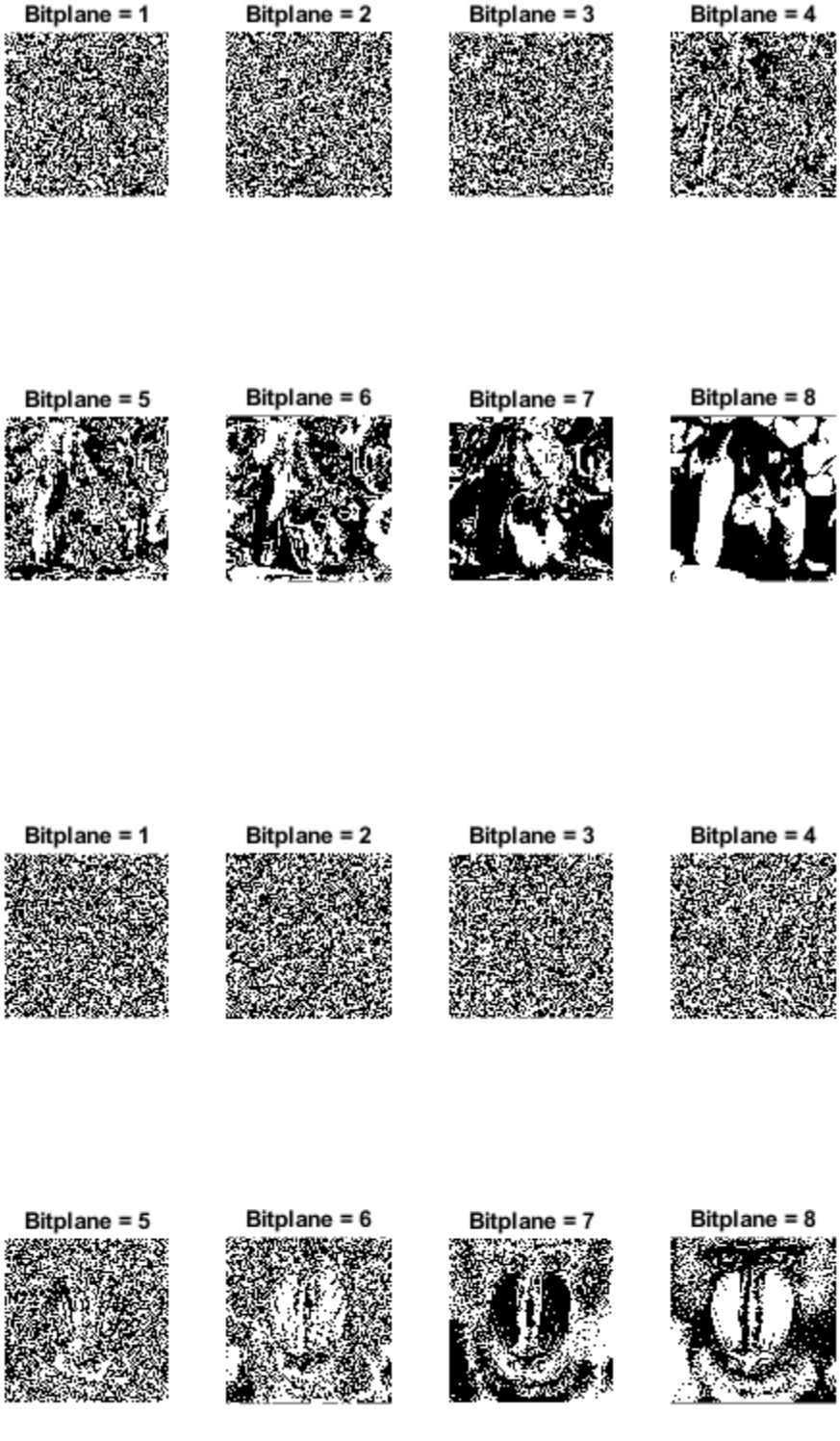
%ECES435 Assignment 3 Part 1 - By Wanyu Li and John Seitz
close all; clear all; clc;
```

Part 1 - 1st Task - LSB Least Significant Bit-plane Hiding

```
%Part 1 - 1st Task
P = imread('peppers.tif'); %Read in image as unit8
B = imread('baboon.tif'); %Read in image as unit8

figure (1);
for I = 1:8
P_Bitplane = get_bitplane(P,I); %extract 1st bitplane of image P,
 using function
subplot(2,4,I)
imshow(P_Bitplane) %show bitplane
title (['Bitplane = ',sprintf('%d',I)])
end

figure (2);
for I = 1:8
B_Bitplane = get_bitplane(B,I); %extract 1st bitplane of image P,
 using function
subplot(2,4,I)
imshow(B_Bitplane) %show bitplane
title (['Bitplane = ',sprintf('%d',I)])
end
```


Bitplane = 1
Bitplane = 2
Bitplane = 3
Bitplane = 4
Bitplane = 5
Bitplane = 6
Bitplane = 7
Bitplane = 8
Bitplane = 1
Bitplane = 2
Bitplane = 3
Bitplane = 4
Bitplane = 5
Bitplane = 6
Bitplane = 7
Bitplane = 8

Part 1 - 2nd Task - Examine bitplanes of images

```
wmk1 = imread('LSBwmk1.tiff'); %Read in image as unit8
wmk2 = imread('LSBwmk2.tiff'); %Read in image as unit8
wmk3 = imread('LSBwmk3.tiff'); %Read in image as unit8



figure(3)

for I = 1:8
wmk1_Bitplane = get_bitplane(wmk1,I); %extract 1st bitplane of image
 P, using function
subplot(2,4,I)
imshow(wmk1_Bitplane) %show bitplane
title (['Bitplane = ',sprintf('%d',I)])
end

figure(4)
for I = 1:8
wmk2_Bitplane = get_bitplane(wmk2,I); %extract 1st bitplane of image
 P, using function
subplot(2,4,I)
imshow(wmk2_Bitplane) %show bitplane
title (['Bitplane = ',sprintf('%d',I)])
end

figure(5)

for I = 1:8
wmk3_Bitplane = get_bitplane(wmk3,I); %extract 1st bitplane of image
 P, using function
subplot(2,4,I)
imshow(wmk3_Bitplane) %show bitplane
title (['Bitplane = ',sprintf('%d',I)])
end
```


Bitplane = 1
Bitplane = 2
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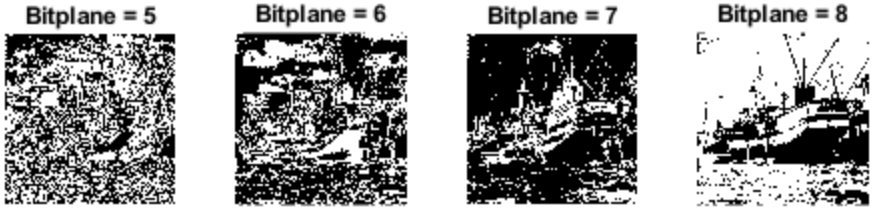
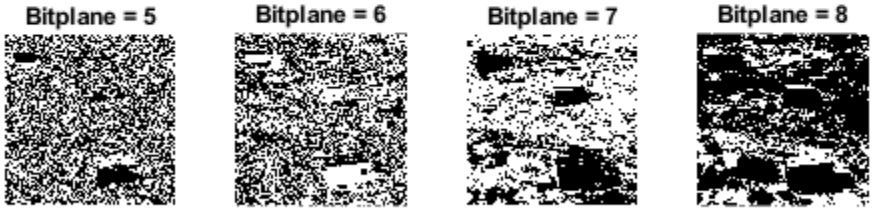
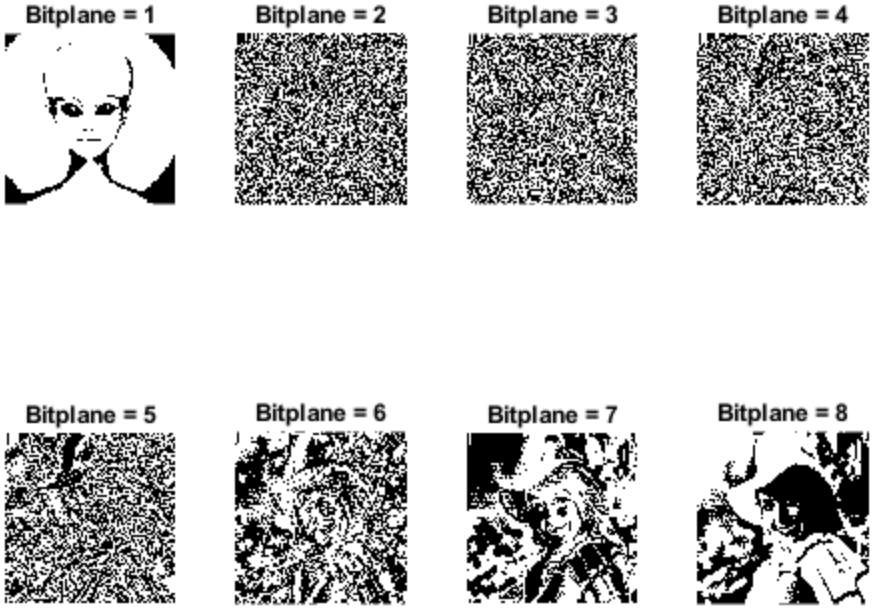
Bitplane = 3
Bitplane = 4


Bitplane = 5
Bitplane = 6
Bitplane = 7
Bitplane = 8


Bitplane = 1
Bitplane = 2
Bitplane = 3
Bitplane = 4


Bitplane = 5
Bitplane = 6
Bitplane = 7
Bitplane = 8



Part 1 - 3rd Task - Embed one image bitplanes into another's

```
Pep = imread('peppers.tif'); %Read in image as unit8
Bab = imread('baboon.tif'); %Read in image as unit8
Barb = imread('Barbara.bmp'); %Read in image as unit8


%Use watermark function to put the bitplanes of Barbera into the
 bitplanes
%of Peppers


figure(6)


subplot(2,4,1)
newimg = watermark2(Pep,Barb,1,1);
imshow(newimg)

subplot(2,4,2)
newimg = watermark2(newimg,Barb,2,2);
imshow(newimg)
```

```
subplot(2,4,3)
newimg = watermark2(newimg,Barb,3,3);
imshow(newimg)

subplot(2,4,4)
newimg = watermark2(newimg,Barb,4,4);
imshow(newimg)

subplot(2,4,5)
newimg = watermark2(newimg,Barb,5,5);
imshow(newimg)

subplot(2,4,6)
newimg = watermark2(newimg,Barb,6,6);
imshow(newimg)

subplot(2,4,7)
newimg = watermark2(newimg,Barb,7,7);
imshow(newimg)

subplot(2,4,8)
newimg = watermark2(newimg,Barb,8,8);
imshow(newimg)

sgtitle('"Barbara" embeded into "Peppers"')
%Do the same for the Baboon Image
figure(7)

subplot(2,4,1)
newimg = watermark2(Bab,Barb,1,1);
imshow(newimg)

subplot(2,4,2)
newimg = watermark2(newimg,Barb,2,2);
imshow(newimg)

subplot(2,4,3)
newimg = watermark2(newimg,Barb,3,3);
imshow(newimg)

subplot(2,4,4)
newimg = watermark2(newimg,Barb,4,4);
imshow(newimg)

subplot(2,4,5)
newimg = watermark2(newimg,Barb,5,5);
imshow(newimg)

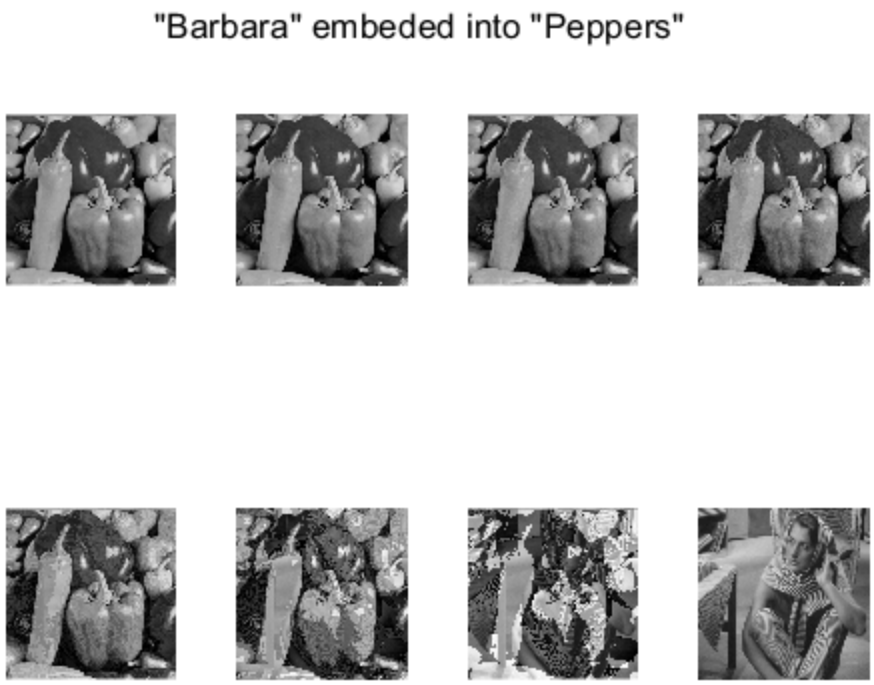
subplot(2,4,6)
newimg = watermark2(newimg,Barb,6,6);
imshow(newimg)

subplot(2,4,7)
newimg = watermark2(newimg,Barb,7,7);
```

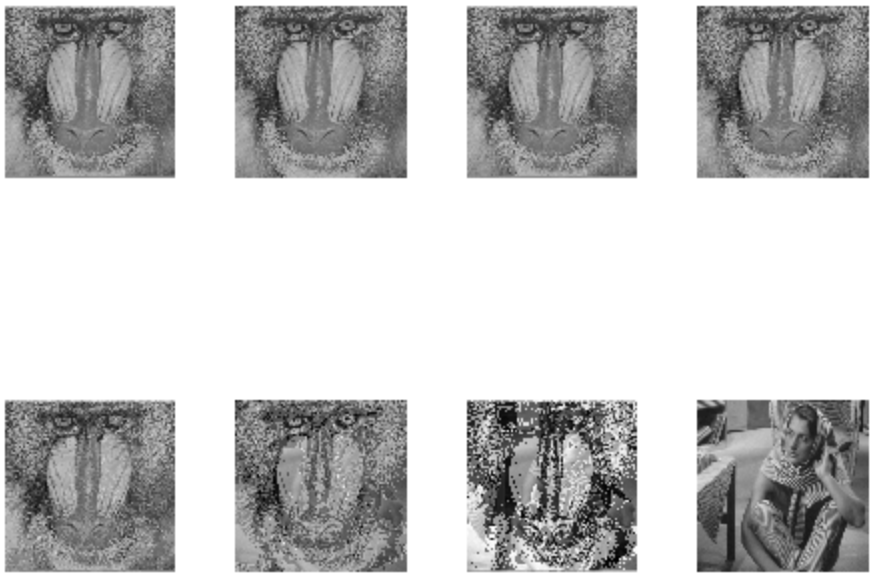
```
imshow(newimg)

subplot(2,4,8)
newimg = watermark2(newimg,Barb,8,8);
imshow(newimg)

sgtitle('"Barbara" embeded into "Baboon"')
```



"Barbara" embeded into "Baboon"



Functions Below

```
type watermark2.m
type get_bitplane.m


function [newimg] = watermark2(img1,img2,NIbp,WMbp)
%Function to replace a specific bitplane of one image with another
%specified bitplane of another image

%img1 = double(img1);
%img2 = double(img2); %watermark

bp = get_bitplane(img2,WMbp);
newimg = bitset(img1,NIbp,bp);

end

function [Bitplane_img] = get_bitplane(img,bitplane)
%This function outputs the specified bitplane of the input img
img = double(img); %Convert unit8 image to double
Bitplane_img = bitget(img,bitplane); %Extract specified bit plane from
 img
end
```

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