Part 4: Bitplane Slicing

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Notes:

- Sample images are available in the images folder of the current directory. (You may need to add images folder into your path.)
- Related lecture: Lecture4 - Point Processing
- pdf versions of the .mlx files are also available for those using GNU Octave

```
% clear workspace variables and close windows
clc, clearvars, close all;
```

```
% read and display input image
I = imread('images/cameraman.tif');
if(size(I,3) == 3) % convert to grayscale if not
    I = rgb2gray(I);
end
imshow(I), title('Original image');
```
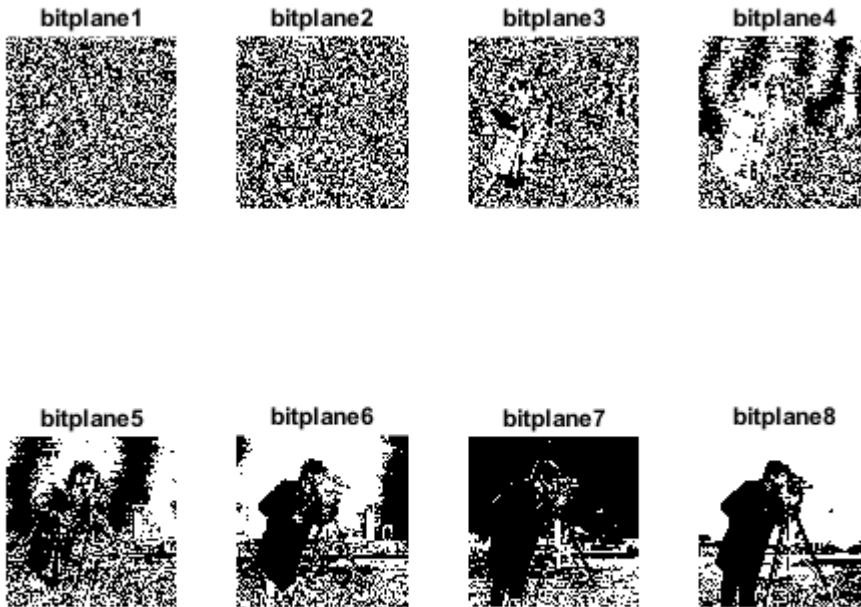

Original image

Bitplane slicing

```
% extract and display bitplanes
figure
```

```
for i = 1:8
    Ib = bitget(I,i);
    subplot(2,4,i), imshow(Ib,[]), title(strcat('bitplane ', num2str(i)));
end
```


bitplane1 bitplane2 bitplane3 bitplane4

bitplane5 bitplane6 bitplane7 bitplane8

Reconstruction from bitplanes

1. reconstruct using all bitplanes

```
Ir = zeros(size(I));
for i = 1:8
    Ir = Ir + 2^(i-1)*double(bitget(I,i));
end
figure, imshow(Ir,[]), title('Reconstructed image using all bitplanes')
```

Reconstructed image using all bitplanes


```matlab
% check wether it is reconstructed correctly
Idif = uint8(Ir)-I;
sum(Idif(:))
```

```
ans = 0
```

2. reconstruct using 6, 7, 8. bitplanes

```matlab
Ir = zeros(size(I));
for i = 6:8
    Ir = Ir + 2^(i-1)*double(bitget(I,i));
end
figure, imshow(Ir,[]), title('Reconstructed image using 6, 7, 8 bitplanes')
```

Reconstructed image using 6, 7, 8 bitplanes

Hiding information into bitplanes

A very simple example of image steganography

```matlab
Itest = imread('circles.png'); %read a totally different image into first bitplane
for i = 2:8 %the other bitplanes are from the cameraman image
    Itest = Itest + 2^(i-1)*double(bitget(I,i));
end
figure, imshow(Itest,[]), title('Output')
```

Output


```matlab
% extract and display bitplanes
figure
for i = 1:8
    Ib = bitget(Itest,i);
    subplot(2,4,i), imshow(Ib,[]), title(strcat('bitplane ', num2str(i)));
end
```

bitplane1

bitplane2

bitplane3

bitplane4

bitplane5

bitplane6

bitplane7

bitplane8