

Experiment-9: Image compression methods:

Compress an image using DCT, then calculate compression ratio and PSNR to evaluate quality of the compressed image.

```
% Image Compression using global DCT (keep top X% coefficients)
```

```
close all;
```

```
clear;
```

```
clc;
```

```
% Parameters
```

```
keepPercent = 40; % keep top 40% coefficients (change it to see different levels of  
compression;)
```

```
% Read and convert image
```

```
I = im2double(imread('cameraman.tif'));
```

```
% Apply global 2D DCT
```

```
dct2d = vision.DCT;
```

```
idct2d = vision.IDCT;
```

```
psnr = vision.PSNR;
```

```
J = step(dct2d, I);
```

```
% Find threshold for top keepPercent coefficients
```

```
coeffs = abs(J(:));
```

```
sortedCoeffs = sort(coeffs, 'descend');
```

```
cutoffIndex = round(numel(sortedCoeffs) * keepPercent / 100);
```

```
threshold = sortedCoeffs(cutoffIndex);
```

```
% Zero out coefficients below threshold
```

```
J(abs(J) < threshold) = 0;
```

```
% Inverse DCT
```

```
It = step(idct2d, J);
```

```
% Compute PSNR
```

```
psnr_val = step(psnr, I, It);
```

```
fprintf('PSNR = %.2f dB\n', psnr_val);
```

```
% Compression ratio
```

```
nonzero = nnz(J);
```

```
total = numel(J);
```

```
CR = total / nonzero;
```

```
fprintf('Compression Ratio = %.2f\n', CR);
```

```
% Display
```

```
figure;
```

```
subplot(1,2,1); imshow(I); title('Original');
```

```
subplot(1,2,2); imshow(It);
```

```
title(sprintf('Reconstructed (Top %d%%, PSNR=%.2f dB)', keepPercent, psnr_val));
```

```
% Save compressed image
```

```
imwrite(It, 'CameramanCompressed.tif');
```