B31SE: Programming Assignment 5: Image Compression

Objectives: We will experiment DCT and DWT and the effects of quantization in compression algorithms

1) Software development for 2D Haar Wavelet Transformation and Inverse Wavelet Transformation (write your own matlab code) (4 marks):

In this Lab you will create functions for computing the 2-D Haar wavelet transformation and the inverse Haar wavelet transformation.

Load an image (for instance circuit.tif) and apply your algorithm to this image and visualize the results in the screen. Test it will various images and comment on the performances.

Apply two iteration of Haar wavelet transform on the images. Comment on your observations.

2) Image Compression using DCT and Haar/ Daubechies Wavelets (Matlab functions such as imquantize, `huffmanenco`, dct etc. can be used for this part) (6 marks)

As we now know, the DCT and DWT of an image can be used compress images. Compression algorithms tend to quantize the image in the transformed domain (for example Discrete Cosine Transform for JPEG).

In this lab, we will investigate how quantization affects the image. Write a Matlab program to transform the image using DCT and DWT and quantize the transformed image using naïve (Various naïve quantisations can be tried) and optimal (to minimize the mean square error and also quantisations used within JPEG and JPEG 2000 can be used) quantization method(s). Information available in external literature (such as Wiki or published papers).

Load an image (for instance circuit.tif) and apply your algorithm to this image by varying the parameters (quantization ranges and levels. Repeat this with various images (Gray and Color)

Calculate the mean square error and Peak Signal to Noise Ratio.

Repeat the above using Iterative Haar wavelet transform and Daubechies AND OTHER wavelets available in matlan.

Compare your results.

Submit the report (by April 22nd) in Vision. Your report may include Matlab codes – results with various images (images that are not provided in the class also can be used) along with brief discussions of the performances.