

**B31XM – Matlab Lab**  
**Image Compression/Quantization**

(15 Marks for the final grading).

**1. Objectives:**

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

- 1) Testing for DCT and invers DCT Transformation: In this Lab you can use existing matlab functions to compute the DCT and the inverse DCT and test them with various images.
- 2) Software development for 2D Haar Wavelet Transformation and Inverse Wavelet Transformation: In this Lab you will create your own functions for computing the 2-D Haar wavelet transformation and the inverse Haar wavelet transformation and test them with various images.
- 3) Extend your work in (2) to implement and test 1) Daubechies wavelets and 2) biorthogonal wavelet transforms modified version of (5,3) biorthogonal spline filter and Cohen/Daubechies/Feauveau CDF(9, 7) filter.
- 4) Apply two iteration of DWT (and inverse DWT) and DCT (inverse DCT) on images.

**2. Objectives:** Image Compression using DCT and Haar/ Daubechies/biorthogonal Wavelets including quantization.

As we now know, the DCT and DWT of an image can be used to 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 compression and quality.

Write a Matlab program to quantization of the transformed images using 1) naïve and 2) optimal (the quantization minimized the mean square error) quantization method(s). You may consider the quantization algorithms used in JPEG and JPEG2000 standards.

Load an image (for instance circuit.tif) and apply your algorithm to this image by varying the parameters (quantization ranges and levels). For example, play with the number of levels on which you quantify the transformed image.

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

Repeat the above using Iterative Haar wavelet transform and Daubechies length 4 and 6 wavelets.

Compare your results. (15 Marks)

(Marking criteria -

**Submit the report (by October 17<sup>th</sup> 5pm) in vision**

**Your report may include Matlab codes – results and brief answers, discussions, comments and any concerns.**

