Experiential Learning- 1

1. Explore and learn the imaging method used in your laptop and mobile phones.

2. Choose any one application of image processing of your own interest and identify the recent advancements in the field. Also explore the thrust research problems associated with it (atleast 2).

3. Resize a picture of size 256×256 to 16×16 by image down sampling and then perform up sampling to witness the effect of sampling. Use a suitable interpolation algorithm.

4. Write a code to represent the image with varying gray level resolution.

5. Collect dataset that has 5 different images of varying information content, contrast, resolution etc. Write a code to apply the following transformation techniques and visualize the effect.
   - Linear gray level mapping
   - Non-Linear gray level mapping

6. Write a code to equalize the histogram of an image. Display the input and the equalized images

7. What filter will be used to remove objects of size m×m in an M×N image? Choose a suitable input image and justify your choice of filter.

8. Write a code to apply all smoothing spatial filters on the images used in Q5.

9. Write a code to apply all sharpening spatial filters on the images used in Q5.

10. Write a code to identify the number of persons moving out of the class and their direction of movement (choose suitable transform)

11. Apply Block DCT (8×8) on an image and retain only 40 coefficients per block, using this reconstruct the image and evaluate the PSNR.

12. Apply single level DWT on an image and visualize the following i) approximation (LL) and detail subbands (LH, HL, HH) as separate images ii) Retain only the LL sub band and set other subbands to zero and reconstruct the image using the inverse DWT iii) threshold the coefficients in all subbands except LL and reconstruct the image using the inverse DWT. Compute PSNR, SSIM, and MSE for ii and iii.

(The USC-SIPI Image Database. University of Southern California <http://sipi.usc.edu/database/>.
Image repository. The University of Waterloo <http://links.uwaterloo.ca>.
Berkeley segmentation database:
http://www.eecs.berkeley.edu/Research/Projects/CS/vision/grouping/segbench/
TNAU Agritech Portal:
http://agritech.tnau.ac.in/crop_protection/crop_prot_crop%20diseases_cereals_rice_main.html,
http://agritech.tnau.ac.in/crop_protection/crop_prot_crop%20diseases_pulses_blackgram.html)

Note: you can use MATLAB/Python for the coding part