

18-798 Image, Video and Multimedia
Instructor: Yang Cai

Assignment #3

Due September 19, Thursday, 1:00 pm

Questions:

1. (50%) Download 3 images from social media, A) find straight lines. Hint: start with the sample code in the lecture notes about Hough Transform; B) Superimpose the detected lines to the original images; C) Analysis the impact of image resolution, size and other factors on line detection.
2. (50%) Leonardo Da Vinci used to hide information in his paintings and drawings. He sometimes used mirror to write text, a naive form of encryption. Now you pick up a color image. Use Least Significant Bit or Zeros-Hiding steganography to encrypt a message or an image. A) Show the image with hidden data (it should appear to be similar to the original); B) show how to decode the secret information.
3. (Bonus 25%) Given a DCT coefficient matrix of an image, one can use a threshold value to set many coefficients to zero. Then take an IDCT to show the image. Is this process a low-pass filter? In what conditions? A) Prove your theory with computational examples in MATLAB; B) Provide a mathematical proof.