# Programming Assignment-1: CSL444

Note: 15 Marks (3x5). Implement any 5 programs. 2 Bonus marks for implementing 6the program as well.

Q1. Given the image "lenna.png" with dimensions 220x220 pixels, apply bilinear and nearest neighbour interpolation techniques to scale up the size of the image. After performing the interpolation, compare and contrast the visual results of the two methods in terms of smoothness, sharpness, and artifact appearance.

Q2. Write a program to find the largest correlation spot in the given image (hills.jpg) using linear filtering- based template matching technique. Draw rectangular bounding box at the detected template (template.png) matched locations. (Use hills.jpeg, template.png images)
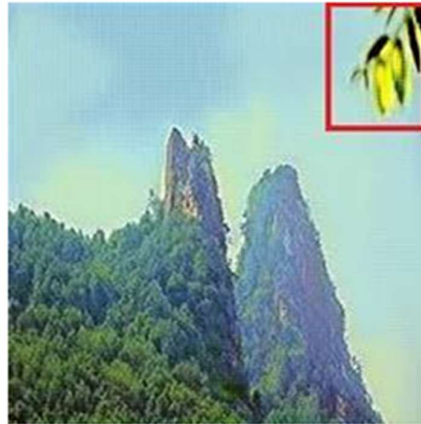
Q3. Write a program to perform histogram equalization on the image "home.jpg" to enhance its contrast. Also implement gamma correction on the image "sunset.jpg" using different gamma values. Check which one gives the best output. Use the histogram equalization method on the image "sunset.jpg" and compare the equalized image with the best gamma corrected image.

Q4. Write a program to implement spatial domain averaging filter, weighted averaging filter, median filter of size 3X3, 5X5 and observe its blurring effect on the given noise.tiff and car.png image. Also find the optimum size of the kernel for median filter for which the features in the image 'noise.tif' are the clearest with minimum noise and deformation of the features. Do not use inbuilt spatial filtering function.

Q5. Using basic image operations combine the scene and object image to get the composite image as shown below. (Use img61.jpg, sample.jpg images)

Q6. Write a program to perform edge detection using morphological operations. Implement the following steps on the coins image:

- Convert the image to grayscale and normalize it to the range [0,1].
- Apply morphological gradient operation (difference between dilation and erosion) to highlight edges.
- Use morphological top-hat and black-hat transformations to extract bright and dark edges.
- Compare the results with a standard Sobel or Canny edge detector (can use library implementations).