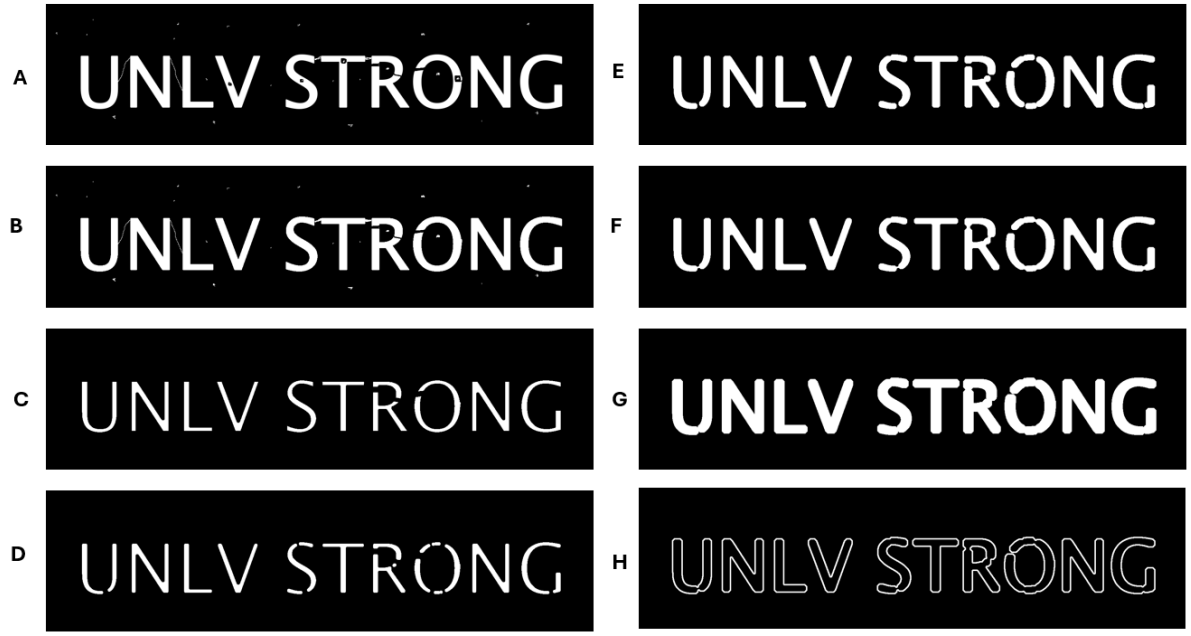
Assignment 2

Due date: April 16, 2024

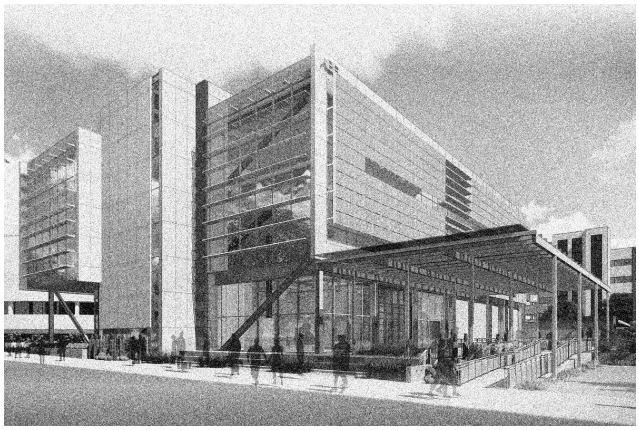
1 Morphological

Question 1: Apply morpholigical operations to image A to generate a series of images, "B" through "H".Each image in the sequence is created by applying a morphological operation to the preceding image. For example, to generate image "C", an operation is applied to image "B". Please, submit the source code and all generated images.
Note (optional): To verify the accuracy of your outputs, conduct an image subtraction between each of your produced images and the corresponding provided reference images. A correct output will result in zero differences across the entire image, indicating your operations have been executed correctly. (40 Marks)



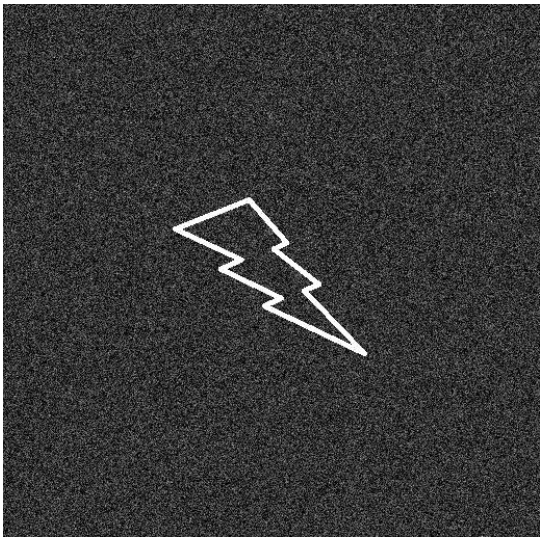
2 Image Enhancement

Write a MATLAB code to enhance an image named 'noisy_image.jpeg' that is affected by noise. Compare Ideal, Gaussian, and Butterworth low-pass filters in frequency domain. Adjust the parameters to achieve the best possible result. Feel free to use intermediate steps to enhance the image. Submit the source code and the enhanced outputs. (30 Marks)

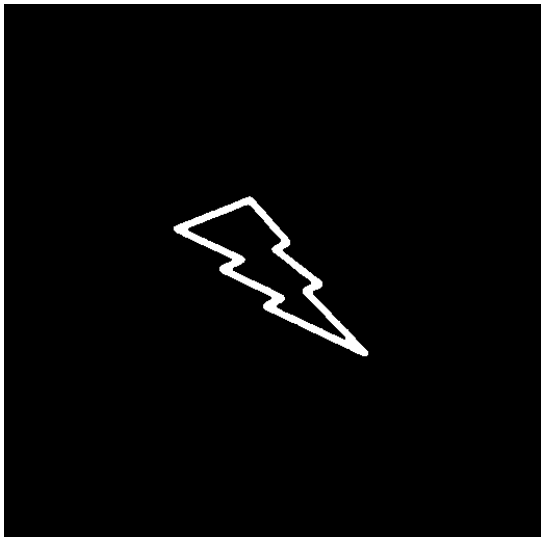


3 Segmentation

Develop a custom thresholding technique that comprises three primary stages: preprocessing, thresholding using Otsu's method, and postprocessing. For preprocessin, apply Gaussian filters to remove noise. Then, manually implement Otsu's thresholding algorithm to identify the optimal threshold. For postprocessing, use a morphological operations like image closing, opening, dilation, erosion, or their combination to refine the segmentation results. Submit the source code and the images. (30 Marks)



(a) Input Image



(b) Output