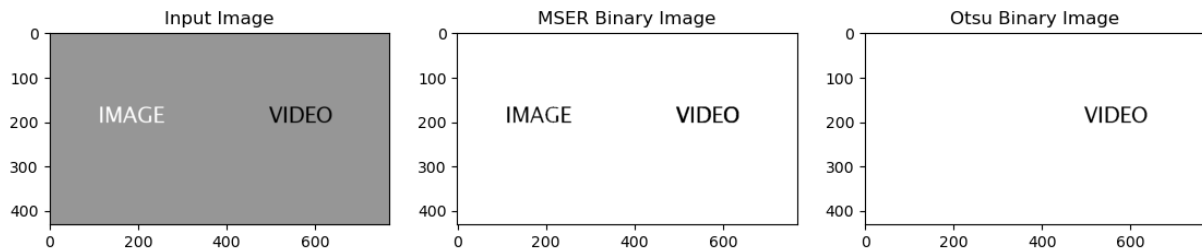


E9 241: Digital Image Processing

Assignment 1

Q 6. The following is the MSER and Otsu based results obtained.



Otsu thresholding based connected component analysis

In the given image, the word “IMAGE” has pixel intensities very close to 255 and the word “VIDEO” has pixel intensities around 0. In Otsu thresholding, the objective is to identify an optimal threshold to split the intensities into two classes by minimizing intra class variance or maximizing inter class variance and we set all the pixels with values above threshold to 255. In this image, any intermediate threshold can only preserve one of the two words. We can’t pick a single threshold that can preserve both the words here. The Otsu threshold is 77 which is less than the background intensity which is 149. This creates a binary image with white background and preserves only near zero pixels or the letters VIDEO. So, Otsu binarization fails to preserve the content in this image and the white connected components can’t be obtained as shown above.

Otsu threshold obtained = 77

Time taken for Otsu thresholding based connected component analysis = ~1.5s

Maximally stable extremal regions (MSER)

It is necessary to switch background while thresholding to keep the word ‘IMAGE’ in the binary image for connected component analysis. In the MSER algorithm given, while sweeping through all the thresholds, in each binary image, the number of white pixels and black pixels are used to decide on switching the background and then connected component analysis is done. So up to a certain threshold, black letters are the connected components obtained. Beyond that, the connected components obtained are the white letters. Lengths of the connected components are collected for both white and black letters within their respective valid intensity ranges. A stable threshold is obtained for each letter based on the epsilon and delta values chosen. As there can be multiple such thresholds, the highest threshold for which the connected component in MSER is chosen as the relative error w.r.t the threshold would be least in this case. As the connected component analysis is done for each threshold, this algorithm takes more time.

Epsilon = 3, Delta = 5

Time taken for MSER algorithm = ~275s