Assignment 1 Report

Name: Adarsh Shah
Sr. No.: 04-03-06-10-51-21-1-19473

1. Histogram

- The function definition is same as specified in the assignment
- The Test wrapper function is `testHist()`.
- The comparison is done with the builtin `plt.hist()`.
- The output plot is saved as `1_histogram.png`.

2. Otsu

- The function definition is same as specified in the assignment
- The custom histogram function is used for calculation.
- The Test wrapper function is `testOtsu()`.
- The comparison is done with the built-in `skimage.filters.otsu()`.
- The output binarized image is saved as `2_otsu.png`.
- The output threshold for given image is **125**.
- The runtime of custom otsu function is about 10 times slower than the built-in otsu binarizer for the given input image.

3. Foreground Extraction

- The function definition is same as specified in the assignment
- The custom otsu function is used for binarizing and extracting the words.
- The extraction and merge operations are vectorized.
- The output image is saved as `3_foreground_extraction.png`.
- The Test wrapper function is `testFE()`.

4. Connected Components

- The function definition is same as specified in the assignment
- The output obtained is 7 ones and 45 digits.
- The connected components are extracted using Breadth First Search.
- The custom otsu function is used for binarizing the image.
- The Test wrapper function is `testCC()`.

5. Binary Morphology

- The function definition is same as specified in the assignment
- The majority function is used for denoising with square window of size 25.
- The Test wrapper function is `testBM()`.
- The output image is saved as `5_binary_morphology.png`.

6. Maximally Stable External Regions

- The function definition is same as specified in the Assignment.

- The implementation is done taking delta as 6 intensity value.
- The mser output is saved as 6_mser_img.png
- In total, 37 components were captured by mser algorithm.
- The main difference between mser and otsu as observed from output lies in the fact that mser can capture multiple connected components whose intensities cannot be classified into two classes class 0 and class 1 as done in otsu.