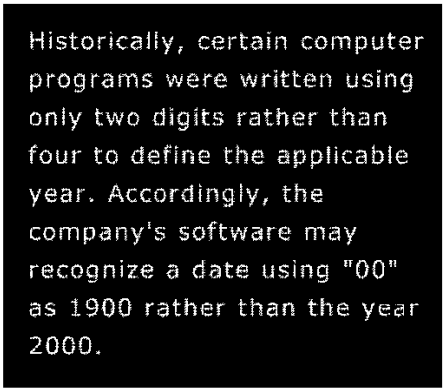
Image Processing – HW2 (5/3/2023)

Instructions – Follow these carefully:

1. Please upload your work as a zip file attachment to Moodle. The zip file must have the source code and a PDF report where you explain and display the outputs for each problem.
2. You can use either Python or Matlab to do the work.
3. Please feel free to read related materials available in the official Matlab/Python documentation.
4. The due date is 5/19 before 11:59 pm. Any late submission will result in a 20% point deduction for the 1st week and 50% for the 2nd week, and no point is given after the 2nd week.

Assignment:

1. (20%) Use binary morphological operations to 1) fix the image shown below ("text-broken.tif") and 2) find the boundaries of each character like '**Historically**.'



2. (20%) Please use linear stretching to enhance the contrast of the image "aerialview-washedout.tif."

3. (20%) Please apply global HE to "einstein-low-contrast.tif" or "aerialview-washedout.tif." You should implement it only using "for loop' and +-*/.

4. (20%) Please divide the histogram of "aerialview-washedout.tif" into two sub-histograms using the median μ of the image and apply HE to two sub-histograms separately (one ranging from 0~μ and the other from (μ+1)~255). You should implement it only using "for loop' and +-*/. Using any built-in APIs, such as numpy.histogram, cumsum, numpy.interp, etc. would result in only 60% of your final score.

5. (20%) Following Question 3, please implement the contrast enhancement method proposed in the paper "Two-dimensional histogram equalization and contrast

enhancement (T. Celik 2012, as attached),” which was also taught in class as CVCE version 1. The window size could be set to 7x7.