Intensity Transformation

1. Perform image negative operation on Binary.png
   - Read the file as a gray-scale image
2. Perform gamma correction on Aerial_image.png and Fracture_spline.png
   - Read the file as a gray-scale image
   - Check the result when you change the gamma value
3. Apply gamma correction on reverse_light_1.jpg
   - Read the file as a gray-scale image
   - Generate an image by add 50 to each pixel
   - Also generate an image by performing gamma correction with proper gamma value. Compare the results
4. Find out the sentence hidden in dark.jpg and bright.jpg
   - Read the files as gray-scale images
   - Can you think of a way to automatically set the gamma value?

Histogram Equalization

1. Compute and display histogram of Moon.png
   - Read the image as a gray-scale image
   - Set the number of bins as 16
2. Compute and print out normalized histograms of R-channel of Apple.jpg in the following cases
   - Normalized histogram of the whole image
   - Normalized histogram of a ROI whose left-top position and right-bottom position are (x:160,y:140) and (x:340,y:370)
   - Set the number of bins as 8

Spatial Filtering

1. Apply averaging filtering and median filtering on Saltnpepper.png
   - Read the image as a gray-scale image
   - Set the mask size as 7X7
2. Perform sharpening by unsharp masking on Moon.png
   - Read the image as a gray-scale image
   - Set the weight for unsharp mask as 0.5

Color processing

1. Perform gamma correction on lena.png.
   - Read the image as a color image
   - Set the value of gamma as 0.5
   - Apply gamma correction on intensity channel only
   - Apply gamma correction on R,G,B channel

2. Perform color slicing on Apple.jpg. Display regions whose color is not red as gray

3. Perform color balancing on balancing.jpg using gray-world assumption.

Image segmentation

1. Perform thresholding on Finger_print.png
   - Read the image as a gray-scale image
   - Set finger print region to 255,and background region to 0
2. Perform thresholding on adaptive_1.jpg
   - Read the image as a gray-scale image
   - Set character region to 0,and background region to 255
3. Perform thresholding on adaptive.png
   - Read the image as a gray-scale image
   - Set character region to 0,and background region to 255

Video segmentation

1. Perform pixel-based background subtraction on "Background.mp4"

- Read the video as gray-scale
- Set background image as the average of current 10 frames
- Generate a binary image by using the following equation
  - $Result(x, y) =$
    $$\begin{cases} 255 & |Current\ frame(x, y) - Background(x, y)| > 20 \\ 0 & Otherwise \end{cases}$$
- Draw bounding rectangle on each moving object whose size is bigger than 200 pixels
- Print out the number of moving objects on the image whose size is bigger than 200 pixels

Morphological operation

1. Perform morphological operation after performing background subtraction on “Background.mp4”

- Read the video as gray scale
- Perform background subtraction using MoG2
- Perform Erosion and opening and print out the number of moving objects
  - Set the shape of structuring element as ‘Cross’ and set the size as 3X3