

# Handout for Image Processing

## 2022/4/20

### 【Part I】

- Basic i/o
  - Reading an image
  - Writing an image
- Displaying images
- Image arithmetic
  - Addition
  - Multiplication
- Histogram
  - Contrast
  - Equalization
- Exercise I
  - i. Please show the 'leaf.jpg' in color.
  - ii. Please show the shape, data type and value of 'leaf.jpg'.
  - iii. Please show the 'leaf.jpg' in grayscale.
  - iv. Please decrease brightness of 'leaf.jpg' in grayscale by division.
  - v. How to get the car out from 'highway1.jpg' and 'highway2.jpg'? How do you do it?
  - vi. Please increase contrast of the 'leaf.jpg' in grayscale.

### 【Part II】

- Thresholding
  - binarization
  - Otsu's method
  - local
- Morphology
  - erosion
  - dilation
  - opening = erosion → dilation
  - closing = dilation → erosion
- Color space
  - RGB
  - HSV
- Exercise II
  - i. Please follow the steps to segment 'leaf.jpg' from background.

- a 、 Read in the image.
- b 、 Convert the image into HSV space.
- c 、 Find an optimal range for filter out the leaf.
- d 、 Use morphology skills to enhance the quality of result from (c).
- e 、 Crop out the leaf from background.

### 【Part III】

- Counting object
  - contour
  - circle
- Exercise III
  - i. Please refer to [Flood Fill — skimage v0.19.2 docs \(scikit-image.org\)](https://scikit-image.org/docs/v0.19.2/skimapi.html#flood-fill) and try to use flood fill to count the number of grains in ‘rice.jpg’.
  - ii. Compare your result to the one in class, are they the same? How to improve the result if it isn’t ideal? [Hint: Binarize the image, and check every pixel is white or black.]