

Silver Exercises

Digital Image Processing

8900

IMAGE

1. IMAGE: (350)

- a) Load a color image.(a.jpg)
- b) Split the image into its individual color channels.
- c) Display each color channel separately.
- d) Merge the color channels back together Inversely (RGB).

OPTICS

2. OPTICS: (300)

- a) Given the focal length (1CM) of a lens, calculate the image distance for an object placed at a specific distance (100 CM) from the lens.
- b) Calculate the magnification of the image formed by the lens
- c) Determine the power of a lens in diopters

CONTRAST ENHANCEMENT

3. Histogram Equalization: (350)

- a) Load an image. (a.jpg)
- b) Convert the image to grayscale
- c) Apply histogram equalization to the grayscale image.
- d) Display the original and equalized images side by side.

CONTRAST ENHANCEMENT

4. Contrast Enhancement with CLAHE: (350)

- a) Load an image (a.jpg)
- b) Convert the image to grayscale
- c) Apply contrast-limited adaptive histogram equalization (CLAHE) to the grayscale image using the `createCLAHE()` and `apply()` functions with customized parameters.
- d) Display the original and enhanced images side by side

MORPHOLOGICAL OPS.

5. Erosion: (300)

- a) Load a binary image (if the image is not binary, binarize that) (b.png)
- b) Apply erosion to the binary image with a specified kernel size.
- c) Display the original and eroded images side by side.

MORPHOLOGICAL OPS.

6. Dilation: (300)

- a) Load a binary image (if the image is not binary, binarize that) (b.png)
- b) Apply dilation to the binary image with a specified kernel size.
- c) Display the original and dilated images side by side

CONVOLOUTION

7. 2D Convolution: (500)

- a) Load an image (c.png) and Create desired kernel (filter)
- b) Convert the image to grayscale
- c) Apply 2D convolution between the grayscale image and the kernel.
- d) Display the original image and the convolved image side by side

DENOISING

8. Gaussian Smoothing: (500)

- a) Load a noisy image (c.png)
- b) Apply Gaussian smoothing to the image.
- c) Adjust the standard deviation (sigma) parameter to control the amount of smoothing.
- d) Display the original noisy image and the denoised image side by side

DENOISING

9. Median Filtering: (500)

- a) Load a noisy image. (c.png)
- b) Apply median filtering to the image.
- c) Adjust the kernel size parameter to control the amount of filtering.
- d) Display the original noisy image and the denoised image side by side.

EDGE DETECTION

10. Find and show the edges in the image(d.jpg) with the intensity between (100, 200) . (750 points)

HOUGH TRANSFORM & CONTOURS

11. Find and show the lines in the image (d.jpg) for edges with intensity more than 150 . (700 points)

HOUGH TRANSFORM & CONTOURS

12. Find and show the Contours of the image (f.jpg) (800)

VIDEO

**13. Split the 18th and 19th frames of the video (e.mp4) and Denoise that, then find the edges, and finally show the edges on the original frame!
(denoising and edge detection methods are desired!) (800)**

SIFT DETECTOR

14. By yourself, Take a color photo of an object and then place that object in another environment. Then resize and turn it around and retake a picture of it. Now extract and match the keypoints of these two photos twice. Once when the image is in color and once when the image is Gray level. Which one works better? Why? (1200)

OBJECT TRACKING

15. Track the formula car in the video(e.mp4), at first to the end!, without any template.(1200)