

DMET 1001 – Image Processing

Assignment #2

(Due on: June 26, 2021 at mid-night)

(This assignment can be done in groups of 2 students each)

(Submit your assignment at DMET1001S21@gmail.com)

Problem 1

Implement the Scale Invariant Feature Transform (SIFT) algorithm to find the blobs in the image “Giraffe.jpg”. Your function should take the image as an input, the maximum value of sigma (MaxS) to examine and the threshold explained in slide 18. You should examine values of sigma in the range $[1, \text{MaxS}]$ with a step of 1. The function should output the image with the circles representing the identified blobs overlaid as shown in the lecture slides.

Deliverables:

- Your code
- The images resulting from convolution with the Laplacian of Gaussian (LoG) mask with $\sigma = 1$ and $\sigma = 5$. Name the files “Giraffe_S1.jpg” and “Giraffe_S5.jpg”, respectively
- The output image with no threshold where $\text{MaxS} = 20$. Name the file “Giraffe_0.jpg”
- The output image with threshold = 0.01 where $\text{MaxS} = 20$. Name the file “Giraffe_01.jpg”
- The output image with threshold = 0.02 where $\text{MaxS} = 20$. Name the file “Giraffe_02.jpg”

Problem 2

Implement a function that uses the SIFT algorithm to stitch two gray-scale images. In your implementation, use the function you implemented in Problem 1. You should apply your function to the images “Louvre1.jpg” and “Louvre2.jpg”. The function should take the 2 images as inputs and it should output the stitched image. You can use the Prewitt operator for gradient orientation computation.

Deliverables:

- Your code.
- The stitched image. Name the file “Louvre_All.jpg”.

Note:

In this assignment, you are allowed to use edge detection and Laplacian of Gaussian methods available in Python. No need to re-implement them. All other steps have to be implemented from scratch.