

Computer Vision

Programming Task 05

Implement the following image filtering techniques using MATLAB or Python.

Tasks to be implemented:

1. Image Derivatives

Write a function that takes an image as input and does the following:

- a. computes its first derivative in x-direction and displays the resultant image.
- b. computes its first derivative in y-direction and displays the resultant image.
- c. computes its first derivative in both directions and displays the resultant image.
- d. computes its second derivative in x-direction and displays the resultant image.
- e. computes its second derivative in y-direction and displays the resultant image.
- f. computes its second derivative in both directions (aka Laplacian filter) and displays the resultant image.

2. Image Sharpening with Laplacian

Write a function that takes an image as input and performs the following operations:

- a. applies Gaussian 7×7 filter to blur it, and then
- b. uses Laplacian to sharpen the blurred image.

3. Unsharp Masking

Implement a function for unsharp masking. The function reads a blurred image and performs unsharp masking to sharpen the image and displays the two images side-by-side.

4. High-boost Filtering

Implement high-boost filtering. The function reads a blurred image and performs high-boost filtering to sharpen the image and display the two images side-by-side.

5. Image Gradient

Write a function that reads a gray-scale image and computes its gradient.

After applying each operation, show the original and the filtered images side-by-side.

Evaluation:

Anytime after CV mid-term exam.

Maximum Points: 10