CMP\_SC 8690: Computer Vision

Homework 1B: Color Edge Detection

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Due: 2/8/2024

Abstract:

The goal of this assignment is to demonstrate utilizing OpenCV and NumPy to perform computational tasks relating to imaging. More specifically exploring the computation of the color structure tensor and how it can be useful in computer vision.

Experiments and Results:

A graph of a graph showing a number of circles

Description automatically generated with medium confidenceA close-up of a microscope

Description automatically generated

A graph showing a grey surface with circles

Description automatically generated with medium confidenceA close-up of a microscope

Description automatically generated

A grayscale image of a grayscale gradient

Description automatically generatedA graph of a gray scale

Description automatically generated

A close-up of a number

Description automatically generatedA blurry image of circles

Description automatically generated

A close-up of a graph

Description automatically generatedA close-up of a graph

Description automatically generated

Conclusion:

In this assignment, we were asked to compute the image gradients (Ix and Iy) for the given RGB image. We were then asked to compute the color structure tensor and then compute the trace of this tensor. Lastly, we were asked to compute the original RGB image to grayscale and then compute the gradient magnitude for the gray image. I demonstrated the color structure tensor by showing the image gradients that I computed Ix and Iy and then the off diagonal element Ixy. Since the image gradients are in the color structure tensor, I didn’t show the same image multiple times. It appears that increasing the sigma increases the blur, which removes the clarity of the color changes that were detected. For the gradient magnitude, I believe the equation I have which is np.sqrt(Ix + Iy) is correct, but it is giving an interesting result, which is just basically a large amount of noise.

References:

* Libraries and tools: PyCharm, OpenCV, NumPy, Matplotlib, Preview.
* Lec04\_EdgeDetection.pdf
* CV2024\_HW1B.pdf