Shape From Focus

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The following sections show some stack sample images along with their `SML` values for different values of **q**

1 m = 0

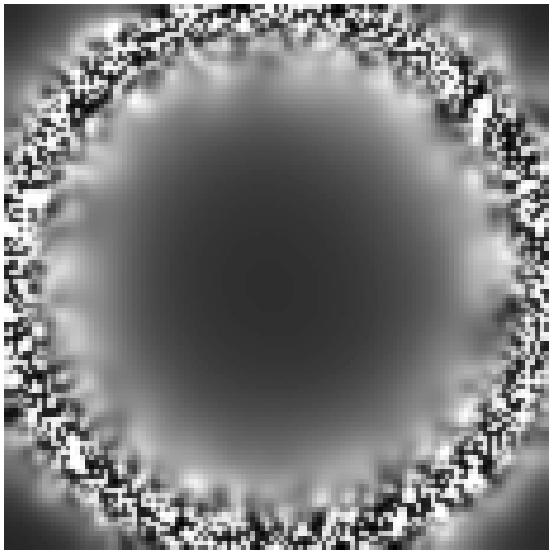

Figure 1: `Image_0`

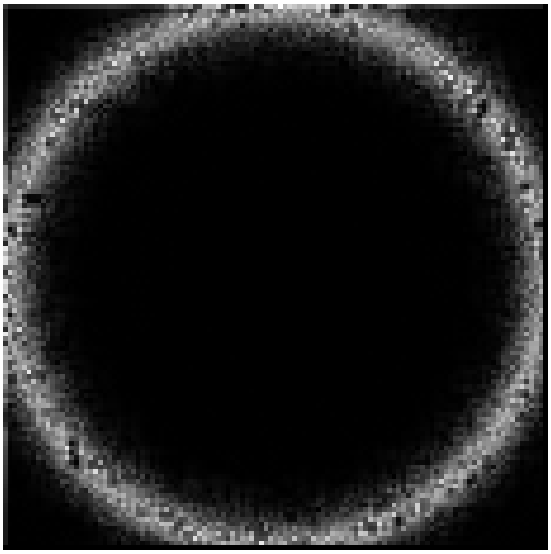

Figure 2: `SML` **q** = 0

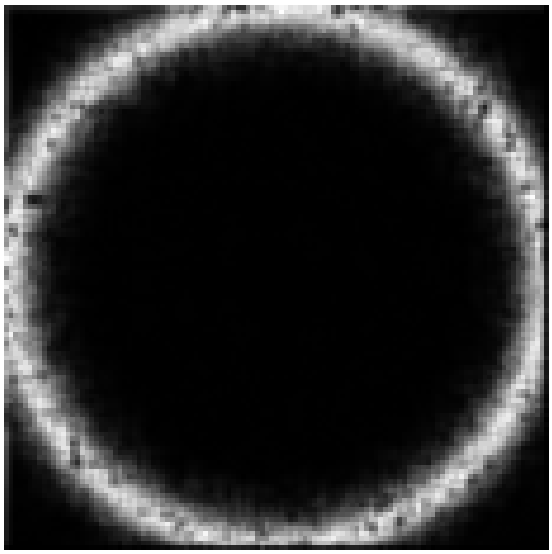

Figure 3: `SML` **q** = 1

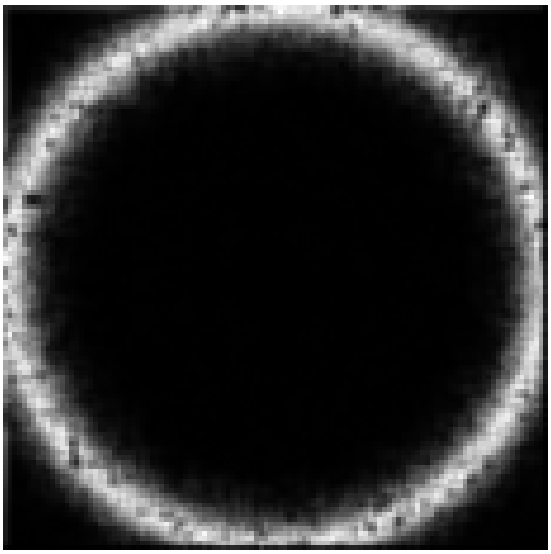

Figure 4: `SML` **q** = 2

2 m = 26

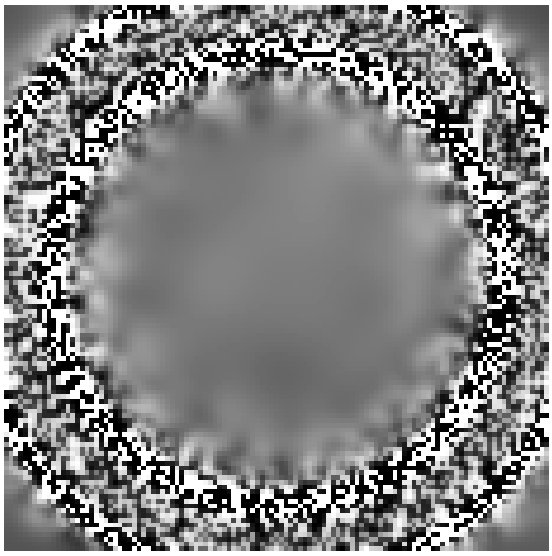

Figure 5: `Image_26`

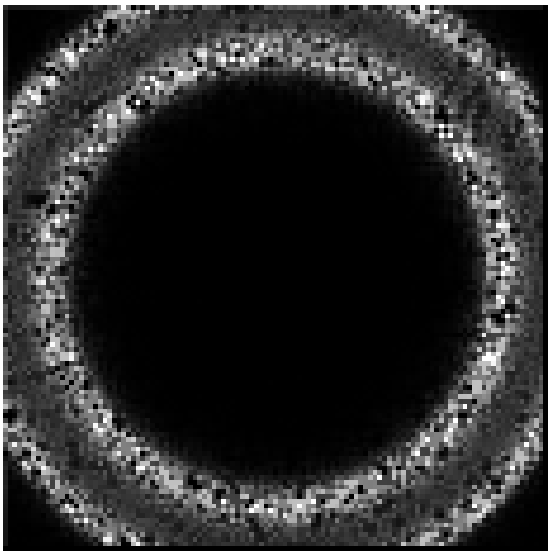

Figure 6: `SML` **q** = 0

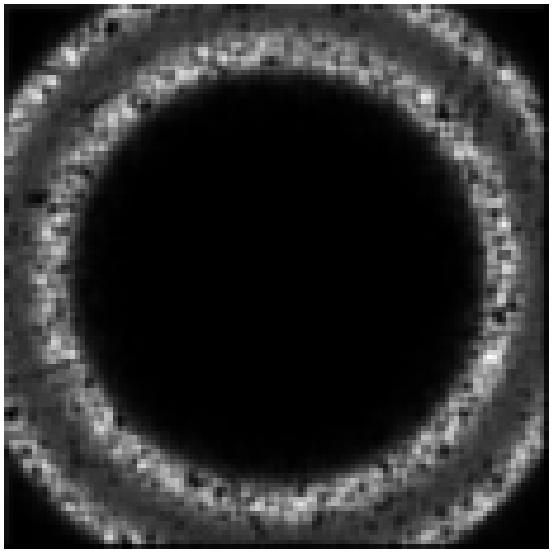

Figure 7: `SML` **q** = 1

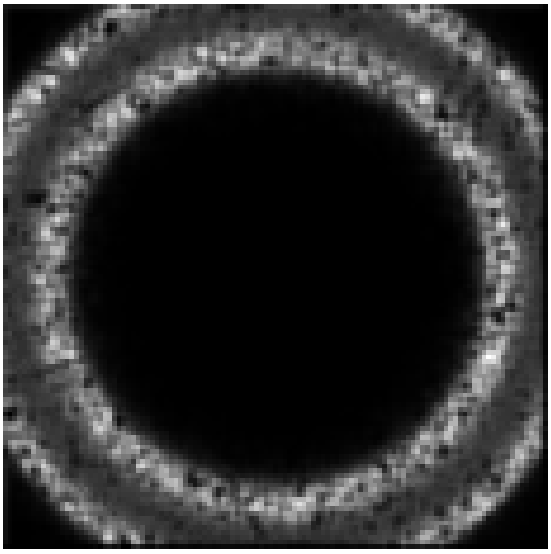

Figure 8: `SML` **q** = 2

3 m = 88

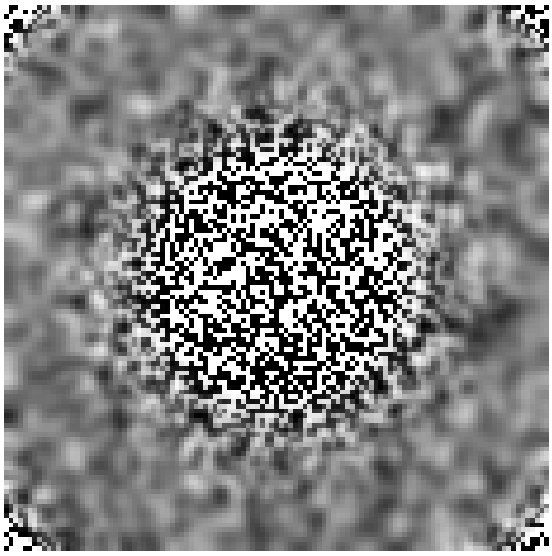

Figure 9: `Image_88`

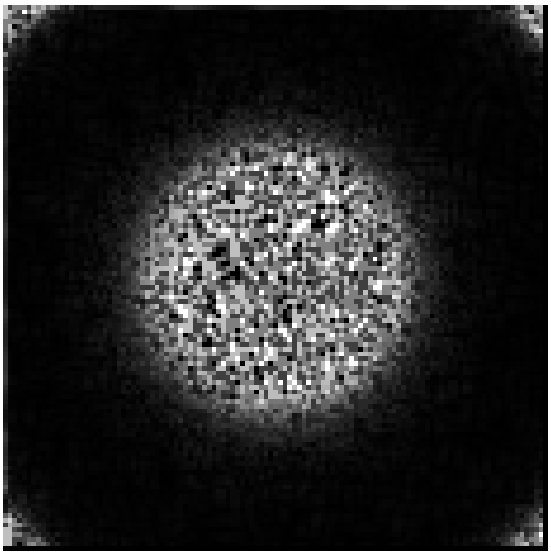

Figure 10: `SML` **q** = 0

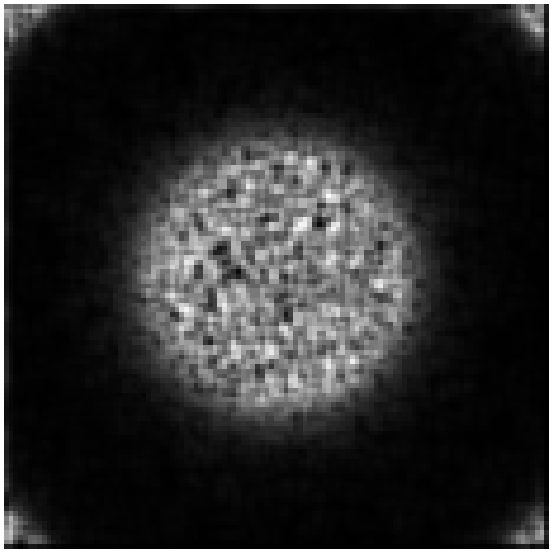

Figure 11: `SML` **q** = 1

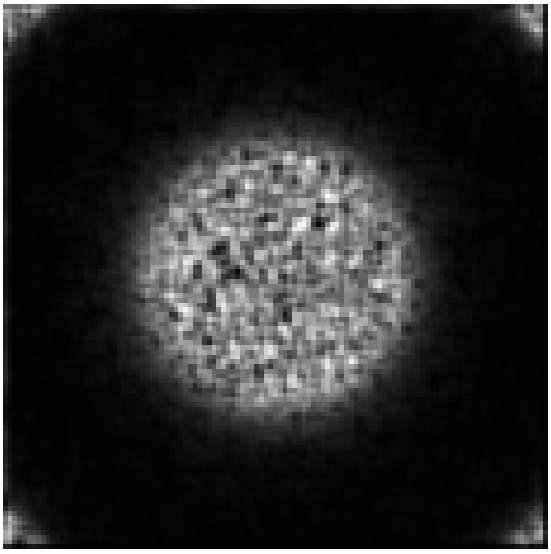

Figure 12: `SML` **q** = 2

The results of running the Shape From Focus (SFF) algorithm for the different values of **q** are shown below.

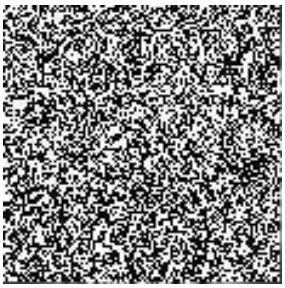

Figure 13: Focused Image for **q** = 0

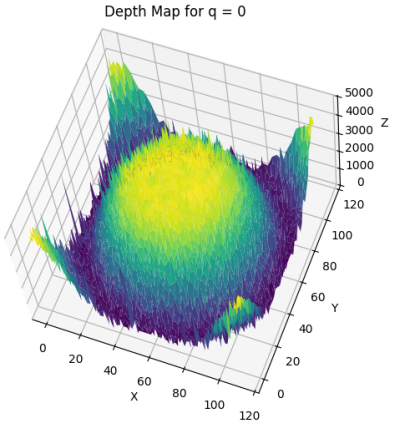

Figure 14: 3D Depth Map for **q** = 0

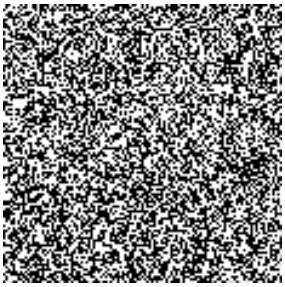

Figure 15: Focused Image for **q** = 1

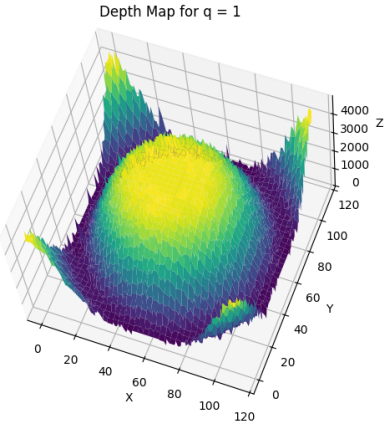

Figure 16: 3D Depth Map for **q** = 1

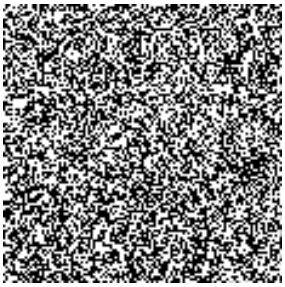

Figure 17: Focused Image for **q** = 2

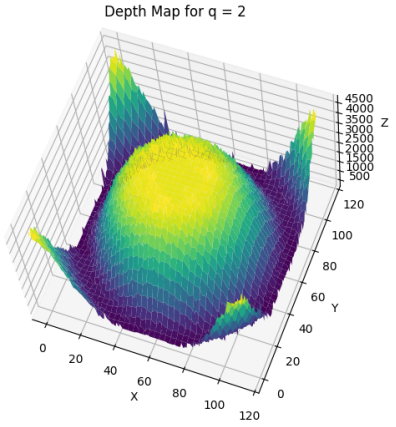

Figure 18: 3D Depth Map for **q** = 2

4 Directory Overview

The directory contains the following files

- `sff.py` The main Python file which computes the depth and reconstructs the all-focused image using Gaussian Interpolation. Uses **multiprocessing** to compute the `SML`s using `sml.py` and **torch-cuda** to compute $\bar{d}$.
- `sml.py` Helper file to compute the `SML`s uses `convolve.py` to compute the second derivatives and `affine_wrap.py` to compute the shifted `ML` values to compute the `SML`.
- `convolve.py` Helper file to convolve.
- `affine_wrap.py` Helper file to perform Affine Transformations using target-source mapping.

5 Observation

With increase in **q** value, the reconstructed all-focused image gets better especially around the borders and the depth map becomes smoother. But when we increase the **q** value even more we tend to lose the local information which results in poor depth information.