DiffuserCam Dataset Generation

Ellin Zhao

April 30, 2018

1 Introduction

For this specific dataset for the DiffuserCam project, the goal was to generate volumes with point sources. This was done using the `numPy` and `sciPy` libraries.

2 Code

The `Volume` object is defined in `volume.py`. A `Volume` contains an array with points created by first masking with a `np.ogrid` and then filtering using `scipy.ndimage.gaussian_filter`. The dimensions of the volume, radii and density of points and blur can all be tuned via the parameters to the constructor.

`volume.py` also provides functions to assist in tuning parameters and in `gen_outputs.py`, there are examples of how to use these functions. Essentially, these functions save image and video files of a `Volume` with specific parameters. For images and videos of volumes, see these slides and for the code, see this repo.

3 Usage

Call the `gen_outputs(·)` method in `gen_outputs.py` to generate and save volumes. Given parameters `num_imgs`, `n`, `r`, `percent_range`, `sigma`, the following `.npy` files will be saved:

File	Description	Dimensions
`data_2D`	flattened projections of each volume	$n^2 \times$ num_imgs
`data_3D`	flattened volumes	$n^3 \times$ num_imgs
`labels_0,...,labels_n`	centers for each volume	num_points $\times$ 3

`gen_outputs.py` provides an example of how to call the function. At the moment, you must call the function in a Python file, then run the file from the command line.