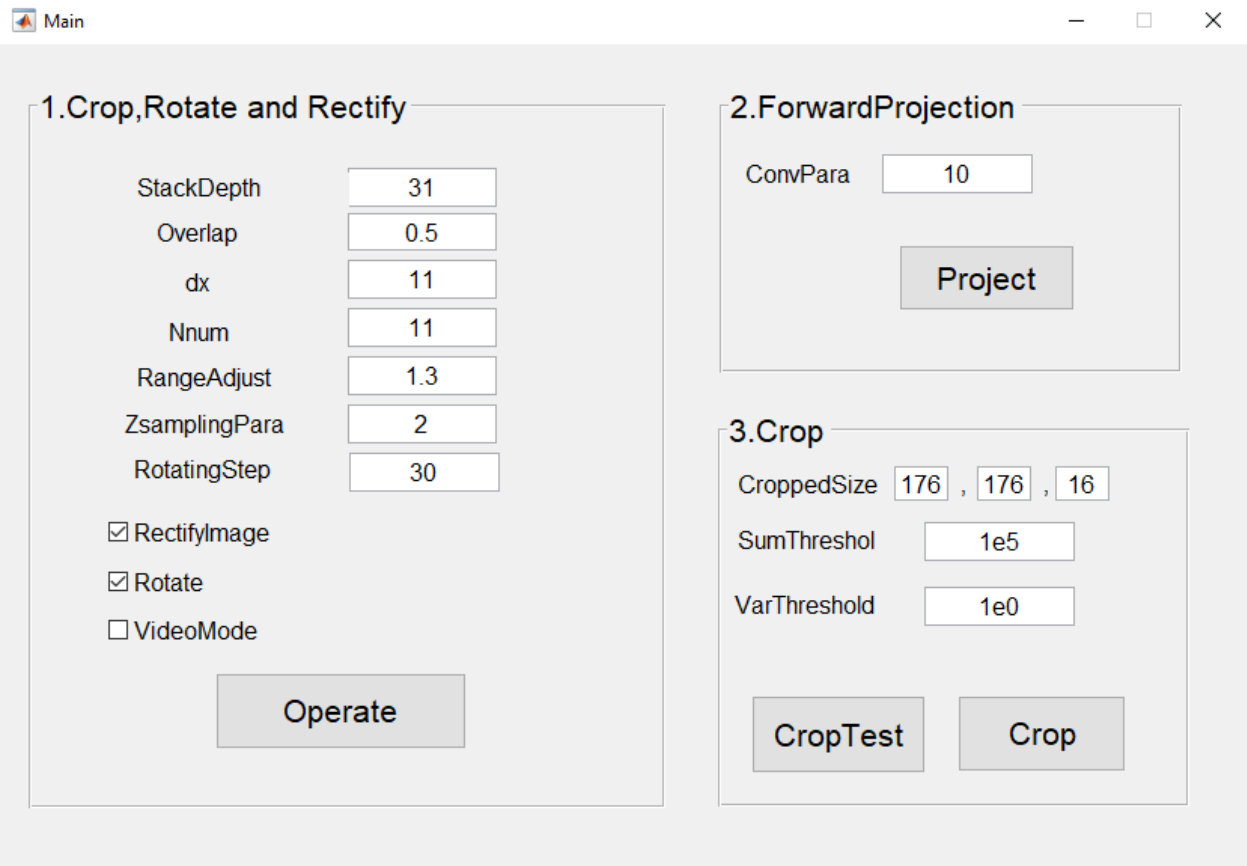
Manual for NetDataPre GUI matlab sctipt

Nov.22.2018 zqwang V1



The NetDataPre program consists of 3 steps:

1. **Crop, Rotate and Rectify**: Rotate the Ground Truth stacks to several angles. Crop them along z direction into your required StackDepth. Rectify(downsampling) them according to MLA parameters.
    a. Textboxes:
    StackDepth: the stack depth you expect for your final training sub-stacks. e.g. you want to have 176x176x31 blocks for training, then you should set 31 here as StackDepth. This step would crop your original stacks into several intermediate sub-stacks with 31 slices in depth.
    Overlap: [0 ~ 1, float] Overlap ratio for each adjacent sub-stacks. e.g. if you set 0.5 for Overlap, then each adjacent sub-stacks this step generate would have half of the slices overlapped.
    dx: the number of pixels behind a lenslet. e.g. you have MLA with lenslet as 150um in diameter and a sCMOS with pixel as 6.5um in size, then you should have 150/6.5 ~= 23 pixels as dx.
    Nnum: the number of virtual pixel you expect to have behing a lenslet. e.g. you may have dx as 23, but you think it's enough or it's required only to have 11 pixels for each

lenslet, so you could set Nnum as 11. [This is a re-sampling procedure and companied by the change of property of pixel size in physical world.]
RangeAdjust: [> 1, float] An adjustable parameter for dynamic range. The higher it is, the lower the intensity of output image will be.
ZsamplingPara: [>=1, int] The sampling step size for z direction. e.g. you have ground truth stacks with z step size as 1um but you want to have output stacks with step size as 2um, then set ZsamplingPara as 2.
RotatingStep: [0~180, int] The rotating step size for each rotation.

b. Checkboxes:
RectifyImage: whether or not to rectify. If not, this step will jump over Rectify.
Rotate: whether or not to rotate.
VideoMode: this is a special mode for video training set preparation. Illustrated later.

Usage: Set the above parameter and click **Operate**. A file selecting window will pop up, in which you could multi-select those original G.T. stacks you want to input. These stacks file could be anywhere in your computer as long as you could locate them in the selecting window and a saving directory for output will automatically be created as ./Data/Substacks in this program's main directory.

*****VideoMode**: this mode has a different locating method. Instead of locating G.T. files directly, it locate the directory which contains a series of sub-folders. Each sub-folder contain a time series. In order to use this mode, you should create such a folder structure and then tick the VideoMode checkbox. Choose the address that contains these sub-folders and **Operate**.

2. **ForwardProjection**: Tranform the sub-stacks generate from Step 1 into light field simulation images.

   ConvPara: [>=1, int] A parameter to adjust the dynamic range of light field simulation images. e.g. if you found the light field images over-exposed, then increase the ConvPara. If intensity appears too low, decrease the ConvPara.

   Usage: select an appropriate ConvPara(Sometimes you need to run one time to see if it's alright and change it then to run second time) and click **Project**. Then you need to choose one PSF file from the popped up window and make sure that your PSF in need is stores in ./PSFmatrix directory in advance. No need to worry about loading and saving directory. They are created automatically.

3. **Crop**: Crop both the simulated light field images (from Step 2) and corresponding G.T. sub-stacks (from Step 1) into small blocks.

   CroppedSize: the size of each block you want to generate for training. Make sure your z size match the StackDepth in Step 1 or you choose to discard some slices when it's less than StackDepth. (Error when bigger than StackDepth :()

   SumThreshold, **VarThreshold**: 2 threshold value for program to decide which of those generated blocks should be discarded (because they fall below the threshold so they might be blank blocks)

Usage: Input proper CroppedSize and **CropTest**. The program will then run a ‘test crop’ on some of the data and output their Sum and Var values. Then you could examine the output blocks and consulting these statistic value to see what kind of a threshold should be put to decide which of them are blank blocks. Input these threshold and click **Crop**. No need to worry about loading and saving directory. They are created automatically.