

## User Manuel of the GUI

The GUI is designed for easy to obtain the projection and back projection functions without the need for syntax knowledge. The file uploaded to the Odtuclass is called GUI\_exported.m. To use this GUI properly, firstly, you must create a folder and place this GUI\_exported.m file into this folder. Then, the projection.m and backprojection.m files that were uploaded to the Odtuclass for Phase 1 and Phase 2, respectively must be located into the same folder. Finally, you should place the input files which you want to reconstruct into the same folder. After doing this configurations, you are ready to use the GUI.

Open the GUI\_exported.m and press the Run button.

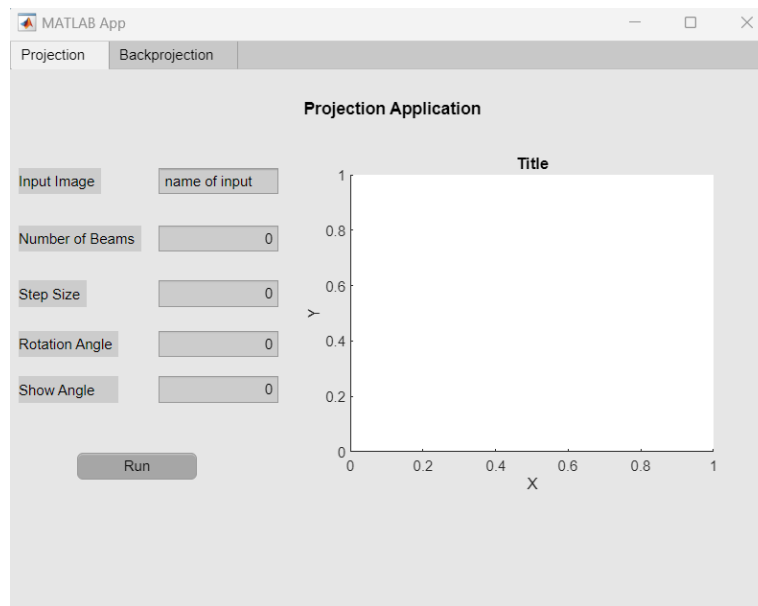


Figure 1. Default Projection Function Interface

After you run the program, an interface will pop up. There are two tabs located in the top left corner. The first tab is Projection and the next one is Backprojection. In the Projection tab,

- Into the Input Image box, you should write the name of the input image such as square.mat, SheppLogan.mat. Double quotes are not needed. Just the name of the input file.
- In the Number of Beams box, you should write the beam number like 100, 200, 1000.
- In the Step Size, you should write how many projections you want. For example, if you type 1, it means you will get 180 projections and each step will be 1 degrees apart.
- In the Rotation Angle box, you should write how many degrees you want to rotate your original image. Generally, I left it as 0 since the orientation of the original input is not required to be rotated.
- In the Show Angle box, you should write which index you want to display. For example, if you entered Step Size as 1 and you want to display the 30<sup>th</sup> projection plot, you should write 30 to this box.
- Finally, you should hit the Run button to see the resultant projection plot on the right side.

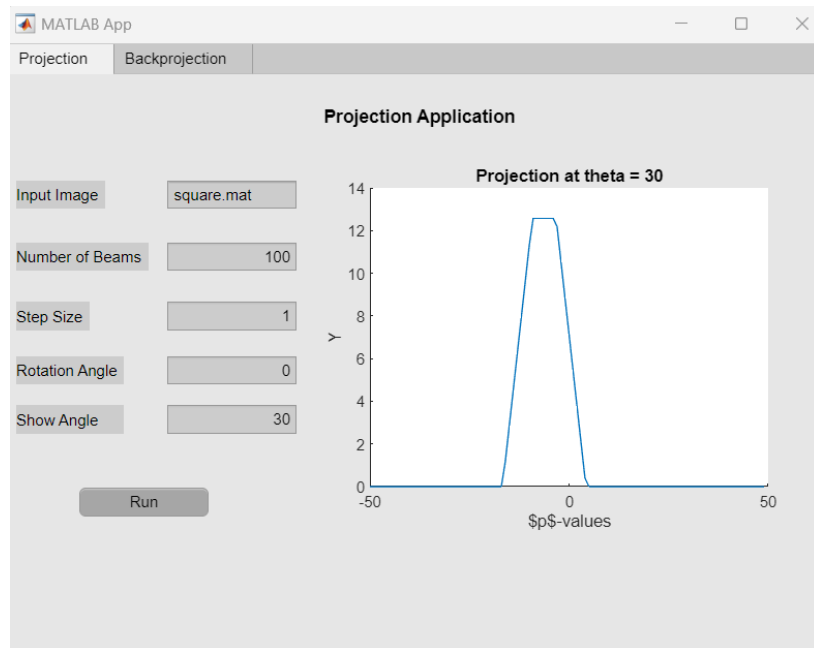


Figure 2. Example Usage of the Projection Function

After you follow the instructions, you will see this result. This concludes the Projection function. Moving on, in the next tab, which is named as Backprojection, you can see the Back Projection function. In default, you will see this screen:

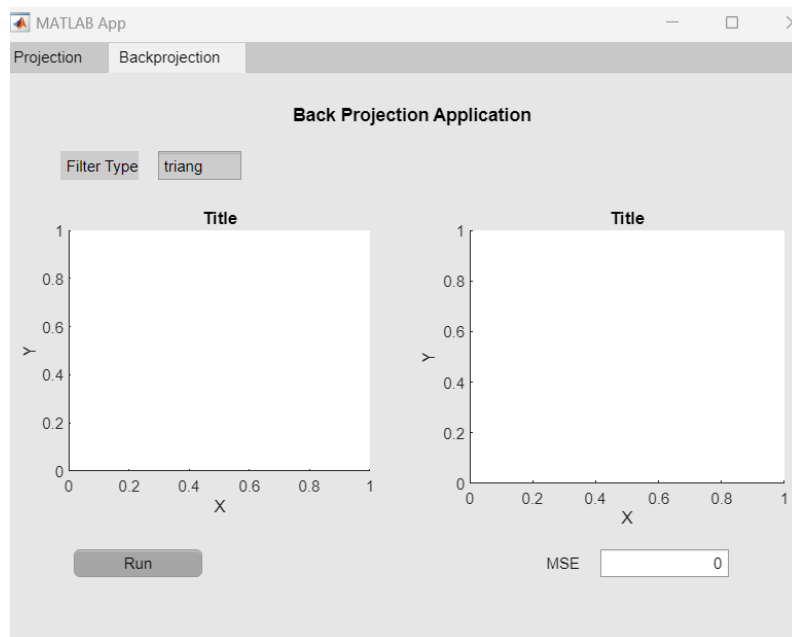


Figure 3. Default Back Projection Function Interface

In this screen, you only need to specify the filter type. In the Filter Type box, you can type these names:

- no-filter
- triang
- hann
- blackman

After specifying the filter type, you can hit the run button.

For example, if you type no-filter, you will see this resultant page:

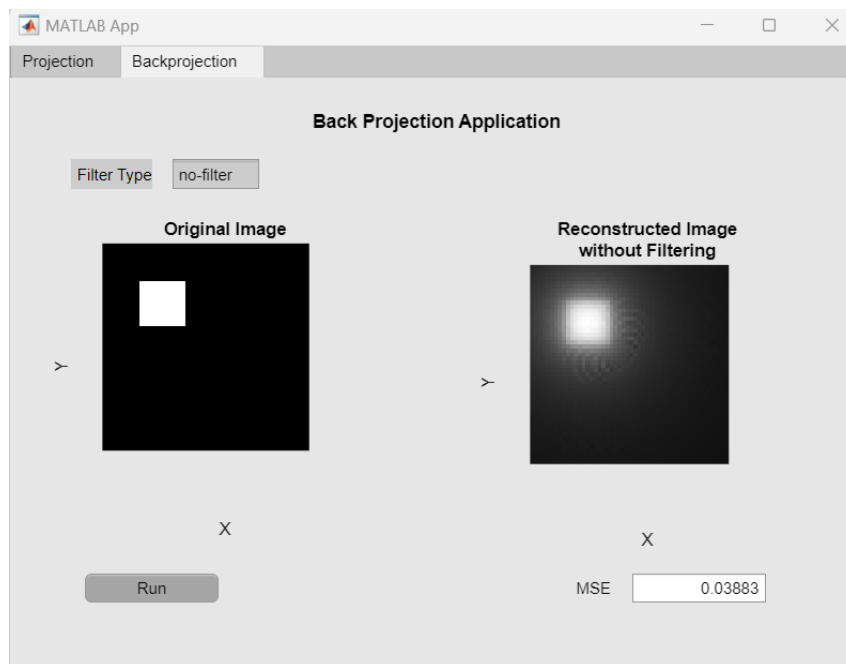


Figure 4. Example Usage of the Back Projection Function

In the left image, you can see the original image you uploaded. In the right image, you can see the reconstructed image according to the type of the filter. Since I typed no-filter to the Filter Type box, the resultant image is for reconstructed image without filtering. At the bottom left, you can see the Mean-Squared Error of the reconstructed image.

As another example, I decided to use Hann filtering. After typing hann to the Filter Type box, you will see this output:

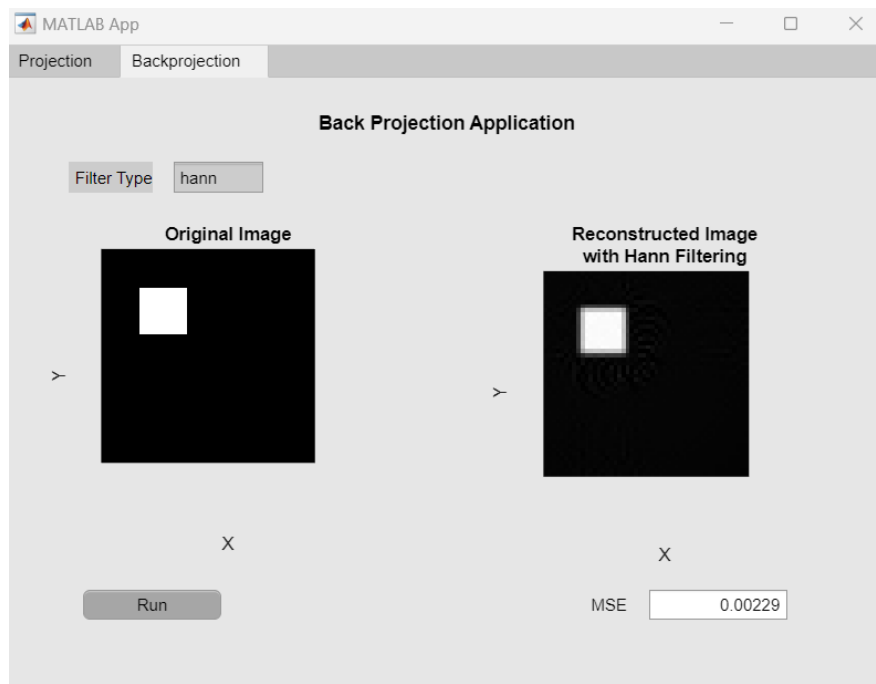


Figure 5. Example Usage of the Back Projection Function with Hann Filter

This concludes the Back Projection function of the GUI.