HRTex V2.0

Documentation

1. Introduction

HRTex is a high-resolution texture data processing tool for monochromatic neutron diffraction based on pixel projection method.

Neutron diffraction is an important non-destructive method to measure statistically the texture and strain within bulk materials. To fulfil the requirement of high-precision measurements of complex texture, HRTex provides a high-resolution, accurate, fast and automatic solution for the raw data processing of texture measurements by monochromatic neutron diffraction. The outputs are a pole figure and a xlsx file of normalized pole density. This software has been successfully tested with the raw datasets from CMRR and ANSTO.

2. Hardware and software environment

CPU: Any Intel or AMD x86-64 processor

Hard disk: 2GB or more

Memory: 2GB or more

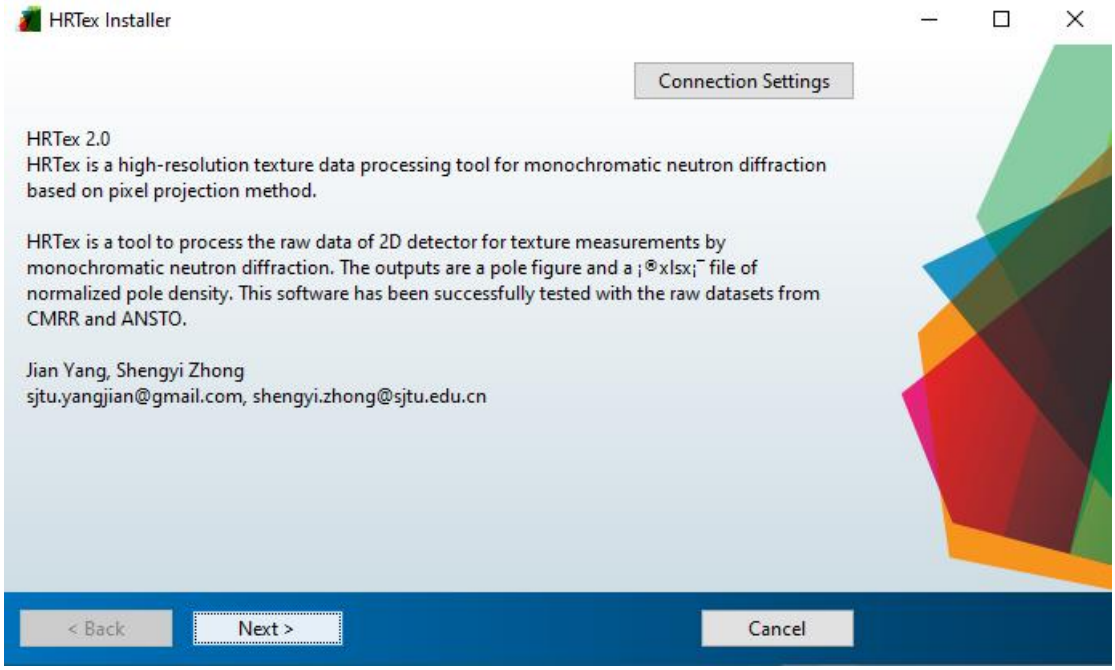
OS: Windows 10 or higher version

Software: MATLAB Runtime 9.1 or higher version (included in installer)

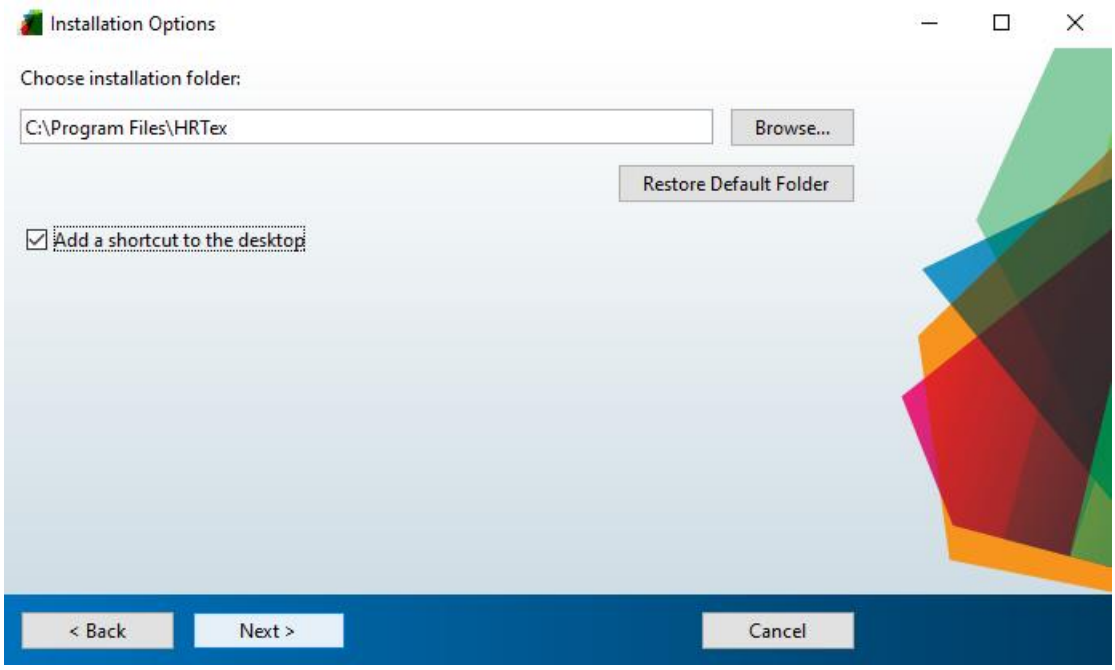
3. Installation

The installer of HRTex is available at https://na.sjtu.edu.cn/ for free. If the MATLAB Runtime has not been installed in your computer before, please select the option. The main steps of installation of HRTex are shown as following:

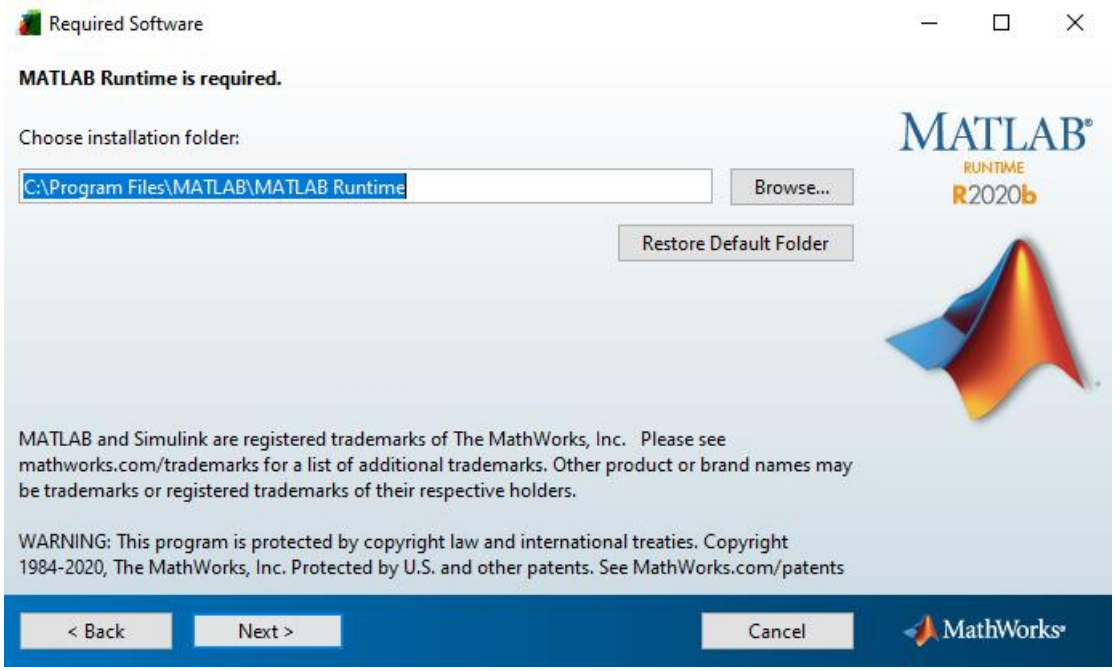
3.1. Start to install HRTex



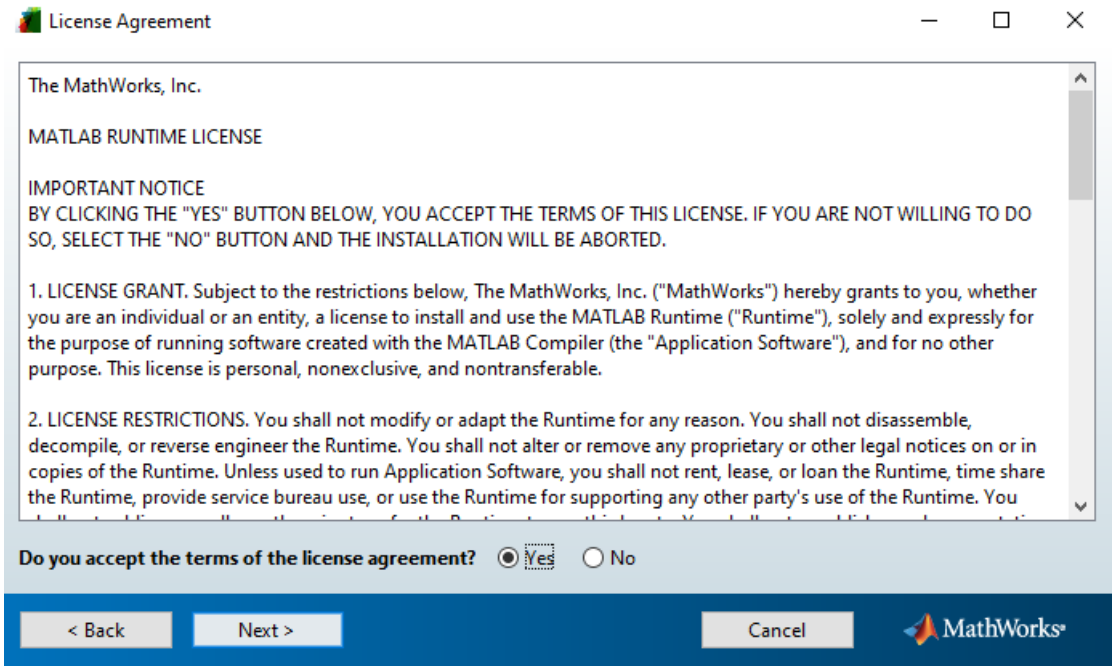
3.2. Choose installation folder for HRTex



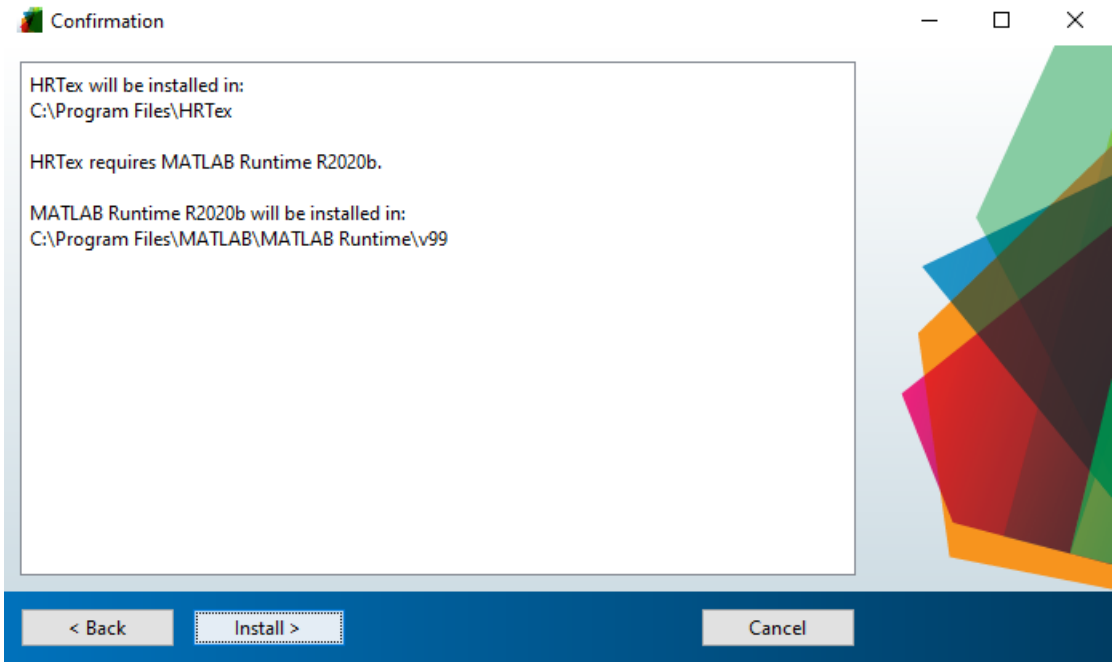
3.3. Choose installation folder for MATLAB Runtime (if needed)



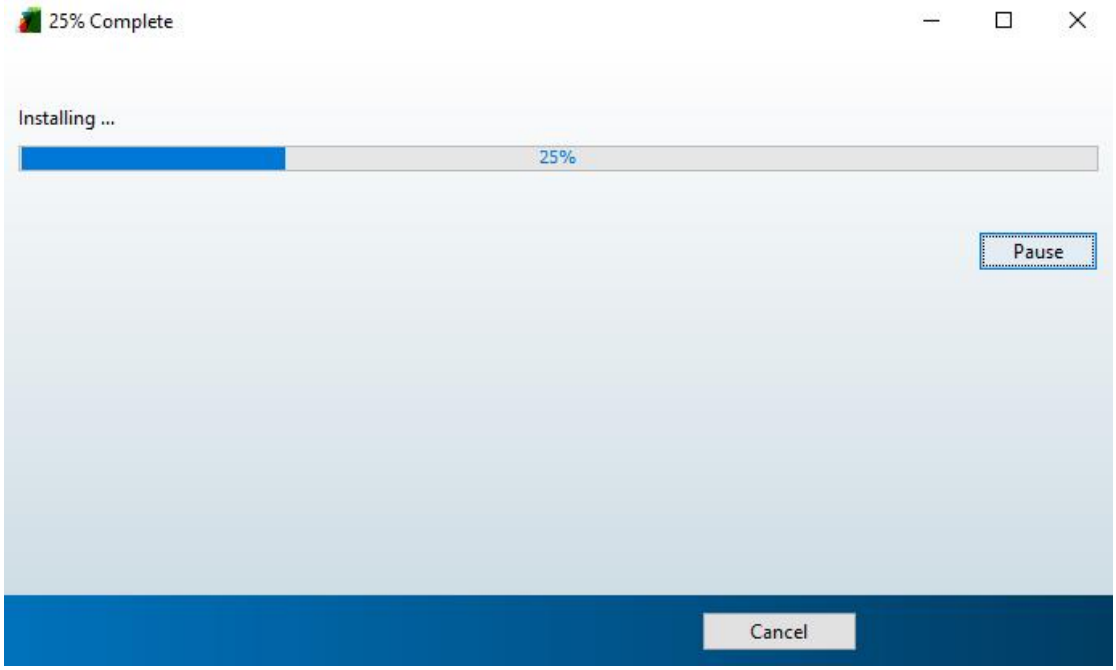
3.4. License agreement



3.5. Confirmation



3.6. Installation



4. Operation

4.1. Configuration

4.1.1. After HRTex is launched, the users need to select or enter the file path which contains all the raw texture data of a complete pole figure. A dataset is provided for testing. Users can download the zip file from https://na.sjtu.edu.cn/.

4.1.2. Then select file type. In txt (CMRR) option, the default parameters are based on the experimental configuration of the diffractometer RSND of CMRR. They are suitable for the testing dataset mentioned in 4.1.1. If users switch to HDF (ANSTO) option, the default setting will change to fit the diffractometer Kowari of ANSTO.

4.1.3. Users are free to calibrate the parameters according to their experimental setup. Also, users can load special rotation of their sample in the format of xlsx file containing the value of ω, χ, and φ at every acquisition step. See the example in Figure 4.1.

	A	B	C
1	Omiga	Chi	Phi
2	26.16718	9	0
3	26.16718	9	5
4	26.16718	9	10
5	26.16718	9	15
6	26.16718	9	20
7	26.16718	9	25
8	26.16718	9	30
9	26.16718	9	35
10	26.16718	9	40

Figure 4.1. Example of special rotation xlsx file.

4.1.4. Users can check the diffraction geometry by clicking the ‘Preview’ button, as shown in Figure 4.2.

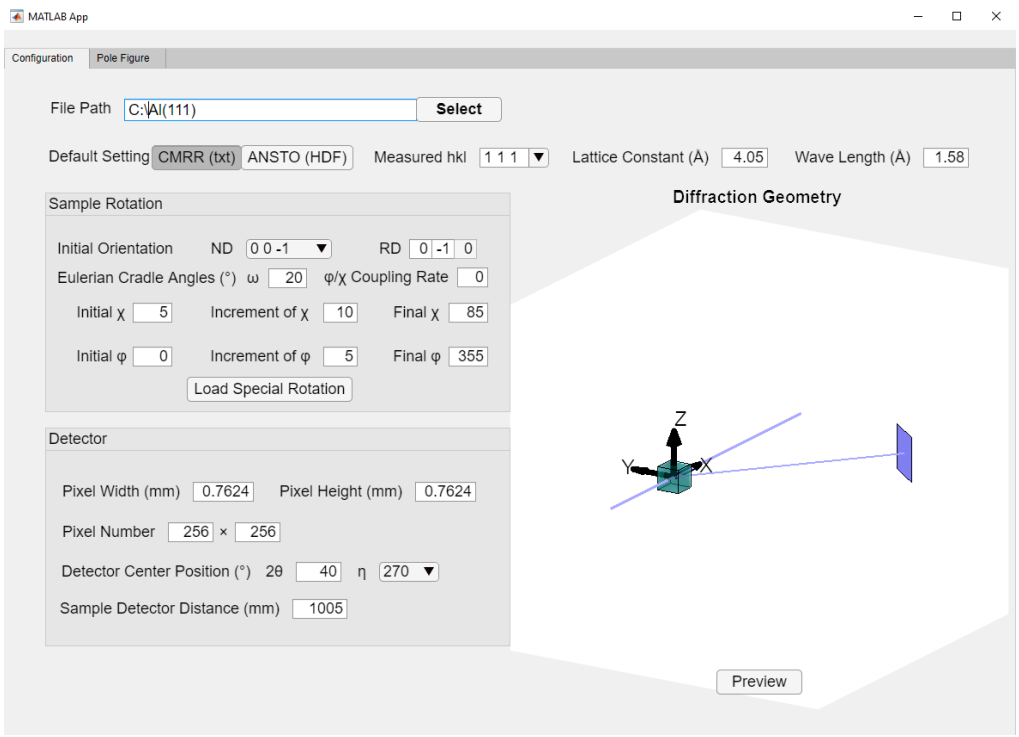


Figure 4.2. Configuration of parameters

4.2. Pole figure calculation

4.2.1. After finishing the configuration part, users need to move to ‘Pole Figure’ sheet and click ‘Load Data’ button. After a few of seconds, the superposed detector image will show (Figure). Users are free to transform the layout of the data to fit the diffraction geometry with buttons of ‘Rotate’, ‘Flip Left-Right’, and ‘Transpose’.

4.2.2. Users can adjust the color bar type and the resolution of pole figure. Then click ‘Draw Pole Figure’ button, and the pole figure will be generated in a few seconds (Figure). Also, users can adjust the maximum value of the color bar and click ‘Draw Pole Figure’ button again.

4.2.3. Users can save the pole density values as an xlsx file by clicking ‘Save as xlsx’ button.

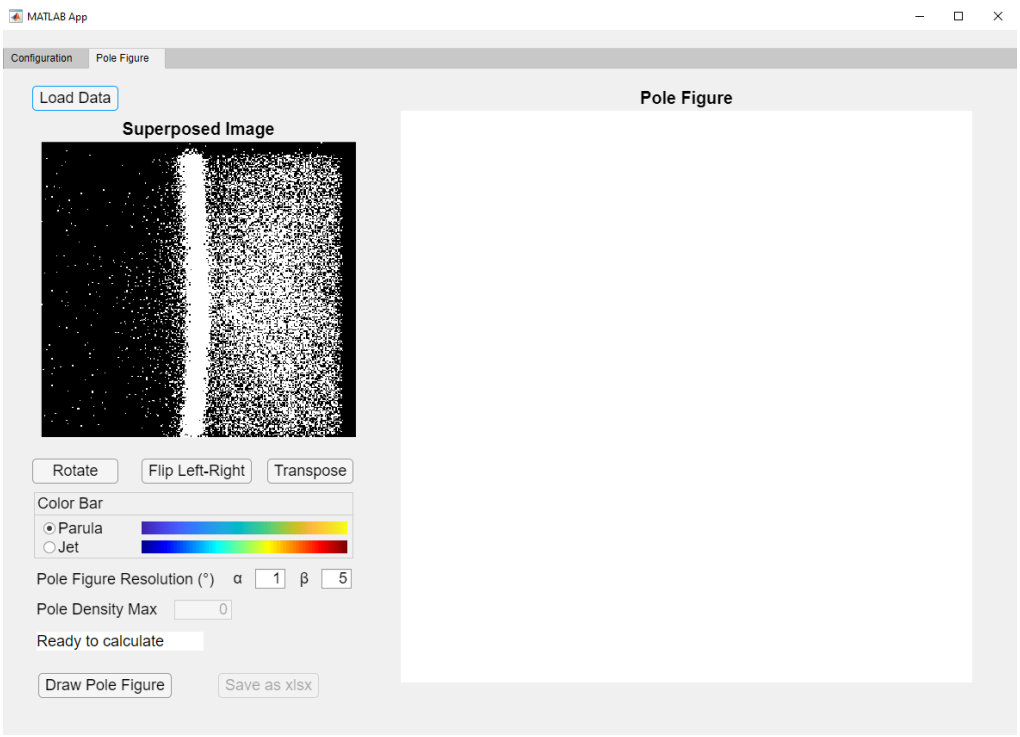


Figure 4.3. Load detector data

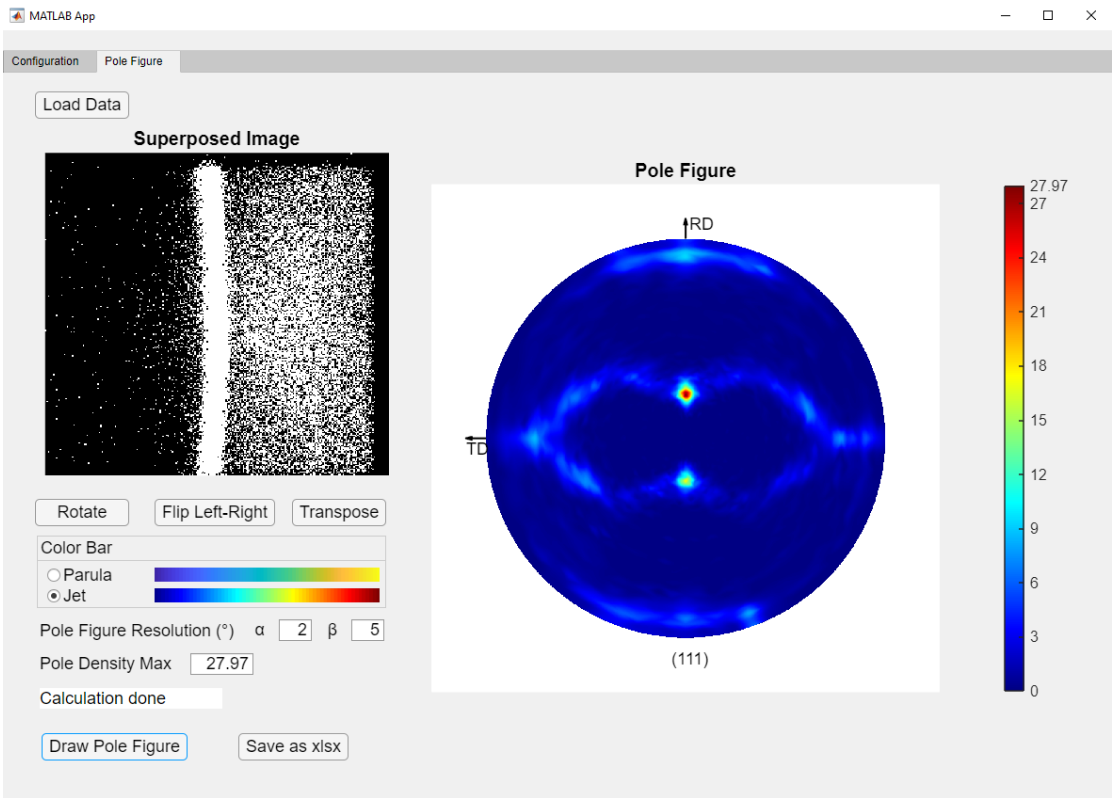


Figure 4.4. Calculate pole figure

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