NonRigid4Reso Toolbox
User manual

1 Prerequisites

The following components are required to successfully run the NonRigid4Reso toolbox.

1.1 Required MATLAB toolboxes

- Image Processing Toolbox (required)
- Statistics and Machine Learning Toolbox (required)
- Parallel Computing Toolbox (optional)

Although Parallel Computing Toolbox is optional, it is recommended to install because it provides huge speedup.

The minimum required MATLAB version is R2013b.

1.2 Required other software

The open source image registration toolbox elastix must be installed on your system before running image registration with the NonRigid4Reso toolbox GUI. You can download the elastix binaries and manual from here. Installation instructions can be found in the elastix manual in section 3.2.1.

2 Installation

To install the NonRigid4Reso toolbox, just open the toolbox file (NonRigid4Reso.mltbx) with the Open menu point of MATLAB. A popup window will appear. Click on Install to perform the installation.

For detailed information, see the section on managing toolboxes in the MATLAB documentation.

3 Description of GUI input parameters

After the NonRigid4Reso toolbox is installed, the GUI can be run by simply typing **nrmc** in the MATLAB command window. The following GUI window appears:

Edit parameters — □ ✕

NON RIGID MOTION CORRECTION ON RESONANT DATA

REQUIRED INPUT DATA

Select mesc files to process

filenames

Do non rigid transformation after rigid

☑ non_rigid

try to use OPEN_CL in case of non rigid transformation

☑ use_OPEN_CL

Reference file and unit for template image calculation

reference_file

reference_unit   0

Number of parameter file

parameterfile   weak distortion - 12 um object (2)

OPTIONAL INPUT DATA

Preview settings for max 100 frames

☐ do_preview

preview_file

preview   Edit structure

OK

- **filenames**: Multiple .mesc files can be selected to be motion corrected. In that case, the contents of the folder selected in dirname has no impact
- **non-rigid**: When this checkbox is unticked, only translation-correction will be performed. When this checkbox is ticked, the non-rigid transformation of distortions will be performed as well.
- **use OpenCL**: When this checkbox is ticked, the OpenCL framework will be enabled. This can accelerate certain calculations for non-rigid corrections, which can be beneficial when compensating greater distortions.
- **reference file and reference unit**: The (zero-based) index of the measurement unit in the .mesc reference file will provide the reference template image to which the correction will be performed.
- **parameter file**: Different parameter files can be chosen for different types of distortions and different sizes of objects.
- **do preview**: Toggles a preview of the motion correction. Preview is run on the file selected in the **preview_file** field on the measurement unit and frame interval selected in the **preview** structure.
  The preview calculation uses the same settings and the same template image as the entire NonRigid4Reso session.

Notes:

- **nrmc** uses the elastix toolbox for non-rigid motion correction. It supports the OpenCL (Open Computing Language) framework, which enables parallel execution on CPUs and GPUs. To use OpenCL, the appropriate OpenCL driver needs to be downloaded and installed from the graphic card vendor's website.
- We recommend installing the MATLAB Parallel Computing Toolbox because it results in a 4-5× speed-up in runtime. NonRigid4Reso automatically detects this toolbox, and uses parallelized data processing if possible.