

## **CT Lung Pipeline for Great Lakes**

### ***Overview:***

The CTlung Pipeline is an automated processing tool, designed to be run either fully locally or on the Great Lakes HPC (GL). It includes multiple steps, individually selectable from the GUI.

Notes for GL: Some local processing is still necessary: step (1) and (2) below. The save directory **MUST** be set to a location on Turbo storage for GL to be able to access it. The username input should be the user's username, allowing SLURM to notify via email of completion of the process.

### ***Pipeline Components:***

1. Data Loading and Preprocessing (*local*)
  - a. Load data from input files (DICOM)
  - b. Check orientation and permute if necessary
  - c. Check Exp/Ins and swap if necessary
  - d. Save images as .nii
2. Lung Segmentation (*local*)
  - a. YACTA, including airways if selected
3. Airways
  - a. Reads YACTA results from CSV file
4. ScatNet
  - a. Generates AT map for passing into the vessels analysis
5. Vessels
6. Unreg Statistics
  - a. Threshold analysis on individual EXP/INS images
7. Image Coregistration
  - a. Elastix warping registration
  - b. Option to save Jacobian map
8. PRM
  - a. Both 10-region and 5-region analyses
9. tPRM
  - a. Runs localized tPRM analysis and interpolates and saves to Exp geometry

### ***Pipeline Procedure***

1. Run local script: Main\_Pipeline\_GL

a. Options:

- Input your uniqueness (e.g. cgalban)
- Select DICOM catalog
- Select folder for saving results (folders will be generated here to contain case results) **MUST BE ON TURBO**
- Select pipeline options

Options Scans										
Tag	SeriesDescription	PatientName	StudyDate	SeriesNumber	ConvolutionKernel	SliceThickness	Slices	Directory	StudyID	Patient
Exp										
Ins										
Exp	Ins	Umlabel	SeriesDescription	PatientName	StudyDate	SeriesNumber	ConvolutionKernel	SliceThickness	Slices	Directory
<input type="checkbox"/>	<input checked="" type="checkbox"/>	ARMS071	Inspiration 2.0 B31f	ARMS071	20181016	3 B31f		2	235	Y:\BHtest\ARMS071
<input checked="" type="checkbox"/>	<input type="checkbox"/>	ARMS071	Expiration 2.0 B31f	ARMS071	20181016	9 B31f		2	217	Y:\BHtest\ARMS071
<input type="checkbox"/>	<input type="checkbox"/>	ARMS068	Expiration 2.0 Br40 3	ARMS068	20181025	4 Br40d3		2	260	Y:\BHtest\ARMS068
<input type="checkbox"/>	<input type="checkbox"/>	ARMS068	Inspiration 2.0 Br40 3	ARMS068	20181025	9 Br40d3		2	260	Y:\BHtest\ARMS068
<input type="checkbox"/>	<input type="checkbox"/>	ARMS072	Inspiration 2.0 B31f	ARMS072	20181029	4 B31f		2	211	Y:\BHtest\ARMS072
<input type="checkbox"/>	<input type="checkbox"/>	ARMS072	Expiration 2.0 B31f	ARMS072	20181029	5 B31f		2	196	Y:\BHtest\ARMS072
<input type="checkbox"/>	<input type="checkbox"/>	ARMS021_2	Carestream PACS Re...	ARMS021_2	20181031	1		0	1	Y:\BHtest\ARMS021_2
<input type="checkbox"/>	<input type="checkbox"/>	ARMS021_2	Inspiration 2.0 B31f	ARMS021_2	20181031	4 B31f		2	267	Y:\BHtest\ARMS021_2
<input type="checkbox"/>	<input type="checkbox"/>	ARMS021_2	Expiration 2.0 B31f	ARMS021_2	20181031	9 B31f		2	210	Y:\BHtest\ARMS021_2
<input type="checkbox"/>	<input type="checkbox"/>	ARMS041_2	Inspiration 2.0 B31f	ARMS041_2	20181109	3 B31f		2	14	Y:\BHtest\ARMS041_2
<input type="checkbox"/>	<input type="checkbox"/>	ARMS041_2	Expiration 2.0 B31f	ARMS041_2	20181109	9 B31f		2	10	Y:\BHtest\ARMS041_2
<input type="checkbox"/>	<input type="checkbox"/>	ARMS036_2	Inspiration 2.0 B31f	ARMS036_2	20181114	4 B31f		2	239	Y:\BHtest\ARMS036_2
<input type="checkbox"/>	<input type="checkbox"/>	ARMS036_2	Expiration 2.0 B31f	ARMS036_2	20181114	9 B31f		2	232	Y:\BHtest\ARMS036_2
<input type="checkbox"/>	<input type="checkbox"/>	ARMS075	Inspiration 2.0 B31f	ARMS075	20181114	4 B31f		2	83	Y:\BHtest\ARMS075
<input type="checkbox"/>	<input type="checkbox"/>	ARMS075	Expiration 2.0 B31f	ARMS075	20181114	9 B31f		2	72	Y:\BHtest\ARMS075

b. Scans:

- Select scans for processing
- Adjust names if desired (Umlabel)
- When finished click the green Done button

c. Local processing:

- Read DICOM, determine Exp/Ins, save as .nii
- Run YACTA segmentation

d. GL command copied to clipboard

- Function inputs and sbatch .sh file are saved on Turbo: ../GreatLakes/temp
- Sbatch .sh file name: `<username>_<function_name>_<timestamp>.sh`
  - Username = your uniqueness
  - Function\_name = the function being processed on GL (e.g. Main\_Pipeline\_GL\_sub)
  - Timestamp = yyyyMMddHHmmss
- Command: `"cd /nfs/turbo/umms-cgalban/GreatLakes/temp && sbatch <filename>"`, where <filename> is the Sbatch .sh file

2. Run script on GL

- a. Log onto GL through PuTTY using your lvl 1 password ([greatlakes.arc-ts.umich.edu](http://greatlakes.arc-ts.umich.edu))
- b. Paste (two mouse button click) or type command into window and hit enter
- c. Email upon completion of the SBATCH task will be sent to the username provided in the GUI