

Liver → YURT

reformatting, reconstructing, reporting

ACTIVITY

Walkthrough project 1 Colab Notebooks, covering different manipulation techniques:

Geometric - rotations, concatenations/cropping, scaling

Intra-pixel - color tinting, inverting, normalizing

Inter-pixel - edge-detection, standardizing

Evaluation

Plenty of activity material, though the colab notebooks alone aren't enough to document the software I explored in project 1

I plan on contextualizing the notebooks with some wiki pages recording the usefulness of Python and the modules I found helpful for data visualization

SUMMARY

Some data is recorded in 2d but can be reconstructed and viewed in 3d

Available open source software offers limited possibilities

Python can be used to manipulate data, and export as .vtk

'Flat' data can be reconstructed and exported for viewing in Paraview

Data	360° x-ray scan
Viewing in YURT	isosurface of reconstructed volume
How?	3d reconstruction in Python, export to Paraview, view

Evaluation

Trying to reconstruct the liver
using computed tomography
methods proved to be too
difficult 😞

MILESTONES

4/2	Import to NumPy
4/9	Reconstruction
4/11	Write-up: 3D Reconstruction of 360° Scans
4/16	Export as .vtk
4/22	View in ZOOMYURT
4/24	Redraft documentation
4/25	Redraft code
4/26	Publish repo
4/27	Update course page

Evaluation

I couldn't successfully reconstruct the liver. The process led me to encounter lots of barriers, and I learned a lot through trying to solve them

Dependencies

FFMPEG – command line tool for file conversion

glob – module for importing groups of files

NumPy – module for optimized array handling

OpenCV's cv2 – module for reading in images

Anaconda3 – command line tool to install and run tomopy in a virtual environment

TomoPy, dependencies – package for computed tomography

matplotlib – module for

DXchange – module for reading files common in synchrotron facilities

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Import to NumPy

FFMPEG, glob, cv2, DXchange

I used FFMPEG to convert
.avi -> directory of frames

imported them with cv2 and glob

After running into problems with reconstructing
the liver, I attempted to complete TomoPy's
tutorial.

DXchange was a required to read a .h5 file

Anaconda

A package installer

Creates a virtual environment to run the package from

I could not get Anaconda to work properly. Weirdly, it did work one time. Even though the packages were installed, the python executable I was running in the virtual environment wouldn't find them.

Finicking with this was miserable – I think my mac needs a factory restor

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Reconstruction

TomoPy, matplotlib

I successfully ran the TomoPy algorithm on the frames of the liver

Result wasn't clear, so I referred to the tutorial to try to mimic their behavior

There was additional computation I had to do to improve accuracy (rotation center, flat-field, dark-field, minus log). I had to research what these were, and I learned some must be taken at the site of recording. I don't have this info for the liver.

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Reconstruction

TomoPy, matplotlib

I tried running without the flat-field correction. I did the minus log, but when I tried to find the rotation center there was a 'segfault' error.

This was my last error in TomoPy before I got locked out by Anaconda again

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4/11, 4/24, 4/25, 4/26, 4/27

Deliverables have pivoted to what will
be lots of course wiki updates

Below is a list of the pages I intend to
add

3D Reconstruction of 360° scan tutorial, python and FFMPEG on the software page, liver and tooth datasets

DELIVERABLES

instructions for 360° scan reconstruction

dataset for course page

GitHub repo

Coming soon...