VIBE PROJECT

Virtual Biomedical and STEM/STEAM Education

2021-1-HU01-KA220-HED-000032251

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Slicer VR

Creating tissue models
from DICOM files

What is Slicer 3D?

- Modular platform for image analysis and scientific visualisation
- Mostly used in medical research fields including neuroscience, autism, cancer, cardiovascular diseases among others
- Free and open-source software

VR Compatibility

- No native support for VR

- Needed software:
  - Slicer 3D – Slicer Virtual Reality extension
  - Steam – Steam VR app
  - Other apps required by your VR set (e.g. Oculus PC)

Installing extensions

To greatly expand the capabilities of the program Slicer 3D offers extension support

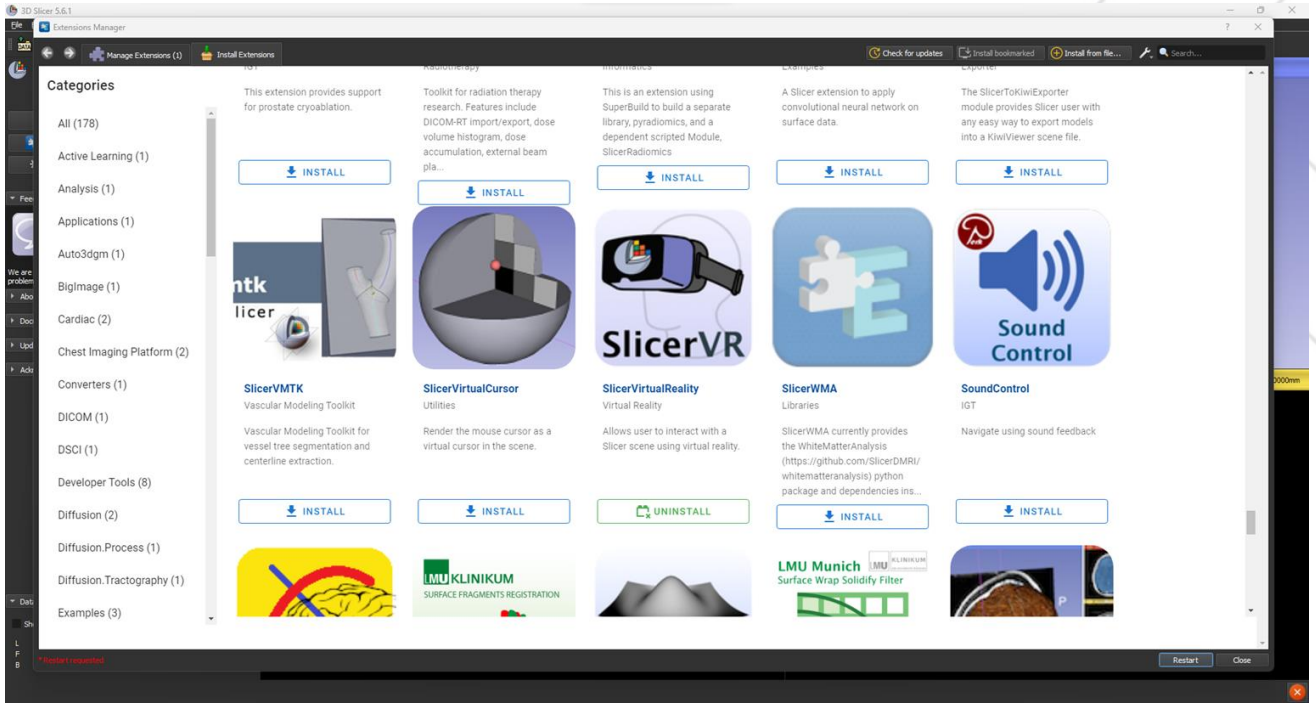
Open the extension manager

Find the extensions you want to use

Click install

Restart Slicer

After restarting your new extensions will be accessible in the modules drop-down menu



VR extension

- After installing the VR extension you can access it's settings in the top left corner or selecting it in the modules menu

- In the VR settings make sure your device is connected
- Once connected Slicer will Render a copy of the 3D view to your VR set

Using VR „mode”

- VR is used to view your model(s) in 3D
- Editing and manipulating models is still done in the desktop app
- Advanced volume rendering performance tuning to balance image quality and refresh rate.
- Additional extensions available to add further VR functions

VR Controls

- Fly around using the touchpad of the right controller
- Grab and reposition objects using the controller's grab button.
- Translate, rotate, and scale the entire scene by pressing grab buttons on both controllers simultaneously.

Importing DICOM files

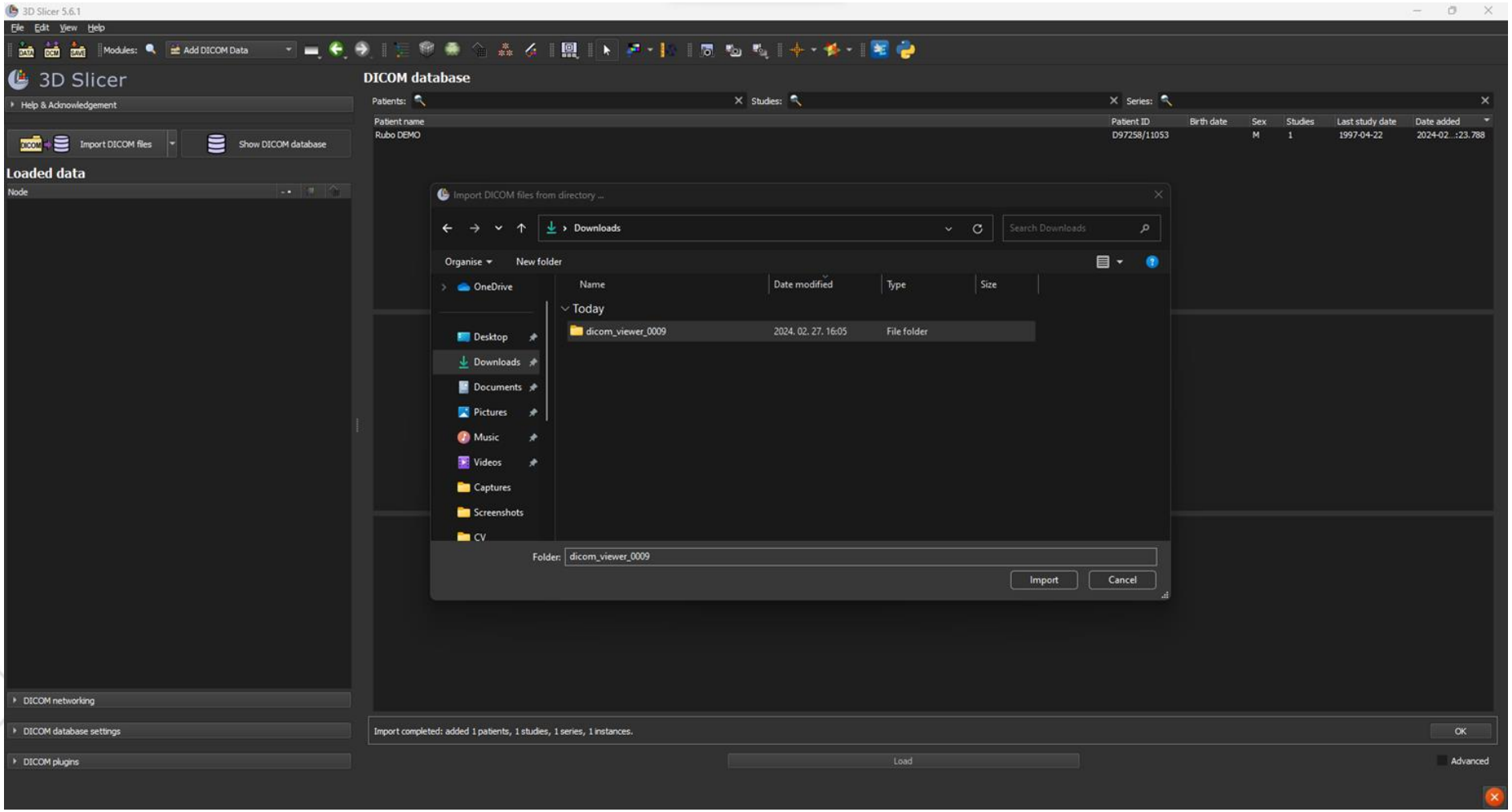
Importing DICOM files

- Multiple options to load the file:
  - *DCM* button
  - *Load DICOM data* button

- After the DICOM module opens
  - Click *Import DICOM files*
  - Select the **folder** that contains your files

- The newly loaded data will appear in the patient list

Importing DICOM files



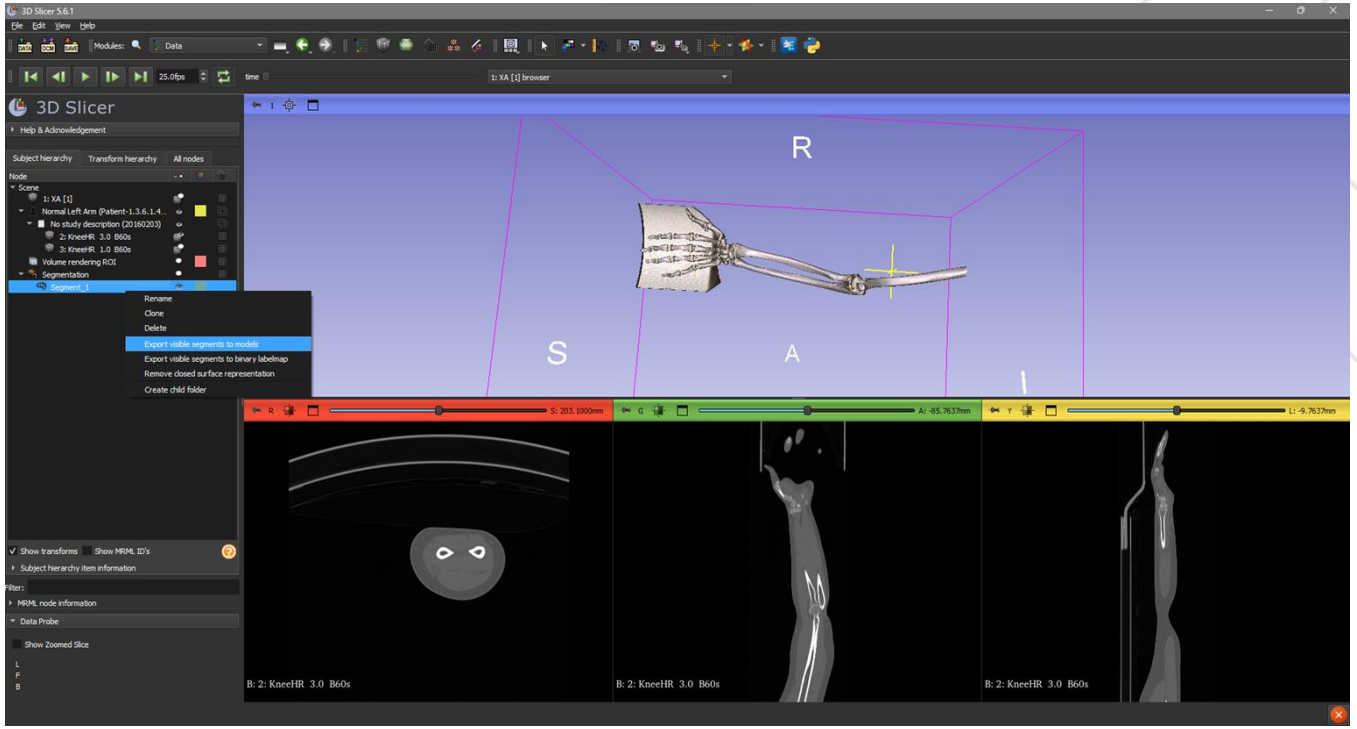
The 4 basic modules

- 3D Slicer uses modules for different functions

- The 4 most used modules are:
  - Data
  - Volume Rendering
  - Crop Volume
  - Segmentation

Data module

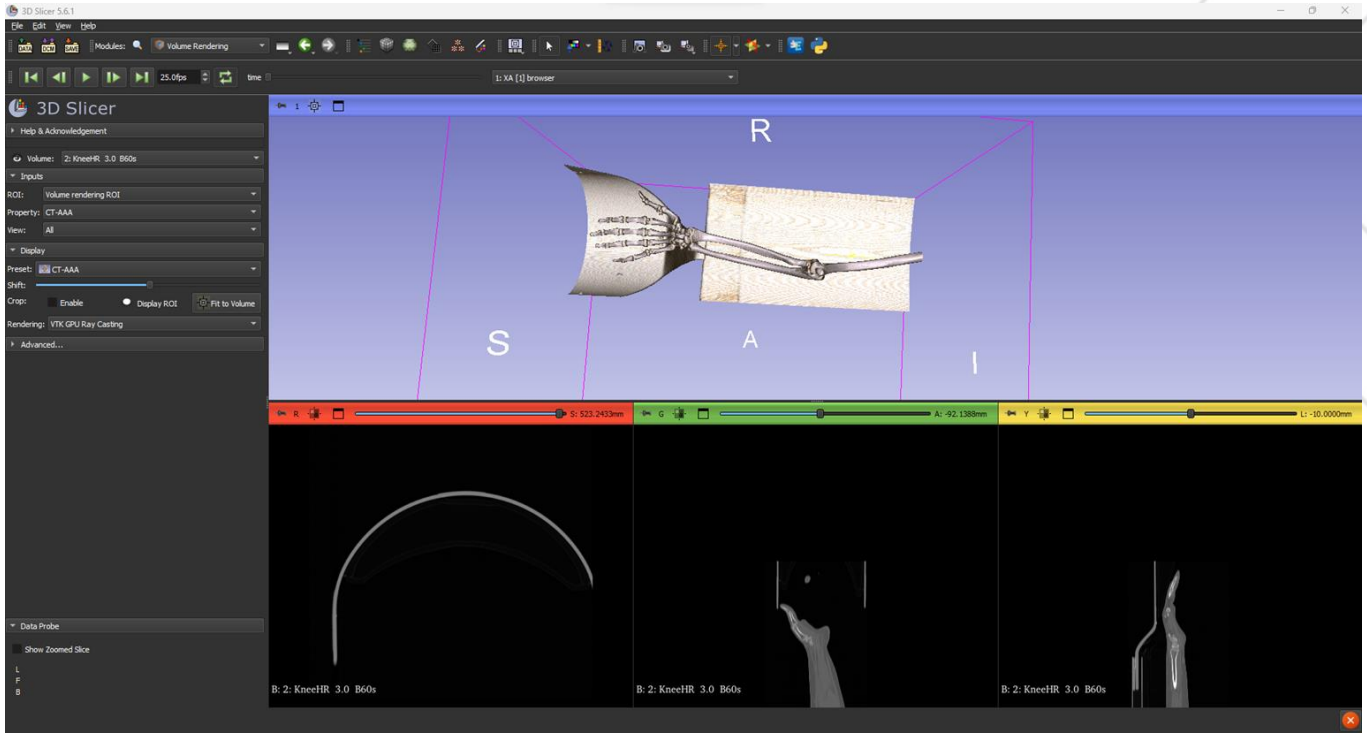
- Usefulness
  - Access to project hierarchy
  - Overview of project files and options
  - Visibility settings
  - Export/import options
  - Model overview



- This is the most basic part of your project
- Few editing functions

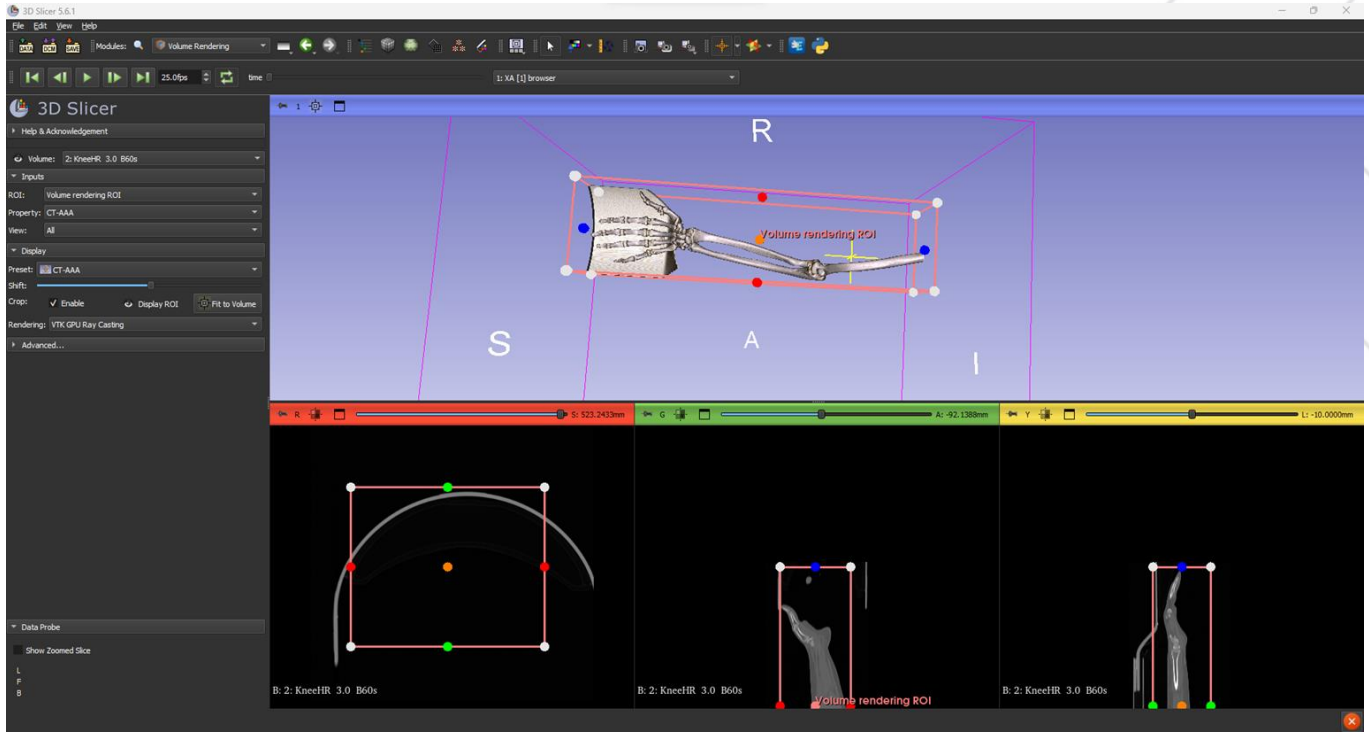
Volume rendering module

- Shift bar
  - Adjust the slider until only the desired material is visible
- Usefulness
  - Removing unneeded tissues and objects
  - Fine detail view for further editing
- Exported model will be less detailed than the rendered object



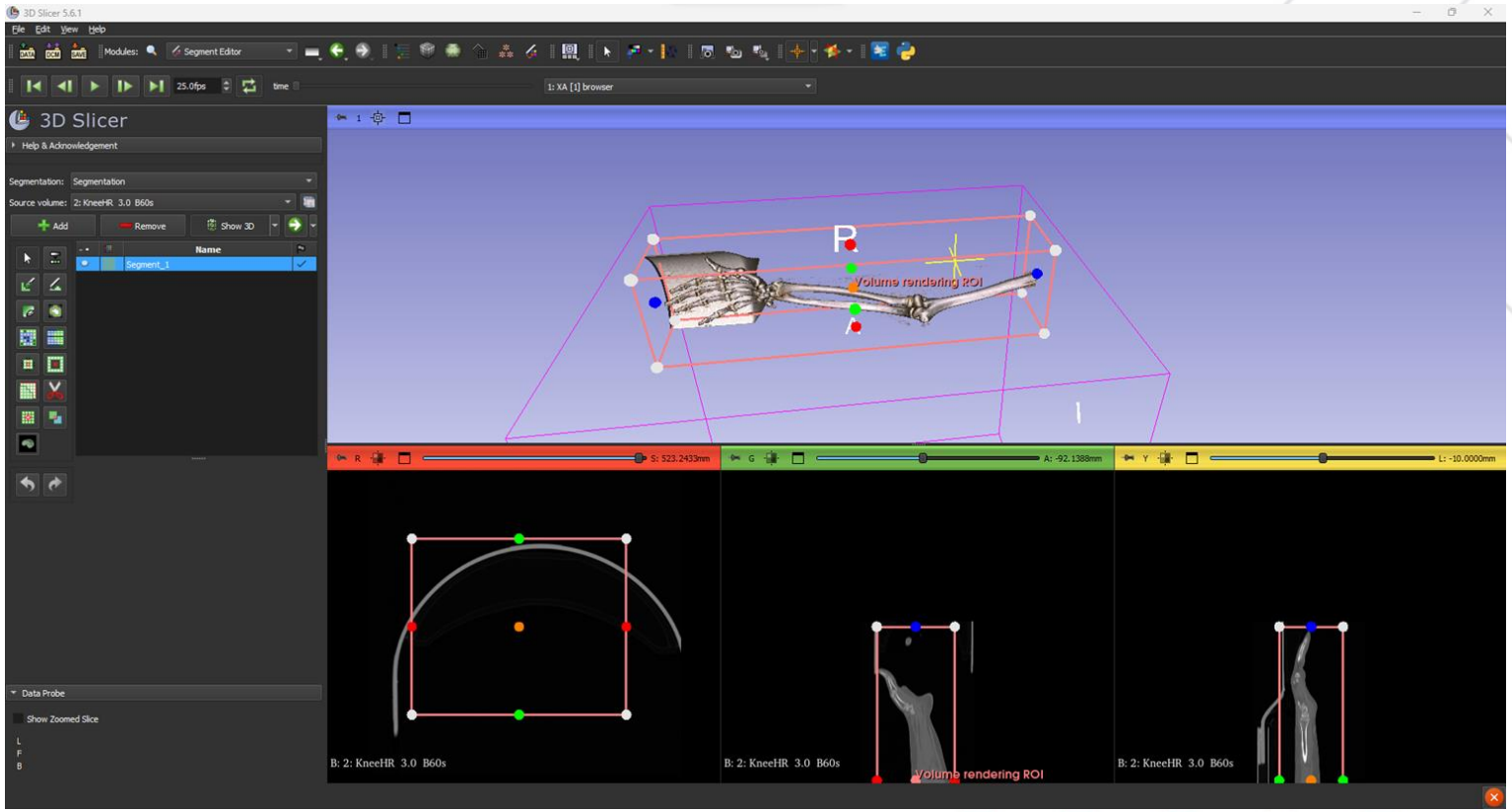
Cropping

- Useful when
  - There are multiple samples in the same file
  - We only want to work with a part of the model
- Simple to use „Grab and Drag” solution
- Useable in 2D, 3D and VR



Segmentation module

- Select the segmentation method and volume you wish to work on
- Basic tools/effects
  - Threshold
  - Scissors
  - Paint/Draw/Erase



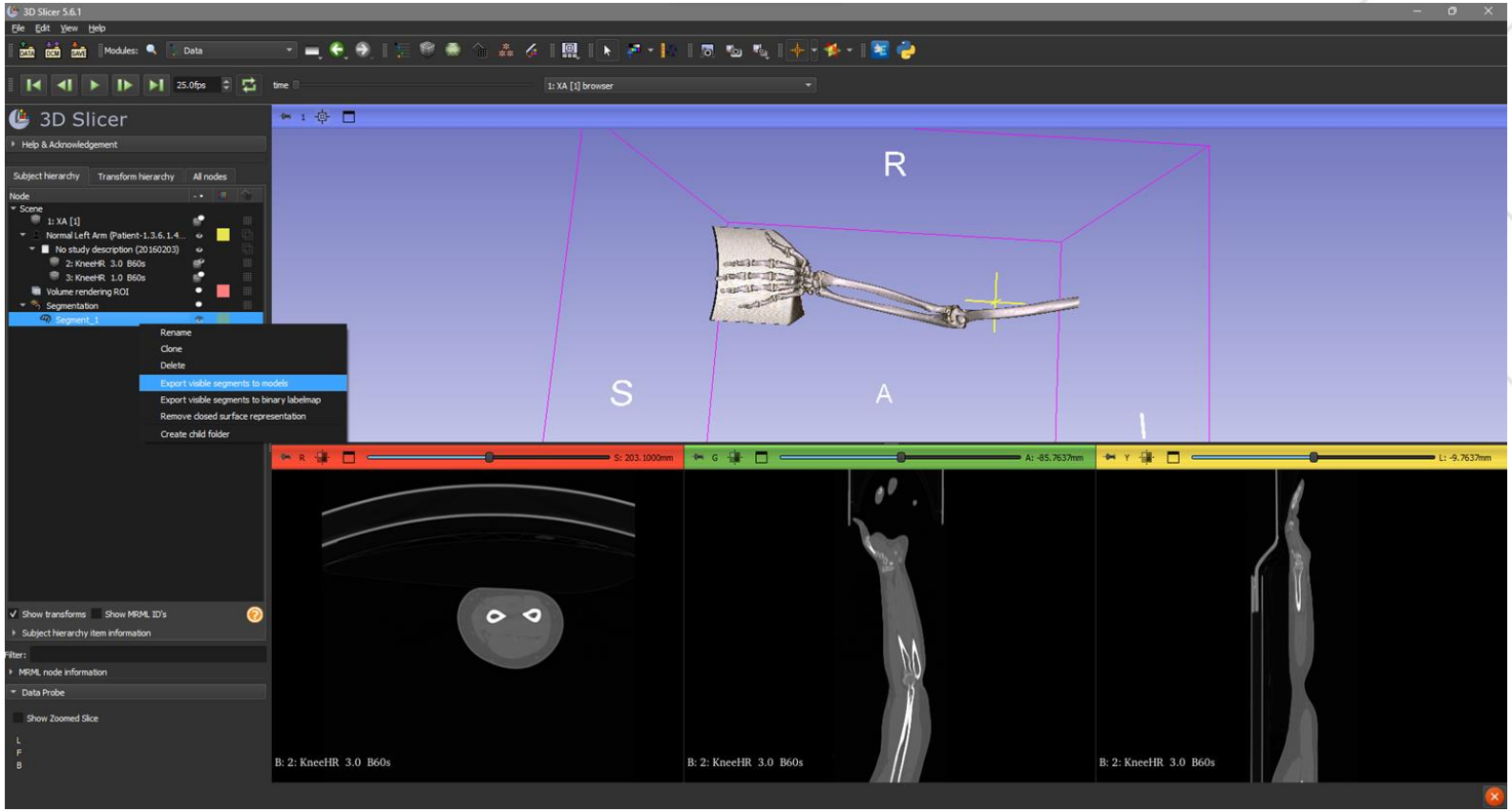
Saving and exporting 3D models

Creating a 3D model

In the Data module select all desired segmentations

In the right click menu select
„*Export visible segments to models*”

You can find your models in a new folder



Exporting a 3D model

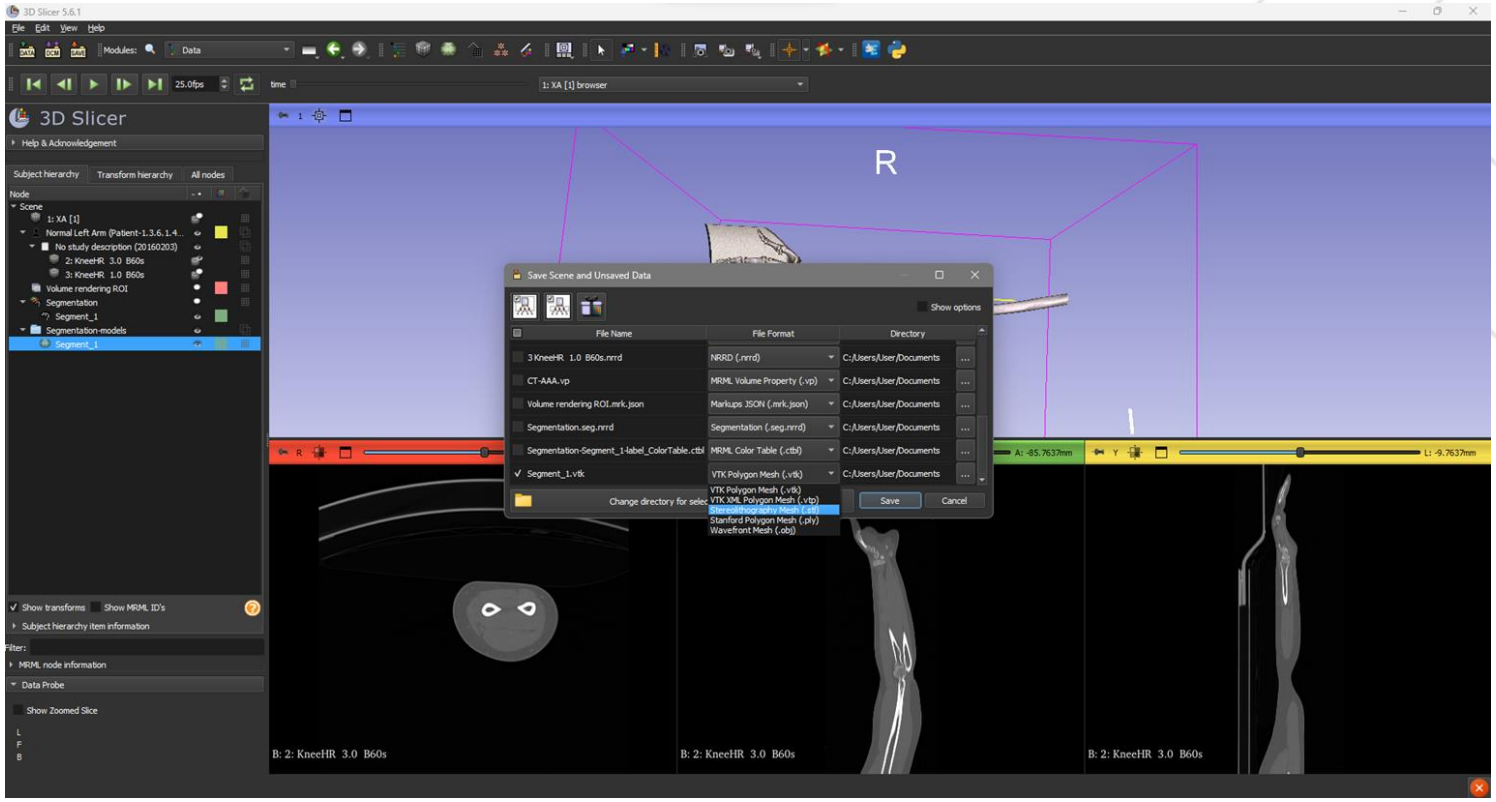
After creating your model(s) you can save them by clicking the „*SAVE*" button

In the save window click the package icon and select the model files you wish to export

Select the correct file format in the drop-down menu

Specify save folder(s)

Click „*Save*"



Sources

Slicer
Slicer documentation
3dicomviewer
Dicomlibrary
Youtube – DeLeon Lab
Youtube – Virtual Paleontologist
Kitware
Github – KitwareMedical
The Perk Lab
Steam Store
Github – ValveSoftware

All images used in the presentation are from the websites listed above, my own

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