

SlicerRT – Radiotherapy toolkit for 3D Slicer

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Targeted consortiums: OCAIRO, CCO/CINO

Background: Radiotherapy (RT) tools mostly exist in the form of expensive proprietary applications. Although there are free open-source software applications and algorithms for solving particular problems in RT research, each of these standalone tools has its own purpose, development environment, data formats, etc. This significantly limits the potentials of collaborative RT research.

Objectives: Create a common software platform for adaptive radiotherapy, built upon existing open-source visualization and analysis tools to support collaboration through sharing valuable algorithms and datasets, and address shortcomings of existing proprietary RT toolsets.

Methods: We propose to extend 3D Slicer (www.slicer.org) to support RT research. Slicer has been widely used as a software application platform in medical image computing. Slicer already contains key functionalities, such as reading DICOM images, visualizing and manipulating datasets, and providing advanced methods for segmentation, registration, etc. Slicer is free, open-source, easily extensible by custom modules, and supported by an extraordinarily large community. There are on-going activities toward integrating RT-related functions into 3D Slicer, such as external modules using the Plastimatch library; import and handling of DICOM-RT structures; dose analysis including dose volume histogram (Fig.1).

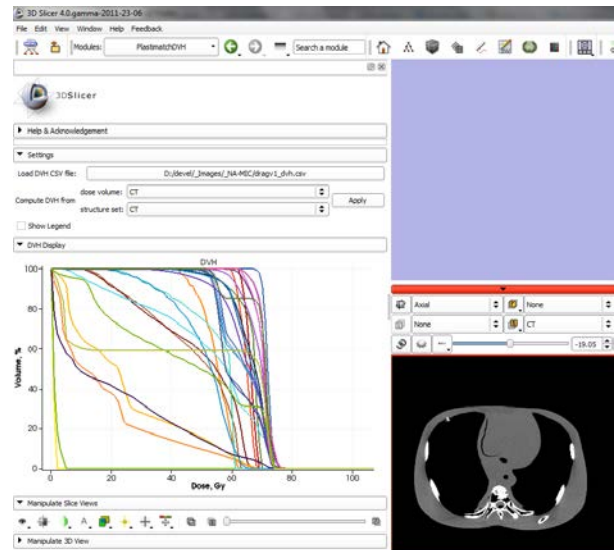


Fig. 1: Dose volume histogram module in Slicer 4

OCAIRO investigators have identified some of the key features required from a 3D Slicer based RT research platform. The features are going to be added in an incremental way, the most common and most demanded features implemented first:

- Robust DICOM-RT import – reads the outputs of the most widely used RT planning systems
- Registration of images taken at different times or using different imaging modalities
- Dose calculation and conversion
- Visualizing treatment plans and resulting dose distributions
- Improve the overall usability of 3D Slicer, so that it would be suitable for daily use

The platform is aimed to be a potential medium into which the researchers can integrate their methods and algorithms, sharing it with the public, so their work can be shared, widely distributed, utilized and further enhanced by the RT research community, and is compatible with tools that are continuously maintained. It will also be an infrastructure that assists clinical translation of experimental diagnostic and therapeutic approaches.

Current progress: This work is being carried out under the Software Platform and Adaptive Radiotherapy Kit (SparKit) project. Please visit www.assembla.com/spaces/sparkit and share with us your comments, ideas and needs.