

AbstractID: 9478 Title: Improvements to the Computational Environment for Radiotherapy Research Open-source Software System

Purpose: The computational environment for radiotherapy research (CERR) has now been downloaded several thousand times by individuals from over 35 countries. The most common user complaint is a loss of DICOM import capability, usually due to unforeseen changes in Mathworks routines previously used in CERR. We implemented an open-source solution to eliminate this dependence. Other recent improvements include increased import functionality and tools for reviewing image registration.

Method and Materials: The open-source, robust, java-based dcm4che library was used as the basis for the new DICOM import module. PLUNC import was implemented using a multiple-pass approach. DICOM-based ultrasound importing was implemented. A new rigid-registration framework was introduced including graphical review tools. Various user-interface improvements were also made based on the use of CERR as a plan review tool for clinical trials.

Results: The new DICOM importing module has increased performance, robustness, compatibility and flexibility. The new implementation initially scans the DICOM directory and exhibits catalogs the DICOM objects prior to importing. Public and private DICOM tags can be accessed flexibly and easily. A new ultrasound importing function is supplied with this importing package. DICOM Importing speed was improved by more than a factor of two. Among new registration review tools, an auto-registration framework was introduced, and novel graphical tools are provided to visually analyze registered data. PLUNC datasets can be imported successfully for further analysis and comparison between plans in these 2 platforms. .

Conclusion: DICOM import capability in CERR has been improved considerably, making it easier to support special cases (e.g., private DICOM tags) while improving reliability and Matlab-version independence. Improvements were made in image-registration tools. New input data sources include ultrasound-based DICOM plans and PLUNC plans.

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