

Purpose:

To review and make a composite plan from treatment plans generated by various treatment planning systems, we developed a universal review system. Our system will read DICOM CT image sets, and contours and dose distribution files in DICOM-RT format.

Methods and Materials:

Many clinical departments have various treatment planning systems; Tomotherapy (Tomotherapy), Pinnacle (Philips Medical), XiO (CMS), Cyberknife (Cyberknife), and Eclipse (Varian). It was impossible to combine two plans generated by two different planning systems. Our system was developed in Linux operating system, and written in C++ program language. We utilized Vega DICOM-RT library, ITK/VTK, and DCM4CHEE DICOM server. We imported a planning image set, contours, and dose distribution files in DICOM and DICOM-RT formats from each planning system. Our system reads them in, displays the dose distribution, and generates dose volume histogram (DVH). It has capability to export DVH in tabulated form for the further analysis. We can add two plans generated with a single image set or two different image sets. We implemented image registration techniques to align the two different image sets; mutual information, and spatially weighted mutual information. If a patient was treated some time ago, then time-dose factor (TDF) can be added when two treatment plans are added.

Results and Discussion:

We were able to import various plans from different planning systems and make a composite plan. Our system was very useful to determine a dose and review the dose distribution for recurrent cancer patients. Some patients treated else where, and we were able to read from their electronic data sent by the other facility. Our image registration techniques implemented were very useful and easy to use. (This work is partly supported by Susan G. Komen Breast Foundation Grant: BTCR126506)