

AbstractID: 3293 Title: Clinic implementation of Automated Planning for 3D-Conformal Therapy

Purpose: We have implemented clinically an automated planning tool for 3DCRT that simultaneously optimizes the beam angles, beam weights, wedge angles, and wedge orientations.

Method and Materials: An automated planning tool for 3DCRT has been developed that interfaces to the Pinnacle³ treatment planning system through its hotscripts utilities. Pinnacle³ is used for dose calculation, plan evaluation, and RT export. A commercial optimization software package (GAMS) is used for plan optimization. For each planning problem, the optimized beam angles and their weights were chosen from either 36 or 72 candidate beams along with their corresponding wedged fields. Because dose contributions from all candidate beams are needed for the optimization, the amount of data is very large. We developed a three-phases sampling technique to effectively handle the large data set and reduce the optimization time.

Results: The tool has been applied to several cases including pancreas, head-and-neck, and lung patients. All planning parameters for a 3DCRT plan can be optimized within 20 minutes, and the optimized plans are comparable to those of experience dosimetrists. By using a three-phase approach, the optimization time can be reduced significantly. During initial angle selection phase, optimizations were performed on randomly selected subsets of the dose calculation points representing about 1% of the points. During the second phase, the gantry and wedge orientation can be obtained from the previous phase with about 10% of original data, and the weight of the selected gantry and wedge fields can be optimized with more data points in the final phase.

Conclusions: We have developed an automated planning tool for 3DCRT. The tool has been evaluated using several treatment sites. Optimized plans can be obtained within 20 minutes and are comparable to those of experience dosimetrists.