AbstractID: 2979 Title: A Greedy Segment Generating Algorithm for IMRT

Purpose:

Time is one of the factors that affect IMRT. Decreasing the number of segment is necessary. Knowing the fact that the most optimal number of segments can be reached is a help to estimate the plan's optimization level on time factor. Also an ideal optimal number of segments can help to overcome MLC delivery constraint without increasing the segment number too much. Therefore, greedy algorithm is used to find an optimal number of unconstraint segments.

Method and Materials:

For each IMRT intensity map, an objective function is defined as intensity level multiplied by the area which is the number of grids. Then two- dimension search problem turns into one dimension search problem so that greedy strategy can be used. The search space turns into O(N), which N is the number of intensity level. By sorting the objective function values, the intensity level satisfying that volume with maximum dose is delivered first (MDDF). Iteratively, an optimal segments sequence is generated. Given maximum step size, with the intensity map from IMRT plan being generated by CMS Xio plan system, this number of segments is compared with that generated by slide window algorithm.

Results:

To deliver the same intensity map dose, MDDF algorithm gives the smallest number of segments compared to slide window algorithm from CMS Xio plan system given maximum step size.

Conclusion:

The optimal delivery segments sequence generated by using MDDF algorithm can be an estimate of the IMRT delivery optimization level and the sequence can be a start for embedding MLC hardware constraint by divide-and-conquer strategy.