AbstractID: 13306 Title: A dose difference maximal intensity projection map for patient dose evaluation: a new 1st line patient QA tool

Purpose: Develop a spatially encoded dose difference maximal intensity projection (DD-MIP) as an online patient dose evaluation tool for visualizing the dose differences between the planning dose and dose on the treatment day. **Method and Materials:** MVCBCT images acquired at treatment time are used for dose recalculation. The dose difference maps between the plan and the treatment day are represented with different colors for under, acceptable and over dose regions. A simple MIP would be dominated by uncritical superficial dose differences. We developed a new method of compressing all the information of an arbitrary 3D dose difference index onto a 2D MIP image. A distance transformation is generated based on the converted binary image from planning CT. Then two new volumes representing the overdose and underdose regions are encoded with the distance transformation map, normalized to the skin distance measured on the planning CT. Two MIP are generated based on the underdose and overdose volumes with green-to-blue and green-to-red lookup tables, respectively. Finally, the two MIPS are merged with an appropriate transparency level and rendered in planning CT images. **Results:** The spatially encoded DD-MIP was implemented in the DGRT prototype and tested on 33 MVCBCT from six patients. The user can easily set the threshold for overdose and underdose. In this study, 3% difference between the treatment and planning dose was used as the threshold; hence the DD-MIP show red or blue color for the difference >3% or <-3%. The overdose and underdose regions can be visualized and distinguished without being overshadowed by superficial dose difference. **Conclusion:** A DD-MIP algorithm was developed that compresses information from 3D into a single or two orthogonal projections while hinting the user whether the dose difference is on the skin or deeper.
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