

AbstractID: 5020 Title: Fluoroscopic tracking of lung tumor mass without implanted fiducial markers

Purpose: To develop techniques for direct lung tumor tracking in fluoroscopic images without implanted markers.

Method and Materials: During the patient setup session, a pair of 15 second orthogonal fluoroscopic images are taken and processed off-line to generate reference templates. Each breathing cycle is divided into 12 phase bins. Setup image frames falling in a specific bin are motion-enhanced and averaged, and an ROI that contains the tumor is selected to be the reference template for that phase bin. Each reference template corresponds to a tumor position in the image. During the treatment, as soon as a fluoroscopic image is acquired, the cross-correlation score between each reference template and this image is maximized by allowing small shifts of the template in both X and Y directions. Then the tumor position is derived by averaging the tumor centroid coordinates in those templates of high scores (above 85% of the maximum score). For comparison, tumor position in each image frame was also marked by a clinician.

Results: We tested our algorithm on six sequences of fluoroscopic images from six lung cancer patients. The automatically detected tumor centroid coordinates agree well with the manually marked results, with an average error of 1 mm.

Conclusion: This study demonstrates the feasibility of tracking lung tumor mass in fluoroscopic images without implanted fiducial markers. Future research will concentrate on further improvement of the accuracy and robustness, and reducing the computational cost.

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