AbstractID: 1455 Title: Definition of target volume using online CT images

In order to take full advantage of the latest technological advances in IMRT, it is essential to be able to precisely determine the target shape as well as its relative location within the body. These variables can change during fractioned radiotherapy. A potential solution is to use image guided radiation therapy (IGRT), especially in the form of online image acquisition, which has been the focus of much attention lately. One system has a kilovoltage (kV) X-ray source and large-area flat-panel detector integrated on a medical linear accelerator for fluoroscopy, radiography, and cone beam volumetric CT. Another approach includes a standard CT scanner in the treatment room, mounted on a rail system. These systems have interesting potential advantages, but it is not clear how they might be used in a time-efficient manner to improve patients' treatments. The work presented here focuses on the problem of rapid structure identification that is consistent with the need for fast reaction to large new image datasets. To this end, the snakes method for the segmentation of both the cone-beam CT and spiral CT has been implemented. Snakes (active contour models) are curves movable under the influence of its internal forces and external forces derived from the image data. The snakes will conform to an object boundary or other desired features under these forces. Preprocessing of the images with techniques such as Gaussian-blurring is essential for obtaining consistent forces. Examples of prostate tumor volume segmentation from these images are provided.