**Analysis of Image Segmentation Algorithms for Auto-Contouring of Kidney Lesions in Adaptive Radiotherapy** DAMON BURROW, VERN HART, SAMANTHA BROLASKI, William Woods University — In external beam radiotherapy, planning images are acquired and a treatment plan is composed at the time of diagnosis. However, when the first dose fraction is administered weeks later, patient anatomy typically differs significantly. Adaptive radiotherapy (ART) is a developing modality in which updated images are acquired on the day of treatment and new contours are established. Manual intervention is typically not feasible during ART, due to time constraints, and lesion identification must be automated. Image segmentation, a common tool in computer vision applications, has been applied to auto-contouring in recent years. This study examined the optimization of parameters used in various automated organ contouring algorithms. Several edge detection techniques were investigated as applied to segmentation of cross-sectional CT images. The accuracy of organ delineation was quantified using the Pearson Correlation Coefficient and compared to manually-contoured regions of interest in order to quantitatively assess their accuracy. Auto-segmentation results will be presented using the Roberts, Canny, Prewitt, and Sobel techniques. These algorithms will be compared and evaluated, based on their performance in identifying the kidneys and malignant lesions present in neighboring anatomical regions. Results will be presented and analyzed for both kilovoltage CT and cone-beam CT. The applicability of this technique to ART will be discussed.

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Date submitted: 18 Oct 2015                    Electronic form version 1.4