AbstractID: 11711 Title: Tools and Methods for Consensus Generation from Experts'
Contours for Radiotherapy Structure Definition

Purpose:
The aim of this work is to develop software tool to that is capable of analyzing and estimating consensus
contour for target volumes and critical structures from experts' contours for radiotherapy treatment
planning

Materials/Methods:
The tool was developed as an add-in for CERR (A Computational Environment for Radiotherapy
Research). The tool can obtain consensus contour based on two statistical methods as well as apparent
intersection between experts' structures. The two statistical approaches include (i) Kappa-corrected
algorithm and (ii) Expectation-maximization (EM) algorithm for simultaneous truth and performance level
estimation (STAPLE). The tool was used to obtain consensus contour for two studies: (i) Clinical target
volume (CTV) definitions of post-operative prostate cancer patient contoured by 11 radiation oncologists
and (ii) CTV and normal structures in rectal cancer contoured by 6 radiation oncologists

Results:
The consensus contouring module was developed in Matlab/CERR. The users can choose structures to
obtain consensus from and the tool provides graphs of consensus contours at any desired CT slice in any of
the transverse, saggittal or coronal views. Users can interactively set the confidence level to obtain desired
consensus estimate using any of the three available methods. The tool offers an option to generate basic
statistics report about minimum, maximum, mean, median intersection volumes, and estimates of
agreement levels, and export this information to an excel file for further analysis of data

Conclusions:
We have developed a tool that can be used to guide radiotherapists to obtain estimates of different contours
consensus at selected statistical confidence levels. It allows for better quantification of the differences in
contour definition among oncologists and their effects on treatment outcomes. It can also be used as a
learning tool for residents, where they can draw contours and compare them with experts' consensus.