Grayden MacLennan

Service Learning Journal

August 13, 2015

Professional Service: Interactive Contouring Workshop

Service learning can take many forms, such as service to a community, service to an employer, or service to a profession. These are the places where we live, where we work, and where we grow. This semester, I focused on professional service. In late June, at the 40th Annual Meeting of the American Association of Medical Dosimetrists (AAMD), I volunteered as a facilitator to keep the Interactive Contouring Workshop running smoothly.

The Interactive Contouring Workshop is an annual pre-conference workshop organized by Ben Nelms, PhD, Greg Robinson, MS, CMD, RT(T), and Aaron Kusano, MD.[1,2] I attended the first one at last year's conference in Seattle and I was impressed with the quality of the anatomy lecture and the method of comparing attendees' contours against not only gold standard contours, but against group consensus of the assembled participants. The work is based on a project involving Nelms and Robinson, as well as two of their colleagues, Wolfgang Tomé, PhD, and James Wheeler, MD, PhD, in which they describe the importance of accurately contouring head and neck organ at risk (OR) structures and propose a method for analyzing contouring variability between multiple people.[3] I was keenly interested to be involved in the workshop again this year for several reasons. Firstly, their work is closely related to the research topic my class group has chosen for our research project, and secondly, contouring accuracy is one of my personal areas of interest, stretching back to my days at MIM Software when I sold and supported contouring software for radiation oncology.

In the course of several email exchanges with Nelms and Robinson regarding our research paper, they both asked if anyone in our group was planning to attend the AAMD Annual Meeting (Greg Robinson, Email communication, May 26, 2015) (Ben Nelms, Email communication, May 27, 2015). The email from Nelms specifically suggested that he would be happy to have someone help out at the workshop since he was unable to attend and they would be shorthanded. I was already planning to attend the workshop, so I jumped on the chance to help run it rather than simply attending it.

The workshop was broken into 4 phases spanning a large portion of the day the Saturday before the conference started officially.[2] In Phase 1, participants were encouraged to come an

hour or more early in order to draw 5 contours that would be the topic of the anatomy lecture. These contours were drawn without receiving any anatomy advice, so that a baseline could be established. Phase 2 was an anatomy lecture by Dr. Kusano with detailed instructions for how to find and contour the structures. Phase 3 was an analysis of all the contours created in Phase 1, showing variability between users and comparison to group consensus contours and gold standard contours drawn by Dr. Kusano. In Phase 4, attendees were invited to return to the contouring workstations for a second attempt, armed with new knowledge and with expert advice at their disposal. Each attendee was able to see their before and after contours, hopefully showing improvement between the two attempts.

When I arrived to help with setup, there was an atmosphere of apprehension because the 25+ computers were not yet set up correctly for the workshop. Varian had graciously offered the use of the computer lab they had set up for their Eclipse training workshops later in the conference, but the sample patient datasets used for the contouring workshop still needed around 5 minutes of preparation on every workstation before they would be ready to use. This wasn't a huge problem on each machine, but with that many workstations, there was a high probability that the workshop would start late and there was even discussion of canceling it entirely. Earlier in my career, I worked in information technology, so making rapid configuration changes to a room full of computers was a familiar task for me. Robinson and I got to work quickly and we drafted another facilitator to help us as well. The time block for Phase 1 had a wide window, so we were lucky that not everyone decided to arrive right away. The rate at which we were able to prepare the machines almost perfectly matched the rate of arrival of the attendees. In the end, most attendees did not have to wait at all and were not even aware that there had been a problem.

The contours of interest were the left and right hippocampus, the left and right cochlea, and the optic chiasm. The attendees were given a planning CT and a thin-cut MRI than was already registered with the CT. These anatomic structures were of particular interest to me because I had spent no small part of my first year in medical dosimetry at the SCCA Proton Center learning to draw a wide variety of intracranial OR structures for proton planning. I quickly got to a point where I was seen as a solid resource for intracranial contouring and almost every case for our chief neuro-oncologist was sent to me for contouring before being sent to whichever medical dosimetrist was assigned to create the treatment plan. The attendees of the workshop had varying levels of familiarity with these anatomic structures because they are often

drawn by physicians rather than medical dosimetrists, or in the case of the left and right hippocampus, they are rarely drawn at all. As a facilitator, my role in this phase was to help with technical issues such as quick overviews of Eclipse's interface for users who were more accustomed to other planning systems. This was also a familiar task from my days at MIM, where I was a senior software trainer. I only had 6 months of experience with Eclipse at that point, but I was able to share what I knew. We did not help with anatomy questions, and explained to the attendees that their contours would not be connected to their names during the Phase 3 presentation unless they volunteered to see how they stacked up. I likened it to a game of golf where you are only competing against yourself, and the goal for the day was to see improvement in contouring after the anatomy lecture.

There were more attendees than machines, so as each attendee finished their Phase 1 contours, we needed to revisit each machine, export the attendee's contours to a flash drive, and reset the machine for the next attendee. As the start time for Phase 2 approached, Robinson had to leave to go to the lecture hall, because he was a speaker he was also running all of the operations in that room. The other facilitator and I stayed in the Phase 1 computer lab and exported every contour set as the attendees finished up and left. I also took an opportunity to create a set of contours for myself. All of the contours were sent electronically to Nelms, who was running the analysis from his home during the Phase 2 lecture.

I missed most of the anatomy lecture because I suggested that we get started right away on re-prepping the machines for Phase 4 so that we would not face any delays between the remaining phases. When I finished that task and moved to the lecture hall to see the Phase 3 analysis of contours, I was pleasantly surprised that Nelms was asking my permission to share my results with the audience. I agreed, and he said that I had the best score of anyone in the workshop. I was one of only 3 people with a positive score based on the analysis metric that rewarded overlapping voxels and penalized non-overlapping voxels. With my accuracy validated, I was able to expand my usefulness in Phase 4 when the attendees started contouring again and were allowed to call for one-on-one coaching with the anatomy while drawing. I was able to take quite a bit of load off of Dr. Kusano, the designated expert, since I was able to answer all but the most detailed questions myself (Figures 1-3). Together, we helped everyone get a second chance to draw the structures, and once again I also assisted with re-prepping the machines between users and pulling contour data off after each person was done.

This workshop was a valuable experience for me in many ways. I made what I felt was a significant contribution to the successful running of the event, and I established what I hope to be an enduring professional relationship with the organizers. I also gained new knowledge; I found out that I have not been extending the hippocampus contour as far anteriorly as I should. This workshop was also a good first experience in teaching and training other medical dosimetrists as a peer rather than as a software company representative. Furthermore, I got to experience the satisfaction of watching and contributing to the professional growth of others. Everyone did a much better job on their second round contours, and I saw many faces having ah-hah moments as the new training clicked with what they were seeing on screen. I was very pleased to have been able to help make this event run successfully.

References

1. Pre-conference workshops. American Association of Medical Dosimestrists Website. https://www.medicaldosimetry.org/meetings/annual_2014_workshops.cfm. Accessed August 13, 2015.
2. Pre-conference workshops. American Association of Medical Dosimestrists Website. http://www.medicaldosimetry.org/meetings/annual_2015/workshops.cfm. Accessed August 13, 2015.
3. Nelms BE, Tomé WA, Robinson G, Wheeler J. Variations in the contouring of organs at risk: test case from a patient with oropharyngeal cancer. *Int J Radiat Oncol Biol Phys*. 2012;82(1):368-378. http://dx.doi.org/10.1016/j.ijrobp.2010.10.019

Figure 1. Dr. Aaron Kusano explaining MRI brain anatomy at the front table during Phase 4 and Greg Robinson helping an attendee in the middle row.

Figure 2. Grayden MacLennan helping an attendee with a question during Phase 4, and Dr. Aaron Kusano helping another attendee in the back row.

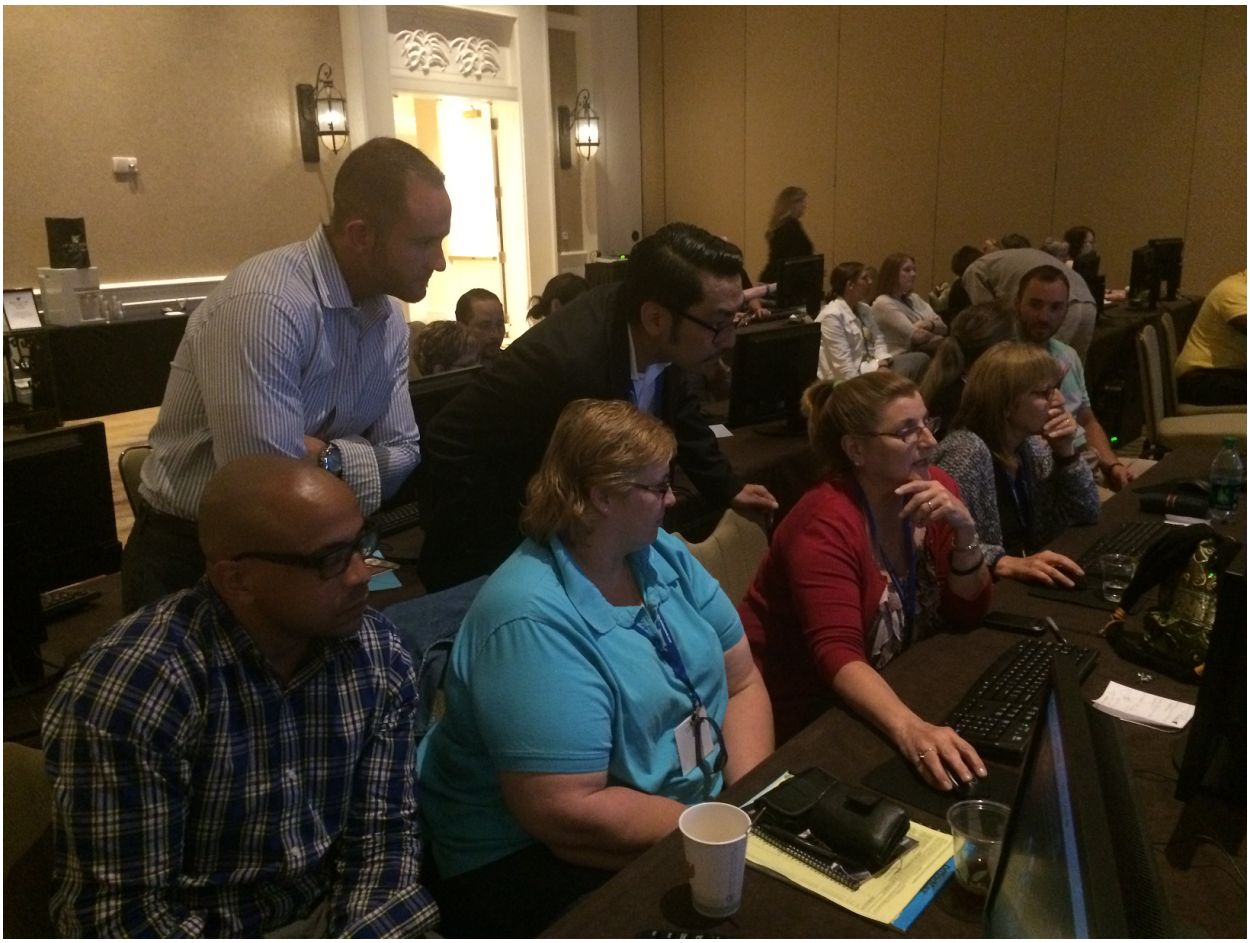

Figure 3. Dr. Aaron Kusano and Greg Robinson helping an attendee with a complex question.