

CS193 Self Assessment

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This semester I worked on techniques to visualize the differences between diffusion tensor MRI's (DTI's). Probably the best way to assess my work is to restate the objectives I set at the beginning of the semester and see which ones I actually met. There were three types of objectives that were set: a high level objective, objectives to be accomplished within the term, and a timeline of milestones to be met.

The high level objective was to combine my background in mathematics and computer science (specifically, computer graphics) in a useful way to study some of the current problems in the field of scientific visualization. Certainly, this objective was met by this project. Visualizing diffusion tensor MRI's is a current area of research in scientific visualization. Furthermore, comparing two or more DTI's is an area where little has been done. Also, there was plenty of math involved from calculating trajectories to understanding the different measures related to diffusion data. Finally, I had to understand concepts from computer graphics in order to generate useful images.

The second type of objective was an objective to be met this semester. Initially, I had three objectives. The first was to learn about the current state of the art in visualization techniques for multi-valued data sets. I have done an extensive amount of reading in this area and have compiled a pretty large (and still incomplete) bibtex file. In addition, I ended up learning about things I had not envisioned I would be learning about such as MR image registration. The second objective I listed was to explore ways to effectively portray 3D multi-valued data sets, specifically MRI diffusion data from the brains of patients with obsessive compulsive disorder (OCD). I think this objective has been met to some extent. I have come up with a technique to portray differences between DTI's. So far, I haven't had the data to test it, so I tested it instead on different integration schemes. Also, there's the question of effectiveness of these images. This has not been measured in any rigorous way. The third objective for the semester was to develop a system that allows the user to easily study large diffusion data sets. This is a pretty ill-defined objective, in retrospect, but I did do something along those lines. Specifically, I helped Song Zang design a library that would help people working on new applications of these techniques.

The final objectives came in the form of a milestones to be met at specific dates. The milestones consisted of regularly getting feedback on my visualization techniques. There was also a milestone for the production of a paper. The only real feedback I got was from Professor Laidlaw. I never really got any feedback from the neurologists who were going to possibly use it some day. I think that this is ok given that the technique should be at a certain level even before a "user" sees it. My work may not have reached this point yet. This, combined with the lack of data to work with, puts the goal of producing a paper out of reach, for the moment. There's still a lot of work to be done.