CS193 Self Assessment
Professor David Laidlaw
Marco da Silva
December 13, 2000

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 visualiza-
tion 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.