Scientific Visualisation Course 1999
Assignment 1

Due: 9/9/99

1. (a) You are given an CT/MRI scan of a lobster. Discuss at least three appropriate visualisation techniques for this type of data and the benefits/issues with each technique.

   (b) Use the Vislab dataset `/apps/avs/data/field/lobster.fld`. Construct and explain networks to demonstrate each technique. Save the three networks in your home directory as `ass1a.net`, `ass1b.net`, `ass1c.net`. Upon loading they should display without adjustment being required. They will be marked based on view presentation and features.

2. Discuss the purpose of Delaunay triangulation. When does it work best and when can it cause problems?

3. Research the *Marching Cubes* algorithm for surface construction. Discuss the overall purpose of such an algorithm in the context of visualisation. Explain in detail how the algorithm works and discuss its benefits and some pitfalls including the surface ambiguity/branching problem. Include references.

   One reference is: Lorenson and Cline, "Marching Cubes: A High Resolution 3D Surface Construction Algorithm", Computer Graphics, Volume 21, Number 4, August 1987, pp 163–169.

4. Explain how kernels can be used to smooth an image and remove noise. What are some of the issues and limitations.

As a guide, each answer should be approximately 500 to 1000 words, include diagrams as appropriate.