Description

The aim of this project is to develop a set of C++/Cg functions for GPU-based visualization of unstructured, convex tetrahedral meshes (on NVidia Quadro GPU or newer). The CPU-based ray casting algorithm for visualization of tetrahedral meshes (described in [1]) uses the adjacency relations between tetrahedra in order to minimize the number of ray-triangle intersections and to find the ordering of tetrahedra along each ray (which is necessary for proper integration of the intensity from the direction of each ray). This algorithm can be performed entirely on the GPU (as described in [2]). It requires storing the adjacency relations between the tetrahedra in textures, and moreover, the limitations of the older graphic cards might require multiple calling of a fragment program, that implements just a single step of the algorithm.

A simple tetrahedral mesh implementation (in C++) with sample Cg programs will be provided.

Caution: some experience in C++ programming and at least basic experience in Cg programming are desirable, if you want to do this project.

References
