COMP 5411 : Advanced Computer Graphics
Fall 2020
Programming Assignment
Released: Wednesday, September 23, 2020
Due: 23:59, Wednesday, October 7, 2020

You are given a code framework written in C++ and GLFW that provides basic viewing functions and loads a mesh into a half-edge data structure. You may build your program upon this code framework.

Laplacian smoothing In this programming assignment, please implement both the explicit and implicit Laplacian smoothing schemes discussed in class. For each scheme, please use both the uniform weights and the cotangent weights to compute the Laplacian vectors. Note that the explicit method involves matrix-vector multiplication, and the implicit method involves solving a sparse linear system. You may implement the iterative biconjugate gradient solver for this purpose. Please refer to the following webpage (`https://en.wikipedia.org/wiki/Biconjugate_gradient_method`).

Submission

Please submit your assignment to Canvas. Please include the following items in a zipped file: 1) compilable source code; 2) executable program (tested on either macOS or Windows); 3) a short report in pdf format.

The report should contain the following:

- Screenshots of the meshes before and after Laplacian smoothing under different settings. Please specify the number of iterations you use for each setting: implicit or explicit, uniform or cotangent weights. Please include at least the following three test-case meshes: data/bunny.obj, data/cube_bumpy.obj, data/feline.obj.
- Your conclusion on the smoothing schemes, comparing the explicit and implicit smoothing schemes, the uniform and cotangent weights, giving your insight on the parameters, timing, etc. You may also mention any interesting observations and problems you encountered.

If you use any special library, please state it in the report as well.