

IFT 6112: Assignment 1

Due: Oct, 4th, 2018

Objective:

Learn to use a real-life medium size programming environment & data structure for meshes.

Tasks:

1. Experiment with the GUI and the mesh
2. Perform simple data-structure operations.
3. Experiment with mesh subdivision

Instructions:

The assignment consists of two components: installation of Cartel and coding.

Installation:

- Download and unpack Cartel sources from ([here](#)).
- To compile the package under Windows you will need Visual Studio 2012 or later. All dependencies are included in the file provided and are already linked in the project, so no work should be required on your part.
- For other building options (e.g. Linux/MacOS, other compilers) the following dependencies should be downloaded and installed, check the Makefile for more details:
 - [GLFW](#)
 - [GLEW](#)
 - [glm](#)
 - [Eigen](#)

Reading the documentation on the Cartel Website is highly recommended to get a handle on the code structure. Your algorithms will be coded as functions directly into the EditMesh class, and called via key bindings in the ControlState class.

Coding:

- You should implement a subdivision scheme for closed meshes as a new function in Cartel or a mesh library of your choice.
- The scheme options are Loop, butterfly or Sqrt(3).

- The Loop and butterfly formulas are found [here](#). The Sqrt(3) algorithm is explained in details in the following [paper](#),

Your function should take only necessary input parameters, and perform one iteration of the algorithm on the loaded mesh. The algorithm should work correctly if run multiple times.

BONUS: You can get extra marks for implementing any of the following options (bonus at my discretion). For the description of each option, please refer to online literature on subdivision.

- Implement a subdivision scheme that performs correctly on meshes with boundaries.
- Implement vertex projection to the limit surface.
- Implement normal computation using the limit surface

Inputs:

A small set of inputs to debug your algorithm can be found [here](#). It contains coarse meshes with and without boundary. More meshes can be downloaded from, e.g. [aim@shape repository](#). Please note that the provided Cartel software only included functionality to load OBJ file, so meshes in any other format will require conversion.

Make sure you understand every line of the code you write.

Submission: private message to me on Piazza with a source code attached.