CMSC 435 / 634 Introduction to Computer Graphics

Project Assignment 3: Curve Modeling

Goals of this project: Understand Parametric curve modeling in computer graphics. Once this project is completed, you will understand how models (e.g., cars and airplanes) are created in many engineering applications.

Introduction

In this assignment, you will be writing your own modeling tool from scratch. You are allowed to use any code either provided by the instructor or written by yourself. You will:

- create a program called *BezierPatch.cpp* that draws the famous Utah teapot based on Bezier patches.

To learn more about the history of the Utah teapot, please take a look at this page: http://en.wikipedia.org/wiki/Utah_teapot

643 only:

- Manipulate the teapot control points to morph the teapot. Make your results as interesting as possible.
- Write a brief description what other uses you can think of for using Bezier patches.

Modeling File:

The Utah teapot control points are provided in the file ./data/teaportCGA.bpt. The file format is rather simple.

```
32                      ←--- the number of Bezier patches
3 3                      ←- Order of the 1st Bezier patch
1.4 0.0 2.4              ← the 1st control point in the 1st Bezier patch
1.4 -0.784 2.4          ← the 2nd control point in the 1st Bezier patch
0.784 -1.4 2.4
0.0 -1.4 2.4
1.3375 0.0 2.53125
1.3375 -0.749 2.53125
0.749 -1.3375 2.53125
0.0 -1.3375 2.53125
1.4375 0.0 2.53125
1.4375 -0.805 2.53125
0.805 -1.4375 2.53125
0.0 -1.4375 2.53125
1.5 0.0 2.4
1.5 -0.84 2.4
```

```
0.84 -1.5 2.4
0.0 -1.5 2.4
3 3                    ← the 2nd Bezier patch
0.0 -1.4 2.4           ← 1st control point in the 2nd Bezier patch
-0.784 -1.4 2.4
-1.4 -0.784 2.4
-1.4 0.0 2.4
 ……
```

Extra credits

For those taking 435, for 20 points, implement the 634 version.

For 10 points, calculate normal at each surface to create a smooth model. You will also need to setup the lighting in the scene properly.

What to turn in

Source code only by email to TA. Please do not include any .o files. Please include:

- A README with your handin containing basic information about your design decisions and any known bugs or extra credit;
- How to compile and run your code as if you are telling a colleague that is to continue the development.

Note: Please comment on your code. The better Alisa understands your code, the higher your grade is likely to be.