Assignment 05 (Due date Nov. 17, 2024)

Computer Graphics

Assignment 05

Pierre Bezier (September 1, 1910--November 25, 1999)

DUE DATE: Nov. 17, 2024

Purpose:. Practice in curved surfaces

Add the capability to your Assignment 04 to create and view cubic surfaces.

This assignment modifies the "Load and Display Objects" command in your assignment 04 such that it can read the geometry vectors of cubic Bezier patches by reading the coordinates of the control points from an input file. There will be 16 points for each surface patch. Maximum number of cubic patches is 100. The order for the points is P_{11},P_{12}, ... P_{44} .

The following command should also be added to the previous commands

Decrement / Increment resolution of Bezier patches: "r" and "R" keys
Hitting the "r" key should decrement the resolution of Bezier patches by 1. The minimum possible resolution is 2.

Hitting the "R" key should increment the resolution of the Bezier patches by one. The maximum possible patch resolution should be set to 100.

Notice that this Lab adds additional functionality to your Assignment 04. All the previous functionalities should stay the same.

Format of the data file:

```
n <n>      //resolution of the patches in both u and v directions
b <x1> <y1> <z1>  //Control point p11
b <x2> <y2> <z2>  //Control point p12
b <x3> <y3> <z3>  //Control point p13
.
.
b <x16> <y16> <z16>  //Control point p44 (first patch ends here)
b <x1> <y1> <z1>  //Control point p11 (second patch starts here)
b <x2> <y2> <z2>  //Control point p12
b <x3> <y3> <z3>  //Control point p13
.
.
b <x16> <y16> <z16>  //Control point p44 (second patch ends here)
b <x1> <y1> <z1>  //Control point p11 (third patch starts here).
.
.
v <x1> <y1> <z1>  //Define a vertex (The same as assignments 03 and 04 )
v <x2> <y2> <z2>
.
.
.
v <xn> <yn> <zn>
f <u1> <v1> <w1> //Define a face (u,v, and w are integers)
...
.
```

Notes:

The cubic patches should be displayed by a polygon mesh of triangles.

The input file may include data for Bezier patches as well as polygon vertices (same as assignments 03 and 04). Make sure that the parametric surfaces (cubic patches) and polygons are shown at the same time on the viewports.

Demo solution for Assignment 05

Data files:

cameras_05.txt

patches_05.txt

teapot_05.txt

teapot_pyramid_05.txt

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