CSCI3260 HW4 Bezier Curve and Surface

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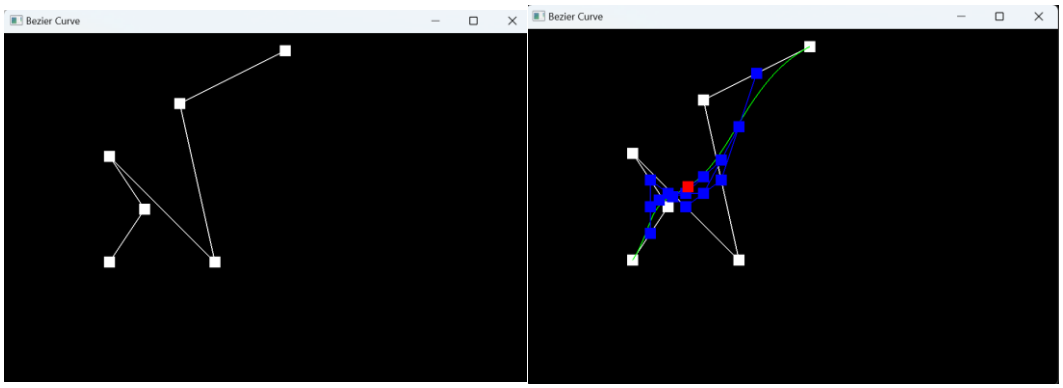
Write-up:

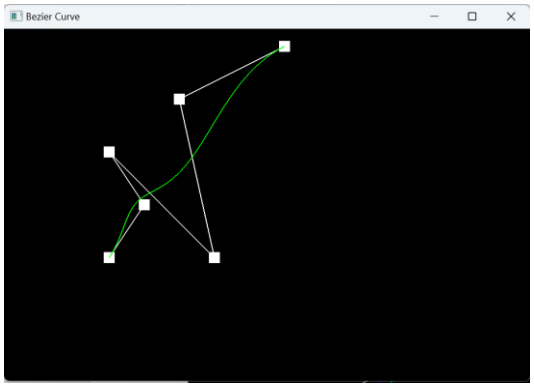
Part I

- de Casteljau's algorithm: p'_i = lerp(p_i, p_{i+1}, t)
- In evaluateStep(), I use for loop to the end of points to represent the iteration of p'_i. A list named newPoint will store the result of p'_i.

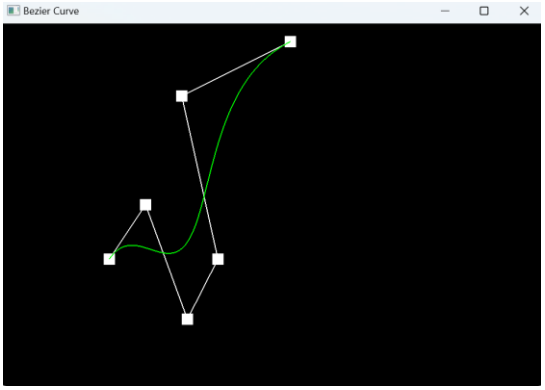
Screenshots:



Before:



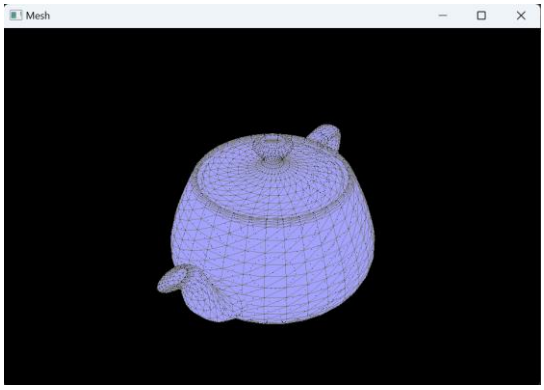
After:

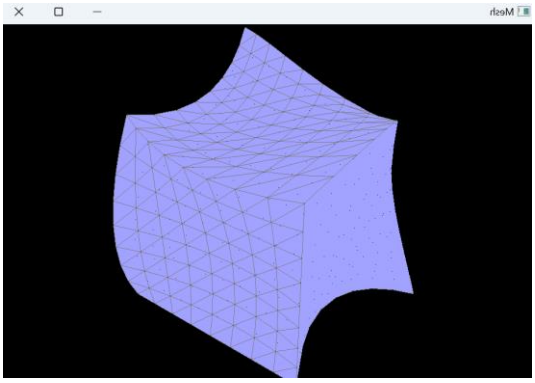


Part II

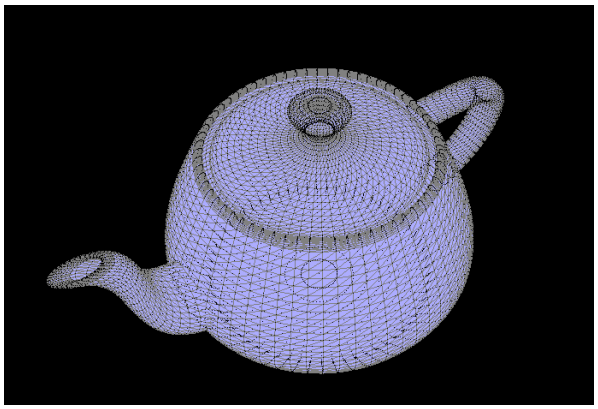
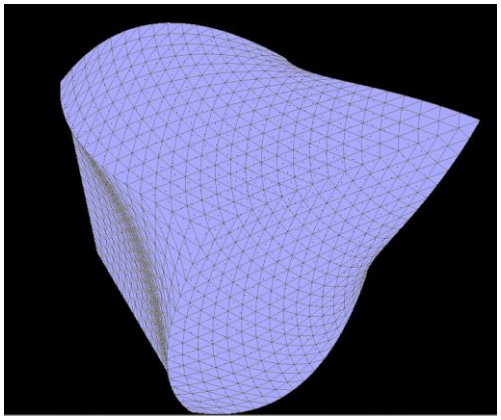
- evaluateStep() is to evaluate the given point by de Casteljau's algorithm at scalar t.
- evaluate1D() is to evaluate a vector of points by de Casteljau's algorithm at scalar t.
- evaluate() is to evaluate the Bezier patch at u,v.

Screenshots:

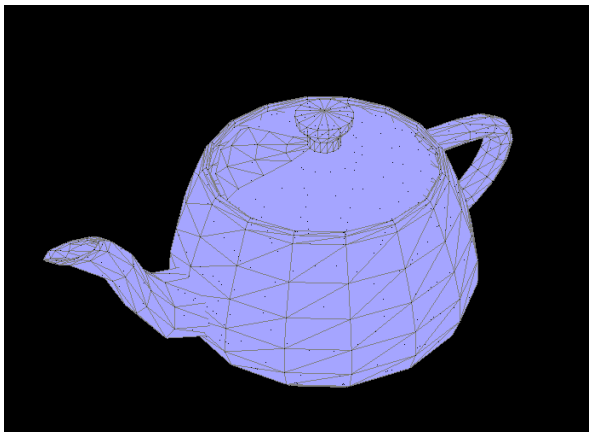
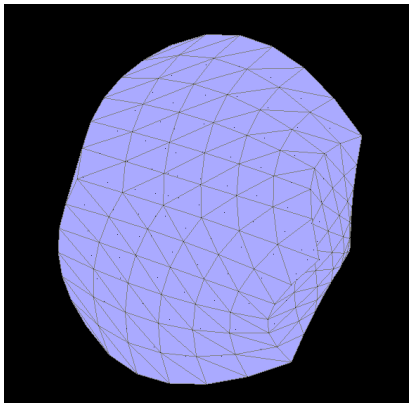




Increase density:

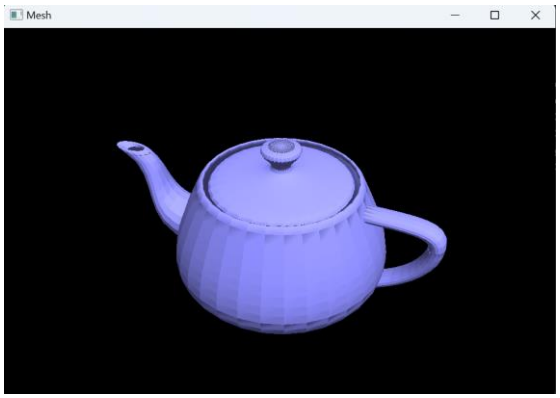



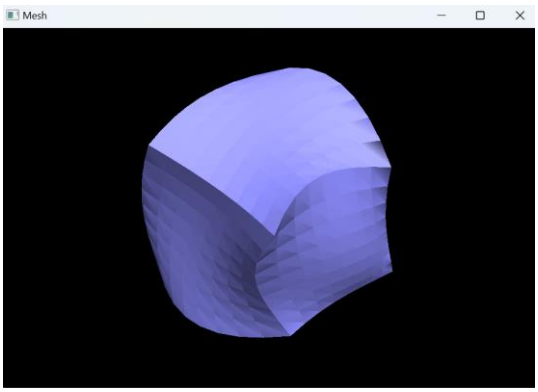
Decrease density:

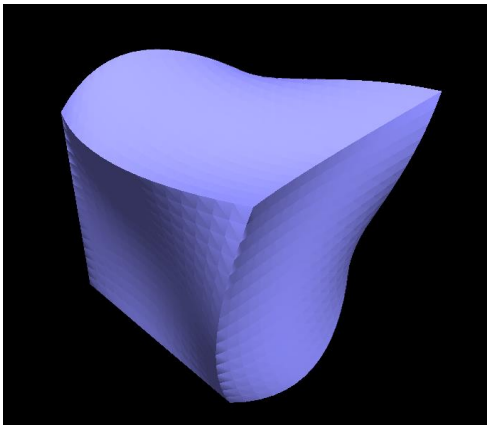
Part III

Screenshots:





increase density:



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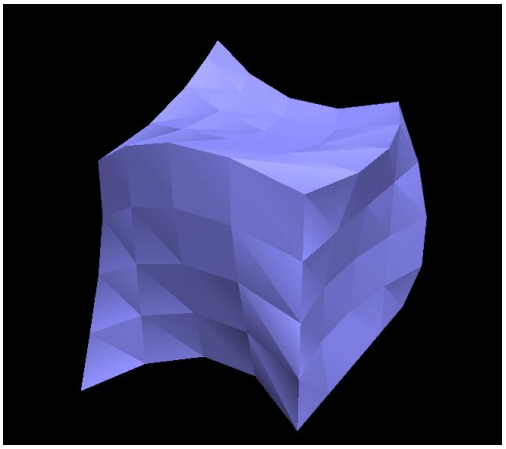

Discussion:

The shading model is comes from calculates the normal of each triangle in a mesh. As the density of the mesh increases, the shading will be more smooth, vice versa. However, the problem of this shading method is that it is very difficult to render a truly curved object. Even when the density of the curved object is approximately

high, you can still see the surface is still rough.