CSGI.GA.2270 – Computer Graphics
Fall 2023 Assignments

Extra Credit Assignment

Catmull-Rom Spline Curves

If you need extra credit, you have a chance to choose a new project. Here are the details.

Catmull-Rom spline is named after Edwin Catmull and Raphael Rom. This is a nice technique which is frequently used in CG to get smooth interpolated motion between keyframes. The uniform Catmull–Rom implementation can produce self-intersections, however, you do not need to handle and correct them in this assignment.

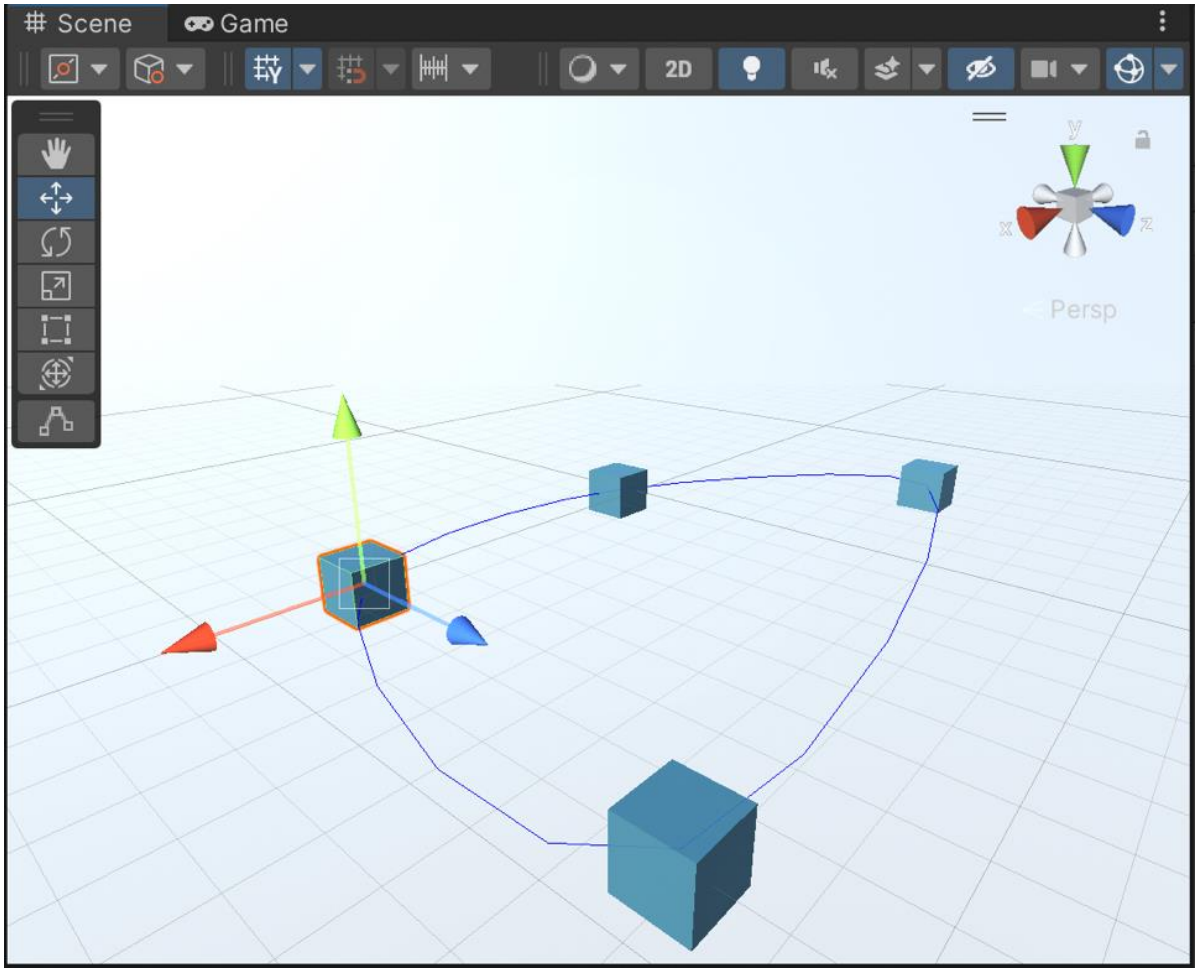
This assignment can be easily implemented in Unity. For this purpose, you need to:

- create a new project and scene
- create an empty GameObject
- create at least 4 control points (cubes or spheres are fine)
- create a script and assign it to your empty Game Object
- implement Catmull-Rom spline
- assign your control points
- try different number of control points

How to write your script?

Please check the given script. Fill in the TO DO parts. Remember that you can use a cubic polynomial for your spline. If you have 4 points, 2 of them are for endpoints and 2 of them are for controlling the shape of your curve. To have a curve loop (check the figure), you need to carefully connect the control points.

Output (for 4 control point (cubes)):



References:

Catmull, E., and Rom, R. A class of local interpolating splines. In Computer Aided Geometric Design, R. E. Barnhill and R. F. Reisenfeld, Eds. Academic Press, New York, 1974, pp. 317–326.

https://en.wikipedia.org/wiki/Cubic_Hermite_spline#Catmull%E2%80%93Rom_spline

http://www.iquilezles.org/www/articles/minispline/minispline.htm