Overview

In these lectures we attempt to take you on a journey to help you understand how modeling is done in computer graphics.

To model in computer graphics, one must realize that our algorithms must be implemented on computer systems, and this means that (frequently) traditional mathematical methods do not fit well. Traditional mathematics are based upon continuous functions, and computer systems don’t work this way in general – they are discrete beasts. Thus, in the early 1970s, it was recognized that we could not represent a curve by a general continuous function but must represent them as a discrete, finite number of defining “things”. It is the reduction of these continuously defined mathematical objects to a more discrete representation that has motivated the field of geometric modeling.

The Mini-Lectures

We have separated this field into numerous mini-lectures and companion notes that exist on the primary website – http://www.cs.ucdavis.edu/~joy/GeometricModelingLectures.
These mini-lectures are broken into nine units, each of which has a companion set of written notes. Occasional exercises are given at the end of various lectures to help the student practice the concepts.

Resources

There are many resources that can be used to help learn this material:

- Associated notes for each lecture. The notes all have the following form, and are self-contained.
• “filetype:” searches in Google. This is the way to find “code” that others have used. A Google search of `GL_Texture filetype:cpp`, will result in links returned where people have used `GL_Texture` in their C++ code.

• Wikipedia – the sections on Bézier and B-spline curves are very good.

• The Book: Farin: Curves and Surfaces in CAGD. This is the “bible” in the field.

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**Summary**

This is an interesting field, and it comes with a complete story. The development of techniques that allow us to model a sculpture like the egghead (below) with general surfaces that can be transformed into many small triangles (and can be colored and textured as we normally do in computer graphics) is an “interesting trip.”