

CS 633 Computer Animation HW05

Name: FU, Bo

Due: March 3, 2008

Question 1:

Solution:

The deformed position(global coordinate) of a vertex can be determined by trivariate Bezier interpolation. I think the reason to use this process is the same as it is in 1D and 2D cases. The control points is easy to be determined and the relationship between control points and vertex is simple. Once we want to move a vertex, only limited number of control points need to be moved. So, this property provides us a local way to control three-dimensional solid.

Question 2:

Solution:

Yes, one pass process is possible.

In the warping process, the final image is a stretched/compressed source/destination image corresponding to intermediate grid. The first pass is from source/destination image to auxiliary grid on a scanline-by-scanline basis. The second pass is from auxiliary grid to intermediate image on a column-by-column basis. One pass will be mapping from source/destination image directly to intermediate image. Suppose (x,y) is a point in source/destination image, (U,V) is a point in intermediate image, of course, the mapping should not be a 1-1 mapping. What we need to do is to find $U=U(x,y)$ and $V=V(x,y)$, to determine the color of (U,V) . If multiple points of source/destination image are mapped to single point of intermediate image, average should be applied. Then, how to find these relationships? The image pixels themselves can be a grid, by computing the pixel coordinate relationship between corresponding points of source/destination grid and intermediate grid, we can presume the relationship of pixels in these two images located in the area of corresponding grid points.

Question 3

Solution:

It depends on the type of weight we use.

If we use the normalized weight, the answer is yes, because the only one weight will be normalized to 1 and the correspondence is direct, so we get single- feature line morphing.

If we set the weight on a feature-line-by-feature-line basis, then, the answer is probably no. We have to set the parameter a , b , p in order to make weight exactly 1.