

CS 6491 Computer Graphics - Project 1 Phase 2

Team : Vinayak Gargya, Amita Karunakaran

Instructions to demo:

1. Press Space to display the SQUINT grid
2. Use 'g' to increase the number of grid lines and 'h' to decrease.
3. Press 't' to switch between three states, no texture, student 1 picture, student 2 picture.
4. Press 'f' to remove grid lines.
5. Press '4' to display the animation

Objective 1 - Implement the SQUINT Map (Vinayak Gargya) and display it in an $n \times n$ grid (Amita Karunakaran):

To implement the SQUINT Map, we use the commutative property of the Log Polar Morph transformation. We use the knowledge of the fact that for a quad ABCD, a Similarity exists between edge AB and DC (S_1), and another Similarity exists between edge BC and AD (S_2).

The focal point of both of these similarities is the same, F.

1. We calculate the two similarities using the approach from phase 1.
2. We apply a combination of these two similarities by calculating
$$\text{Lambda}_{\text{new}(t_1, t_2)} = \text{Lambda}_{S_1}^{1/t_1} * \text{Lambda}_{S_2}^{1/t_2}$$
$$\text{Angle}_{\text{new}} = t_1 * \text{Angle}_{S_1} + t_2 * \text{Angle}_{S_2}$$
3. In order to give a smooth appearance to the edges, after we apply the Similarity to its points, we divide the edges into a high number of points. For our demonstration we use 50. We apply the $\text{Similarity}_{\text{new}}$ to all $50 * 50$ points in the quad formed from the two edges.
4. To display the grid, we divide the length of the edge into n sections. We draw $n+1$ grid lines by looping from 0 to n and calculating and applying the similarity at i/n (i is the current grid line number). This process is repeated for every row of the grid line
5. Use it to produce and display an $n \times n$ grid of points (let the user control n) (Amita Karunakaran). Keys g and h were added - they increase or decrease the amount of grid blocks from 0 to 10.

Objective 2 - Render a texture inside the SQUINT Map (Amita Karunakaram)

To render a texture inside the quad mesh we map the texture coordinates from the texture space to their corresponding positions in the SQUINT Map by using the commuted similarity above.

The texture mode is a three state machine where there is no texture, a picture of Vinayak, and a picture of Amita. The texture coordinates go through a simple linear loop and are associated with the calculated vertex that is obtained after applying the similarity.

Objective 3 - Create an SEM animation using the SQUINT Map (Vinayak Gargya)

This is fairly simple to accomplish after doing 1 and 2. We use the same animation that we created in Phase 1 of this project. The only difference is that we render the quad formed from the four points using the method that we use to render the quads above in step 1 and 2. The texture state machine and the gridlines works the same way as the 4 points quad.