Lab Report

Week 6

Ritobroto Maitra (1301CS50)

15/03/2016

Title

- Implement a scan converting polygon filling algorithm in OpenGL. Define a polygon using a list of vertices. Describe the operation of Active Edge List (AEL) for your code, step by step.

Algorithm Outline

Steps :

1. We iterate over the scanlines starting from scanline passing through the bottom most vertex to the top most vertex.
2. For each scanline if a edge starts at that scanline we add it to active edge list and remove the edges which end at that scanline.
3. Find the intersection of the edges in AEL with the scanline and sort the intersection points by x-coordinate.
4. Draw the points between alternate sets of the intersection points.

Code Snippet

```
1
2
3  void edgedetect(GLfloat x1,GLfloat y1,GLfloat x2,GLfloat y2,std::vector<std::vector<int>>& ael) {
4      float mx,x,temp;
5      int i;
6      if((y2-y1)<0) {
7        temp=x1; x1=x2; x2=temp;
8        temp=y1; y1=y2; y2=temp;
9      }
10     if((y2-y1)!=0) mx = (x2-x1)/(y2-y1);
11     else mx = x2-x1;
12
13     x=x1;
14     for(i=y1; i<y2; i++) {
15         ael[i].push_back(x);
16         x+=mx;
17     }
18 }
19
20 void scanfill(float x1,float y1,float x2,float y2,float x3,float y3,float x4,float y4) {
21     std::vector<std::vector<int>> ael(500);
22     int i,y;
23     edgedetect(x1,y1,x2,y2, ael);    // call edge detect four times
24     edgedetect(x2,y2,x3,y3, ael);    // once for each edge.
25     edgedetect(x3,y3,x4,y4, ael);
26     edgedetect(x4,y4,x1,y1, ael);
27     for(int i = 0; i < 500 ; i++)
28         std::sort(ael[i].begin(), ael[i].end());
29     for(y=0;y<500;y++) {
30         for(auto x_1 = ael[y].begin(), x_2 = x_1;x_1 != ael[y].end(); ){
31             x_2 = x_1+1;
32             if(x_2 == ael[y].end()) break;
```

```
33              for(int x_cord = *x_1+1; x_cord < *x_2; x_cord++)
34                  drawpixel(x_cord,y);
35              x_1 = x_2+1;
36          }
37      }
38  }
```

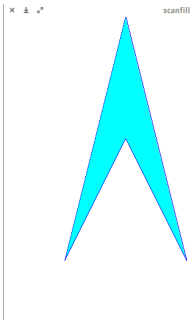

FIGURE 1 – Scan-convertion polygon filling