实验十四 曲线曲面生成实验

时间：2022年6月8日

地点：信息学院机房2202

1、实验内容

使用opengl，书写教材P323代码，运行Bezier曲线生成程序。

2、实验目的

采用Bezier函数验证曲线生成

3、实验代码

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| #include <windows.h>  #include <GL/glut.h>  #include <stdio.h>  #include <math.h>  GLsizei winWIdth = 600, winHeight = 600;  GLfloat xwcMin = -50.0, xwcMax = 50.0, ywcMin = -50.0, ywcMax = 50.0;  class wcPt3D  {  public: GLfloat x, y, z;  };  void init(void)  {  glClearColor(1.0, 1.0, 1.0, 0.0);  }  void plotPoint(wcPt3D p)  {  glBegin(GL\_POINTS);  glVertex2f(p.x, p.y);  glEnd();  }  void binomialCoeffs(GLint n, GLint\* C)  {  GLint i, j;  for (i = 0; i <= n; i++)  {  C[i] = 1;  for (j = n; j >= i + 1; j--)  {  C[i] \*= j;  }  for (j = n - i; j >= 2; j--)  {  C[i] /= j;  }  }  }  void computeBezPt(GLfloat u, wcPt3D\* bezPt, GLint nCtrlPts, wcPt3D\* ctrlPts, GLint\* C)  {  GLint i, j = nCtrlPts - 1;  GLfloat bezBlendFcn;  bezPt->x = bezPt->y = bezPt->z = 0.0;  for (i = 0; i < nCtrlPts; i++)  {  bezBlendFcn = C[i] \* pow(u, j) \* pow(1 - u, j - i);  bezPt->x += ctrlPts[i].x \* bezBlendFcn;  bezPt->y += ctrlPts[i].y \* bezBlendFcn;  bezPt->z += ctrlPts[i].z \* bezBlendFcn;  }  }  void bezier(wcPt3D\* ctrlPts, GLint nCtrlPts, GLint nBezPts)  {  GLint\* C, k;  GLfloat u;  wcPt3D bezPt;  C = new GLint[nCtrlPts];  binomialCoeffs(nCtrlPts - 1, C);  for (k = 0; k <= nBezPts; k++)  {  u = GLfloat(k) / GLfloat(nBezPts);  computeBezPt(u, &bezPt, nCtrlPts, ctrlPts, C);  plotPoint(bezPt);  }  delete[] C;  }  void displayFcn(void)  {  GLint nCtrlPts = 4, nBezCurvePts = 1000;  wcPt3D ctrlPts[4] = {  {-40.0, -40.0, 0.0},  {-10.0, 200.0, 0.0},  {10.0, -200.0, 0.0},  {40.0, 40.0, 0.0} };  glClear(GL\_COLOR\_BUFFER\_BIT);  glPointSize(4);  glColor3f(1.0, 0.0, 0.0);  bezier(ctrlPts, nCtrlPts, nBezCurvePts);  glFlush();  }  void winReshapeFcn(GLint newWidth, GLint newHeight)  {  glViewport(0, 0, newWidth, newHeight);  glMatrixMode(GL\_PROJECTION);  glLoadIdentity();  gluOrtho2D(xwcMin, xwcMax, ywcMin, ywcMax);  glClear(GL\_COLOR\_BUFFER\_BIT);  }  int main(int argc, char\*\* argv)  {  glutInit(&argc, argv);  glutInitDisplayMode(GLUT\_SINGLE | GLUT\_RGB);  glutInitWindowPosition(50, 50);  glutInitWindowSize(winWIdth, winHeight);  glutCreateWindow("Bezier Curve");  init();  glutDisplayFunc(displayFcn);  glutReshapeFunc(winReshapeFcn);  glutMainLoop();  } |

4、实验总结

本次实验主要是对书上代码进行学习生成曲线.