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Subject :CGAVR

Mid-point Ellipse Algorithm

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#include <stdio.h>
#include <GL/glut.h>
#include <math.h>

int xc, yc, rx, ry; // Center coordinates and radii

// Function to plot points in all four quadrants
void plotEllipsePoints(int x, int y) {
glBegin(GL_POINTS);
glVertex2i(xc + x, yc + y); // Quadrant I
glVertex2i(xc - x, yc + y); // Quadrant II
glVertex2i(xc + x, yc - y); // Quadrant III
glVertex2i(xc - x, yc - y); // Quadrant IV
glEnd();
}

// Midpoint Ellipse Drawing Algorithm
void drawEllipse() {
int x = 0;
int y = ry;
// Decision parameter for region 1
float d1 = (ry * ry) - (rx * rx * ry) + (0.25 * rx * rx);
float dx = 2 * ry * ry * x;
float dy = 2 * rx * rx * y;

// Region 1
while (dx < dy) {
plotEllipsePoints(x, y);
if (d1 < 0) {
d1 += dx + (ry * ry);
} else {
y--;
dy -= 2 * rx * rx;
d1 += dx - dy + (ry * ry);
}
x++;
dx += 2 * ry * ry;
}

// Decision parameter for region 2
float d2 = (ry * ry) * ((x + 0.5) * (x + 0.5)) + (rx * rx) * ((y - 1) * (y - 1)) - (rx * rx * ry * ry);

// Region 2
```

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while (y >= 0) {
plotEllipsePoints(x, y);
if (d2 > 0) {
y--;
dy -= 2 * rx * rx;
d2 += (rx * rx) - dy;
} else {
x++;
dx += 2 * ry * ry;
d2 += dx - (rx * rx);
y--;
dy -= 2 * rx * rx;
}
}
glFlush(); // Render now
}

// Initialization function
void init() {
glClearColor(1.0, 1.0, 1.0, 0); // Set clear color to white
glColor3f(0.0, 0.0, 0.0); // Set drawing color to black
gluOrtho2D(0, 640, 0, 480); // Set the coordinate system
}

// Display function
void display() {
glClear(GL_COLOR_BUFFER_BIT);
drawEllipse(); // Call the ellipse drawing function
}

// Main function
int main(int argc, char** argv) {
printf("Enter the center of the ellipse (xc yc): ");
scanf("%d %d", &xc, &yc);
printf("Enter the radii of the ellipse (rx ry): ");
scanf("%d %d", &rx, &ry);

glutInit(&argc, argv);
glutInitDisplayMode(GLUT_SINGLE | GLUT_RGB);
glutInitWindowSize(640, 480);
glutInitWindowPosition(100, 100);
glutCreateWindow("Midpoint Ellipse Drawing Algorithm");

init();
glutDisplayFunc(display);
glutMainLoop();
return 0;
}
```

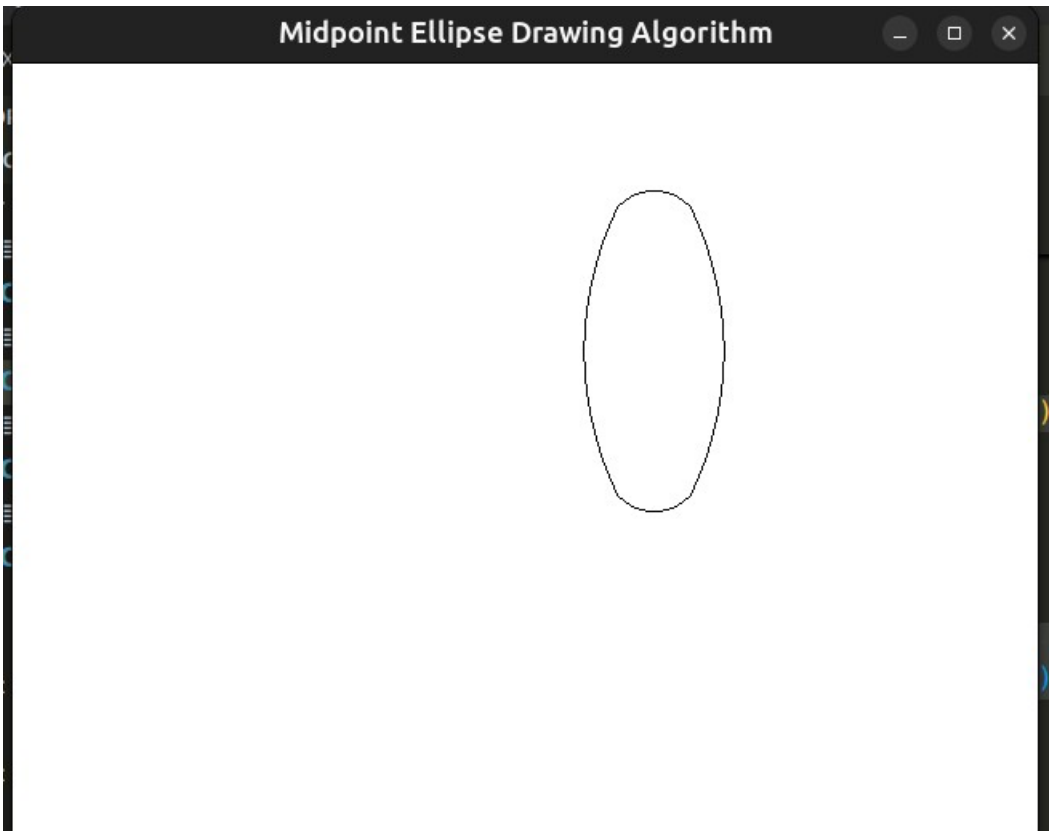
Midpoint Ellipse Drawing Algorithm