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//CG Lab 04 Line Clipping
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#include "clip.h"
#include "ui_clip.h"
#include "QColorDialog"
#include <QMouseEvent>
#include <QtDebug>
#include <QTime>
#include <iostream>

using namespace std;

static int LEFT=1,RIGHT=2,BOTTOM=4,TOP=8,xl = 50,y1 = 50,xh = 450,yh = 350;

QImage img(500,500,QImage::Format_RGB888);
QColor color;
int ver=0,temp,i,j,a[20],b[20];
float slope[20],dx,dy,x[20];

clip::clip(QWidget *parent)
    : QMainWindow(parent)
    , ui(new Ui::clip)
{
    ui->setupUi(this);
    ver=0;
    start=true;
}

clip::~clip()
{
    delete ui;
}

void clip::dda(int x1,int y1, int x2, int y2)
{
    int dx,dy,p;
    int x,y;
    int i=0;
    x=x1;
    y=y1;
    dx=abs(x2-x1);
    dy=abs(y2-y1);
    if(dx>=dy)
    {
        p=2*dy-dx;
        while(i<=dx)
        {img.setPixel(x,y,color.rgb());
            if(p<0)
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        {
            p=p+2*dy;
        }
        else{
            p=p+2*(dy-dx);
            y=y+sign(y2-y1);
        }
        x=x+sign(x2-x1);
        i++;
    }
}
else{
    p=2*dx-dy;
    while(i<=dy)
    {img.setPixel(x,y,color.rgb());
        if(p<0)
        {
            p=p+2*dx;
        }
        else{
            p=p+2*(dx-dy);
            x=x+sign(x2-x1);
        }
        y=y+sign(y2-y1);
        i++;
    }
}
ui->label->setPixmap(QPixmap::fromImage(img));
}

int clip::sign(float x)
{
    if(x<0)
        return -1;
    else
        return 1;
}

void clip::mousePressEvent(QMouseEvent *ev)
{if(start)
    {
        int p=ev->pos().x();
        int q=ev->pos().y();
        a[ver]=p;
        b[ver]=q;
        if(ev->button()==Qt::RightButton)
        {
            dda(a[0],b[0],a[ver-1],b[ver-1]);
            //start=false;
        }
        else{
            if(ver%2 !=0)
            {
                dda(a[ver],b[ver],a[ver-1],b[ver-1]);
            }
        }
    }
}

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        ver++;
    }

}

void clip::on_pushButton_clicked()
{
    dda(50,50,450,50);
    dda(50,50,50,350);
    dda(50,350,450,350);
    dda(450,50,450,350);
}

int clip::region(int x, int y){
    int code = 0;

    if(y > yh) code |=TOP;
    if(y < yl) code |=BOTTOM;
    if(x < xl) code |=LEFT;
    if(x > xh) code |=RIGHT;
    return code;
}

void clip::on_pushButton_2_clicked()
{
    //    a[ver] = a[0];
    //    b[ver] = b[0];
    for (int i=0; i<ver ;i= i+2 ) {
        int x1 = a[i];  int y1 = b[i];
        int x2 = a[i+1]; int y2 = b[i+1];
        int outcode1=region(x1,y1), outcode2=region(x2,y2);
        int accept = 0;

        while(1){
            float m =(float) (y2-y1)/(x2-x1);

            if(outcode1==0 && outcode2==0){
                accept = 1;
                break;
            }

            else if((outcode1 & outcode2)!=0){
                break;
            }else{
                int x,y;
                int temp;

                if(outcode1==0)
                    temp = outcode2;
                else
                    temp = outcode1;

                if(temp & TOP){
                    x = x1+ (yh-y1)/m;
                    y = yh;
                }
            }
        }
    }
}

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        else if(temp & BOTTOM){
            x = x1+ (y1-y1)/m;
            y = y1;
        }else if(temp & LEFT){
            x = x1;
            y = y1+ m*(x1-x1);
        }else if(temp & RIGHT){
            x = xh;
            y = y1+ m*(xh-x1);
        }

        if(temp == outcode1){
            x1 = x;
            y1 = y;
            outcode1 = region(x1,y1);
        }else{
            x2 = x;
            y2 = y;
            outcode2 = region(x2,y2);
        }
    }

    if(accept){
        img.setPixel(i,j,qRgb(0,0,0));
        ui->label->setPixmap(QPixmap::fromImage(img));
        dda(x1,y1,x2,y2);
    }

}

int i =0;
while ( i<500) {
    int j = 0;
    while (j<500) {
        if((i<50) or (i>450)){
            img.setPixel(i,j,qRgb(0,0,0));
            ui->label->setPixmap(QPixmap::fromImage(img));
        }
        if((j<50) or (j>350)){
            img.setPixel(i,j,qRgb(0,0,0));
            ui->label->setPixmap(QPixmap::fromImage(img));
        }
        j++;
    }
    i++;
}

}

void clip::on_pushButton_3_clicked()
{
    color=QColorDialog::getColor();
}

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