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//CG Lab 02 Transformation



#include "transform.h"
#include "ui_transform.h"
#include"QColorDialog"
#include<QMouseEvent>
#include<QtDebug>
#include<QTime>
#include<iostream>
#include<cmath>
using namespace std;
QImage img(500,500,QImage::Format_RGB888);
QColor color;
transform::transform(QWidget *parent)
    : QMainWindow(parent)
    , ui(new Ui::transform)
{
    ui->setupUi(this);
    start=true;
    ver = 0;
}

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


int ver=0,temp,i,j,a[20],b[20];
float slope[20],dx,dy,x[20];

void transform::dda(float x1,float y1, float x2, float 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)
          {
              p=p+2*dy;
          }
          else{
              p=p+2*(dy-dx);
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                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 transform::sign(float x)
{
    if(x<0)
        return -1;
    else
        return 1;
}


void transform::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>0)
            {
               dda(a[ver],b[ver],a[ver-1],b[ver-1]);
            }
        }
        ver++;
    }
}
```

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void transform::on_pushButton_clicked()
{
    color=QColorDialog::getColor();
    dda(250,0,250,499);
    dda(0,250,499,250);
}


void transform::on_pushButton_2_clicked()
{   int tx,ty,x,y,x1,y1;
    tx=ui->textEdit->toPlainText().toInt();
    ty=ui->textEdit_2->toPlainText().toInt();
    for(int i=0; i<ver-2;i++){
        x = a[i];
        y = b[i];
        x1 = a[i+1];
        y1 = b[i+1];
        dda(x+tx,y+ty,x1+tx,y1+ty);
    }
    dda(a[0]+tx,b[0]+ty,x1+tx,y1+ty);
}


void transform::on_pushButton_3_clicked()
{
    int cx, cy;
    for (int i=0; i<ver-1 ;i++ ) {
        cx += a[i];
    }
    for (int j=0; j<ver-1 ;j++ ) {
        cy += b[j];
    }
    cx = cx / ver;
    cy = cy / ver;
    float sx,sy;
    float x,y,x1,y1;
    sx = ui->textEdit_3->toPlainText().toInt();
    sy = ui->textEdit_4->toPlainText().toInt();
    for(int i=0; i<ver-2;i++){
        x = a[i];
        y = b[i];
        x1 = a[i+1];
        y1 = b[i+1];
        dda((x-250)*sx +250,(y-250)*sy +250,(x1-250)*sx +250,(y1-
250)*sy+250);
//        dda(x+(x1-x)*(sx/2),y+(y1-y)*(sy /2),x1+(x1-x)*(sx /2),y1+(y1-
y)*(sy/2));
    }
    dda((a[0]-250)*sx +250,(b[0]-250)*sy +250,(x1-250)*sx +250,(y1-250)*sy
+250);
//    dda(a[0] +(x1-a[0])*(sx/2),b[0]+(y1-b[0])*(sy/2),x1+(x1-a[0])*(sx/2),y1
+(y1-b[0])*(sy/2));
}
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```
void transform::on_pushButton_4_clicked()
{
    int cx, cy;
    for (int i=0; i<ver-1 ;i++ ) {
        cx += a[i];
    }
    for (int j=0; j<ver-1 ;j++ ) {
        cy += b[j];
    }
    cx = cx / ver;
    cy = cy / ver;
    float angle;
    int theta,x,y,x1,y1;
    theta = ui->textEdit_5->toPlainText().toInt();
    angle = (theta * 3.141)/180;
    for(int i=0; i<ver-2;i++){
        x = a[i];
        y = b[i];
        x1 = a[i+1];
        y1 = b[i+1];
        dda((x-250)*cos(angle) - (y-250)*sin(angle)+250,(x-250)*sin(angle) +
(y-250)*cos(angle)+250,(x1-250)*cos(angle) - (y1-250)*sin(angle)+250,(x1-
250)*sin(angle) + (y1-250)*cos(angle)+250);
    }
    dda((a[0]-250)*cos(angle) - (b[0]-250)*sin(angle)+250,(a[0]-
250)*sin(angle) + (b[0]-250)*cos(angle) + 250,(x1-250)*cos(angle) - (y1-
250)*sin(angle)+250,(x1-250)*sin(angle) + (y1-250)*cos(angle)+250);
}
```