#include <stdio.h>

#include <iostream>

#include <opencv2/highgui/highgui.hpp>

#include <opencv2/imgproc/imgproc.hpp>

#include <opencv2/core/core.hpp>

using namespace cv;

using namespace std;

int s=0, k=0;

Mat rotation(Mat img, int s){

int a = img.rows/2, b = img.cols/2 ,x1,y1;

Mat img1(sqrt(img.rows\*img.rows +img.cols\*img.cols), sqrt(img.rows\*img.rows +img.cols\*img.cols), CV\_8UC3, Scalar(255,255,255));

for(int x=0; x<img.rows; x++){

for(int y=0; y<img.cols; y++){

x1 = (x-a)\*cos(s) + (y-b)\*sin(s) + img1.rows/2;

y1 = (x-a)\*sin(s) + (y-b)\*cos(s) + img1.cols/2;

img1.at<Vec3b>(x1,y1)[0] = img.at<Vec3b>(x,y)[0];

img1.at<Vec3b>(x1,y1)[1] = img.at<Vec3b>(x,y)[1];

img1.at<Vec3b>(x1,y1)[2] = img.at<Vec3b>(x,y)[2];

}

}

return img1;

}

int main(){

Mat img = imread("lena.jpg");

namedWindow("lena",WINDOW\_NORMAL);

createTrackbar("t","lena",&k, 360);

while(1){

s = k\*(3.14/180);

imshow("lena",rotation(img,s));

waitKey(5);

}

}