#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 i, j, k, l, a, b, c, a1, a2, a3, a4, b1, b2, b3, b4, c1, c2, c3, c4;

int main(){

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

Mat img1(img.rows\*3, img.cols\*3, CV\_8UC3, 255);

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

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

a = img.at<Vec3b>(i, j)[2];

b = img.at<Vec3b>(i, j)[1];

c = img.at<Vec3b>(i, j)[0];

for(l=0+(3\*i); l<3+(3\*i); l++){

for(k= 0+(3\*j); k<3 +(3\*j); k++){

img1.at<Vec3b>(l, k)[2] = a;

img1.at<Vec3b>(l, k)[1] = b;

img1.at<Vec3b>(l, k)[0] = c;

}

}

}

}

imshow("lena", img1);

Mat img2(img1.rows/2, img1.cols/2, CV\_8UC3, 255);

for(i=0; i<img2.rows; i++){

for(j=0; j<img2.cols; j++){

a1 = img1.at<Vec3b>(2\*i, 2\*j)[0];

b1 = img1.at<Vec3b>(2\*i, 2\*j)[1];

c1 = img1.at<Vec3b>(2\*i, 2\*j)[2];

a2 = img1.at<Vec3b>(2\*i + 1, 2\*j + 1)[0];

b2 = img1.at<Vec3b>(2\*i + 1, 2\*j + 1)[1];

c2 = img1.at<Vec3b>(2\*i + 1, 2\*j + 1)[2];

a3 = img1.at<Vec3b>(2\*i + 1, 2\*j)[0];

b3 = img1.at<Vec3b>(2\*i + 1, 2\*j)[1];

c3 = img1.at<Vec3b>(2\*i + 1, 2\*j)[2];

a4 = img1.at<Vec3b>(2\*i, 2\*j + 1)[0];

b4 = img1.at<Vec3b>(2\*i, 2\*j + 1)[1];

c4 = img1.at<Vec3b>(2\*i, 2\*j + 1)[2];

a = (a1 + a2+ a3 +a4) / 4;

b = (b1 + b2+ b3 +b4) / 4;

c = (c1 + c2+ c3 +c4) / 4;

img2.at<Vec3b>(i, j)[0] = a;

img2.at<Vec3b>(i, j)[1] = b;

img2.at<Vec3b>(i, j)[2] = c;

}

}

imshow("lena2", img2);

waitKey(0);

}