double anal(Mat im, int r, int c)

{double dx=0, dy=0, sum;

for (int i = r - 1; i <= r + 1; i++)

dx += double(im.at<uchar>(i, c + 1) - im.at<uchar>(i, c - 1));

for (int j = c - 1; j <= c + 1; j++)

dy +=double(im.at<uchar>(r+1,j) - im.at<uchar>(r-1,j));

sum = sqrt((dx \*dx) + (dy \* dy));

return sum;

}

double dil(Mat im1, int r1, int c1)

{

int w = 0, b = 0; double n;

for (int i = r1 - 1; i <= r1 + 1;i++)

for (int j = c1 - 1; j <= c1 + 1; j++)

{

if (im1.at<uchar>(i, j) == 255)

w++;

else

b++;

}

if (w != 0 && b != 0)

{

if (w > b)

n = 255;

else n = 0;

}

else n= (double)im1.at<uchar>(r1, c1);

return n;

}

double eros(Mat im2, int r2, int c2)

{

int w = 0, b = 0; double n;

for (int i = r2 - 1; i <= r2 + 1; i++)

{

for (int j = c2 - 1; j <= c2 + 1; j++)

{

if (im2.at<uchar>(i, j) == 255)

w++;

else

b++;

}

}

if (w != 0 && b != 0)

{

if (w > b)

n = 0;

else n = 255;

}

else n= (double)im2.at<uchar>(r2, c2);

return n;

}

Mat makebinary(Mat pic, int q)

{

for (int i = 0; i < pic.rows; i++)

{

for (int j = 0; j < pic.cols; j++)

{

if (pic.at<uchar>(i, j) >= q)

pic.at<uchar>(i, j) = 255;

else

pic.at<uchar>(i, j) = 0;

}

}

return pic;

}

int main()

{

int p = 1;

Mat image = imread("C:\\Users\\Sony\\Desktop\\IP\\a.jpg", 0); Mat img2(image.rows, image.cols, CV\_8UC1);

for (int i = 1; i < img2.rows - 1; i++)

for (int j = 1; j < img2.cols - 1; j++)

img2.at<uchar>(i, j) = anal(image, i, j);

namedWindow("My Output0", WINDOW\_AUTOSIZE);

imshow("My Output0", img2);

img2 = makebinary(img2, 70);

for (int i = 1; i < img2.rows - 1; i++)

for (int j = 1; j < img2.cols - 1; j++)

{

img2.at<uchar>(i,j ) = dil(img2, i, j);

}

namedWindow("My Output1", WINDOW\_AUTOSIZE);

imshow("My Output1", img2);

for (int i = 1; i < img2.rows - 1; i++)

for (int j = 1; j < img2.cols - 1; j++)

{

img2.at<uchar>(i, j) =eros(img2, i, j);

}

namedWindow("My Output", WINDOW\_AUTOSIZE);

imshow("My Output", img2);

waitKey(0);

return(0);

}