**CSC 381Image Processing (Java)**

**Project: AVG 3X3 Filter**

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**Due date: soft copy: 8/29/2016 // See softcopy requirement in II.**

**Hardcopy :8/30/2016**

Algorithm steps:

step 0: - open the input file and output file

- read the image header, the four numbers

- dynamically allocate mirrorFramedAry

- dynamically alloicate tempAry

step 1: read the input file and load onto mirrowframeAry begin at [1,1]

step 2: mirrowFramed (mirrorFramedAry)

step 3: process the MirrorframedAry, from left to right and top to bottom

using i, and j, begin at (1, 1)

- neighborAry <- load MirrorframedAry[i,j]'s 3 X 3 neighborhoods

- tempAry[i,j] <-- compute the averaging of neighborAry

- keep tracking the newMin and newMax of tempAry

step 4: repeat step 3 until all pixels are processed

step 5: output the image header (numRows, numCols, newMin, newMax) to AVG3X3Out.txt.

step 6: output to AVG3X3Out.txt from tempAry, begin at [1,1], without the pixels on the boarder.

step 7: close input file and AVG3X3Out.txt

**B) Source Code**

import java.io.BufferedWriter;

import java.io.File;

import java.io.FileNotFoundException;

import java.io.FileWriter;

import java.io.IOException;

import java.util.Arrays;

import java.util.Scanner;

public class Average {

static int numRows;

static int numCols;

static int minVal;

static int maxVal;

static int newMin;

static int newMax;

static int[][] mirrorFramedAry;

static int []neighborAry = new int [9];

static int[][] tempAry;

public static void main(String[] argv){

loadImage(argv[0]);

File output = new File(argv[1]);

loadNeighbors();

try {

BufferedWriter out = new BufferedWriter(new FileWriter(output));

out.write(numRows+" "+numCols+" "+newMin+" "+newMax);

out.newLine();

for(int row = 1; row<=numRows; row++){ //print out from [1][1] w/o border

for(int col = 1; col<=numCols; col++){

int value = tempAry[row][col];

out.write(value+" ");

}

out.newLine();

}

out.close();

} catch (IOException e) {

// TODO Auto-generated catch block

e.printStackTrace();

}

}

private static void loadImage(String argv) {

File input = new File(argv);

Scanner sc;

try {

sc = new Scanner(input);

//assign params

numRows=sc.nextInt();

numCols=sc.nextInt();

minVal=sc.nextInt();

maxVal=sc.nextInt();

mirrorFramed(sc);

}catch (FileNotFoundException e) {

e.printStackTrace();

} catch (IOException e) {

e.printStackTrace();

}

}

private static void mirrorFramed(Scanner sc){

mirrorFramedAry = new int [numRows+2][numCols+2];

for(int row = 1; row<=numRows; row++){

for(int col = 1; col<=numCols; col++){

int value =sc.nextInt();

mirrorFramedAry[row][col] = value;

if(row == 1) mirrorFramedAry[0][col] = value; //mirrors top row

if(row == numRows) mirrorFramedAry[row+1][col] = value; //mirrors bottom row

}

}

for(int side=0; side<=numRows+1; side++){ //mirroring sides

mirrorFramedAry[side][0] = mirrorFramedAry[side][1]; //left side

mirrorFramedAry[side][numCols+1] = mirrorFramedAry[side][numCols]; //right side

}

sc.close();

}

private static void loadNeighbors() { //load 3x3 neighbors

tempAry = new int [numRows+2][numCols+2];

int count =1;

for(int row = 1; row<=numRows; row++){

for(int col = 1; col<=numCols; col++){

neighborAry[0]=mirrorFramedAry[row-1][col-1];

neighborAry[1]=mirrorFramedAry[row-1][col];

neighborAry[2]=mirrorFramedAry[row-1][col+1];

neighborAry[3]=mirrorFramedAry[row][col-1];

neighborAry[4]=mirrorFramedAry[row][col];

neighborAry[5]=mirrorFramedAry[row][col+1];

neighborAry[6]=mirrorFramedAry[row+1][col-1];

neighborAry[7]=mirrorFramedAry[row+1][col];

neighborAry[8]=mirrorFramedAry[row+1][col+1];

AVG3X3(row,col, count);

count++;

}

}

}

private static void AVG3X3(int row, int col, int count) {

int sum = 0;

for(int index =0; index<=8; index++){

sum= sum +neighborAry[index];

}

int average = sum / 9;

if(count==1){ //first iteration

newMin = average;

newMax = average;

} else{ //compare and change min and max

if(newMin>average)newMin = average;

if(newMax<average)newMax=average;

}

tempAry[row][col] = average;

}

}

**AVG3X3Out1\_7.txt (Threshold output of avg ouput)**

31 40 0 1

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

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**AVG3X3Out1\_7\_PP.txt (Pretty Print output of Threshold output of avg ouput)**

31 40 0 1

1 1 1 1 1 1 1

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1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

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**AVG3X3Out2\_8.txt (Threshold output of avg ouput)**

31 40 0 1

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

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**AVG3X3Out2\_8\_PP.txt (Pretty Print output of Threshold output of avg ouput)**

31 40 0 1

1 1 1

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