CV Programming Language: CPP

Mock Final 2 Mock Final 2

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(1) Open the three files: the binary image, SumRows and SumCols using argv or args

(2) Pretty Print the binary image and **output** the pretty print to a txt file (**called it imgPrettyPrint**)

(3) Use an array, sumRowsAry to store SumRows, and another array, sumColsAry, to store SumCols

(4) **Output** sumRowsAry (without indexes) to a text file (**called it imgHP**P) with the image header.

(5) **Output** sumColsAry (without indexes) to a text file (**called it imgVPP**), as that of imgHPP.

(6) Turn sumRowsAry to a binary 1-D array, using threshould value = 4 (i.e., a value >= 4 turns to 1 and less turns to 0), thenOutput the binary array to a text file **(called it imgHPPbin.)**

(7) Turn sumColsAry to a binary 1D array, using threshould value = 4 (i.e., a value >= 4 turns to 1 and less turns to 0), then Output the binary array to a text file **(called it imgVPPbin.)**

Data Structures

```
Class Image
      numRow -int
      numCol -int
      minVal -int
      maxVal -int
      imageAry -int**

      loadImage(imageFile)-
            0- numRows, numCol <- from imageFile
            1- allocate imageAry numRow by numCol
            2- i <- 0
            3- j <- 0
            4- input <- read from imageFile
            5- imageAry[i][j] <- input
            6- j++
            7- repeat 4-7 while j < numCols
            8- i++
            9- repeat 3-9 while I < numRows
      prettyPrint(imgPrettyPrint)-
            0- imgPrettyPrint <- given
            1- read imageAry from L to R, T to B
            2- value <- from imageAry read
            3- if(value > 0) print value ELSE print space
            4- repeat 1 -4 until done with imgAry read

Class RCAry
      numRow -int
      numCol -int
      minVal -int
      maxVal -int
      thresholdVal -int (4)
      sumRowsAry -int*
      sumColsAry -int*


      loadRowAry(rowFile)
            0- rowFile <- given
               numRow, numCol, minVal, maxVal <- read from rowFile header
            1- index <- read from rowFile
            2- sum <- read from rowFile
            3- sumRowAry[index] <- sum
            4- repeat 1-4 until rowFile.eof()

      printRowAry(imgHPP, imgHPPbin)
            0- imgHPP, imgHPPbin <- given
            1- output image header to imgHPP
            2- i <- 0
            3- sumRowsAry[i] -> imgHPP
            4- i++
            5- repeat 3-5 while i < numRows
            6- i <- 0
            7- if (sumRowsAry[i] >= threshold)
               print 1 else print 0 to imgHPPbin
            8- i++
            9- repeat7-9 while i < numRows
```

```
loadColAry(colFile)
      0- colFile <- given
         numRow, numCol, minVal, maxVal <- read from colFile header
      1- index <- read from colFile
      2- sum <- read from colFile
      3- sumColsAry[index] <- sum
      4- repeat 1-4 until colFile.eof()

printRowAry(imgVPP, imgVPPbin)
      0- imgVPP, imgVPPbin <- given
      1- output image header to imgVPP
      2- i <- 0
      3- sumColsAry[i] -> imgVPP
      4- i++
      5- repeat 3-5 while i < numCols
      6- i <- 0
      7- if (sumColsAry[i] >= threshold)
         print 1 else print 0 to imgVPPbin
      8- i++
      9- repeat7-9 while i < numCols
```

SOURCE CODE

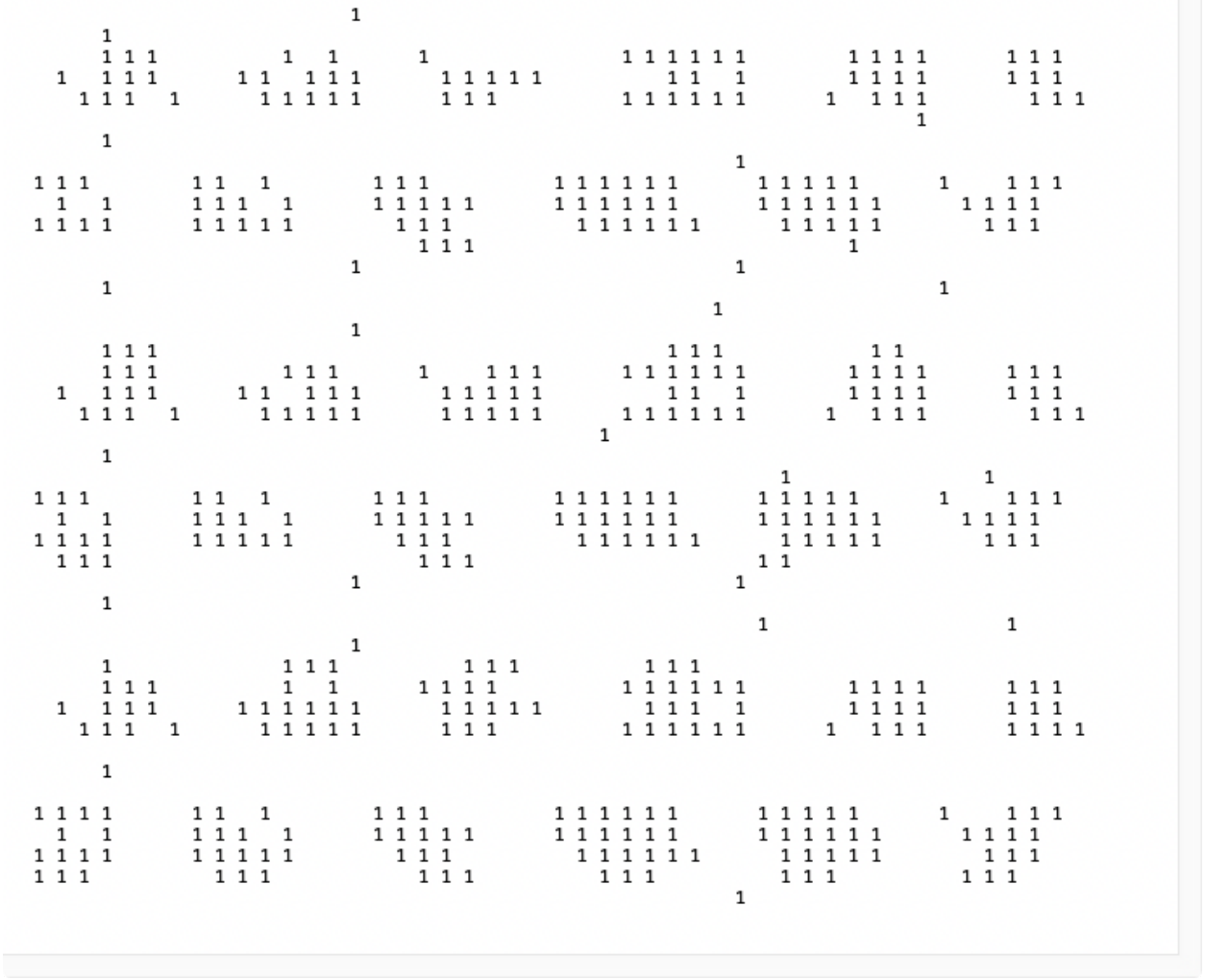
```
#include <iostream>
#include <string>
#include <fstream>
using namespace std;

class Image{
    public:
    int numRows;
    int numCols;
    int minVal;
    int maxVal;

    int** imageAry;

    void loadImageAry(ifstream& inFile){
        imageAry = new int*[numRows];
        for(int i = 0; i < numRows; i++){
            imageAry[i] = new int[numCols];
        }

        int input;

        for(int i = 0; i < numRows; i++){
            for(int j= 0; j < numCols; j++){
                inFile >> input;
                imageAry[i][j] = input;
                }
        }
    }

    void prettyPrint(ofstream& outFile){
        for(int i = 0; i < numRows; i++){
            for(int j= 0; j < numCols; j++){
                if(imageAry[i][j] > 0){
                    outFile << imageAry[i][j] << " ";
                } else {
                    outFile << "  "; // two spaces
                }
            }
            outFile << endl;
        }
    }
};
```

```
class RCAry{
    public:
    int numRows;
    int numCols;
    int minVal;
    int maxVal;
    int thresholdVal;

    int* sumRowsAry;
    int* sumColAry;

    void loadRowAry(ifstream& rowFile){
        sumRowsAry = new int[numRows];

        // image header has been read by now so now
        // pairs (index, sum)
        int index, sum;
        while(!rowFile.eof()){
            rowFile >> index;
            rowFile >> sum;
            sumRowsAry[index] = sum;
        }
    }


    void loadColAry(ifstream& colFile){
        sumColAry = new int[numCols];


        // pairs (index, sum)
        int index, sum;
        while(!colFile.eof()){
            colFile >> index;
            colFile >> sum;
            sumColAry[index] = sum;
        }
    }

    void printRowAry(ofstream& imgHPP, ofstream& imgHPPbin){
        // Header first
        imgHPP << numRows << " " << numCols << " " << minVal << " " << maxVal << endl;
        for(int i = 0; i < numRows; i++){
            imgHPP << sumRowsAry[i] << endl;
        }

        // 1-D array with threshold 4
        for(int i = 0; i < numRows; i++){
            if(sumRowsAry[i] >= thresholdVal){
                imgHPPbin <<  "1 "; // per-line not specified
            } else {
                imgHPPbin << "0 ";
            }
        }
    }

    void printColAry(ofstream& imgVPP, ofstream& imgVPPbin){
        // Header
        imgVPP << numRows << " " << numCols << " " << minVal << " " << maxVal << endl;

        for(int i = 0; i < numCols; i++){
            imgVPP << sumColAry[i] << endl;
        }

        for(int i = 0; i < numCols; i++){
            if(sumColAry[i] >= thresholdVal){
                imgVPPbin << "1 ";
            } else {
                imgVPPbin << "0 ";
            }
        }
    }
```

```
};

int main(int argc, char* argv[]){
    ifstream imageFile(argv[1]);
    ifstream rowFile(argv[2]);
    ifstream colFile(argv[3]);

    ofstream imgPrettyPrint(argv[4]);
    ofstream imgHPP(argv[5]);
    ofstream imgVPP(argv[6]);
    ofstream imgHPPbin(argv[7]);
    ofstream imgVPPbin(argv[8]);

    Image image;
    // Need to read first
    imageFile >> image.numRows;
    imageFile >> image.numCols;
    imageFile >> image.minVal;
    imageFile >> image.maxVal;

    image.loadImageAry(imageFile);
    image.prettyPrint(imgPrettyPrint);

    RCAry Arys;
    Arys.thresholdVal = 4;

    //Row stuff
    rowFile >> Arys.numRows;
    rowFile >> Arys.numCols;
    rowFile >> Arys.minVal;
    rowFile >> Arys.maxVal;

    Arys.loadRowAry(rowFile);
    Arys.printRowAry(imgHPP, imgHPPbin);


    //Col stuff
    colFile >> Arys.numRows; // Still need to read these
    colFile >> Arys.numCols;
    colFile >> Arys.minVal;
    colFile >> Arys.maxVal;

    Arys.loadColAry(colFile);

    Arys.printColAry(imgVPP, imgVPPbin);


    // Closing files
    imageFile.close();
    rowFile.close();
    colFile.close();

    imgPrettyPrint.close();
    imgHPP.close();
    imgVPP.close();
    imgHPPbin.close();
    imgVPPbin.close();

}
```

OUTPUTS

imgPrettyPrint.txt



imgHPP.txt

```
45 50 0 1
0
1
1
19
24
25
1
1
1
24
27
26
4
2
2
1
1
8
23
24
27
1
1
2
24
27
26
8
2
1
2
1
10
22
26
26
0
1
0
25
27
26
18
1
0
```

imgHPPbin.txt

```
0 0 0 1 1 1 0 0 0 1 1 1 1 0 0 0 0 1 1 1 1 0 0 0 1 1 1 1 0 0 0 0 1 1 1 1 0 0 0 1 1 1 1 0 0
```

imgVPP.txt

```
45 50 0 1
0
7
14
11
25
10
7
3
9
10
10
13
14
8
10
11
6
9
15
16
14
9
6
5
6
9
11
16
18
20
14
8
13
8
12
10
13
16
16
10
10
4
4
8
18
18
12
3
0
0
```

imgVPPbin.txt

```
0 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 0 0
```