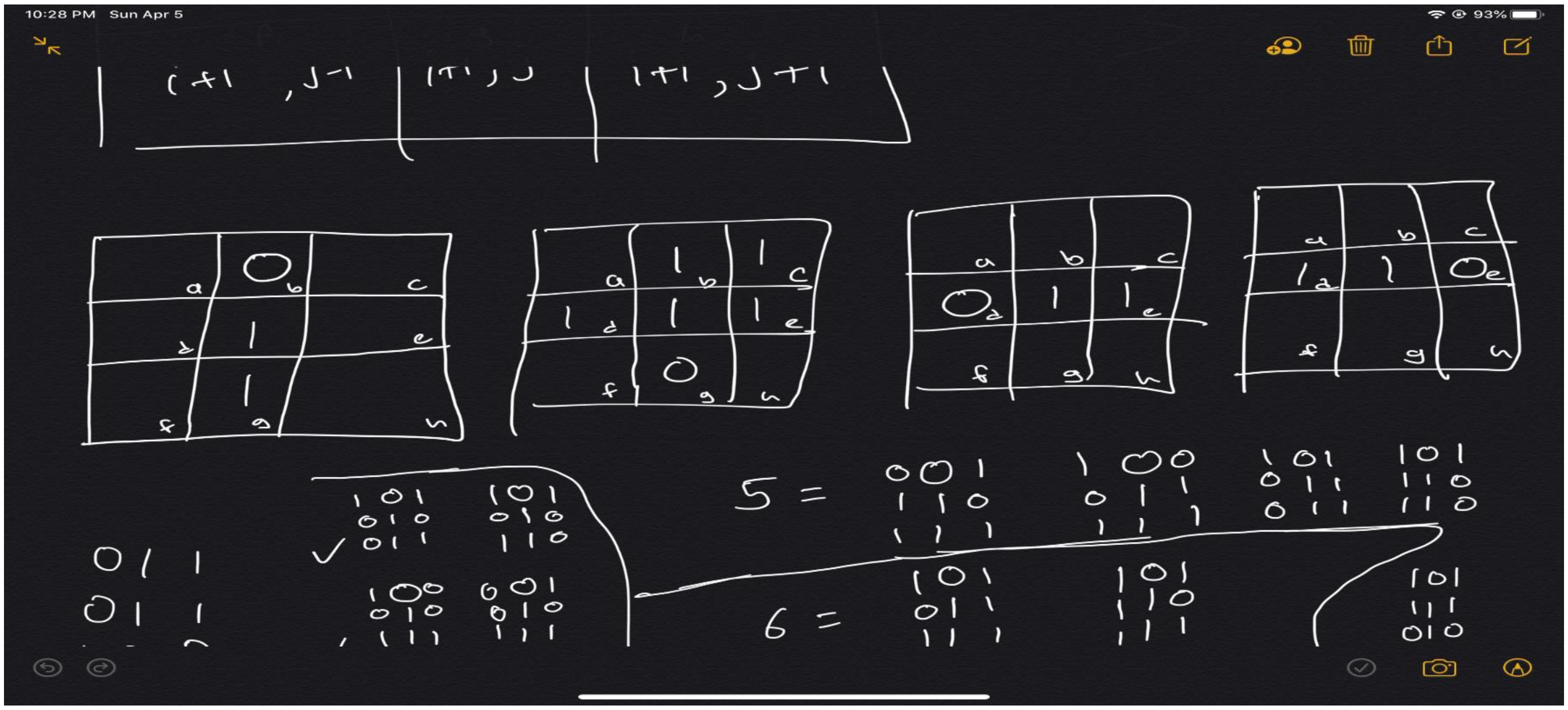
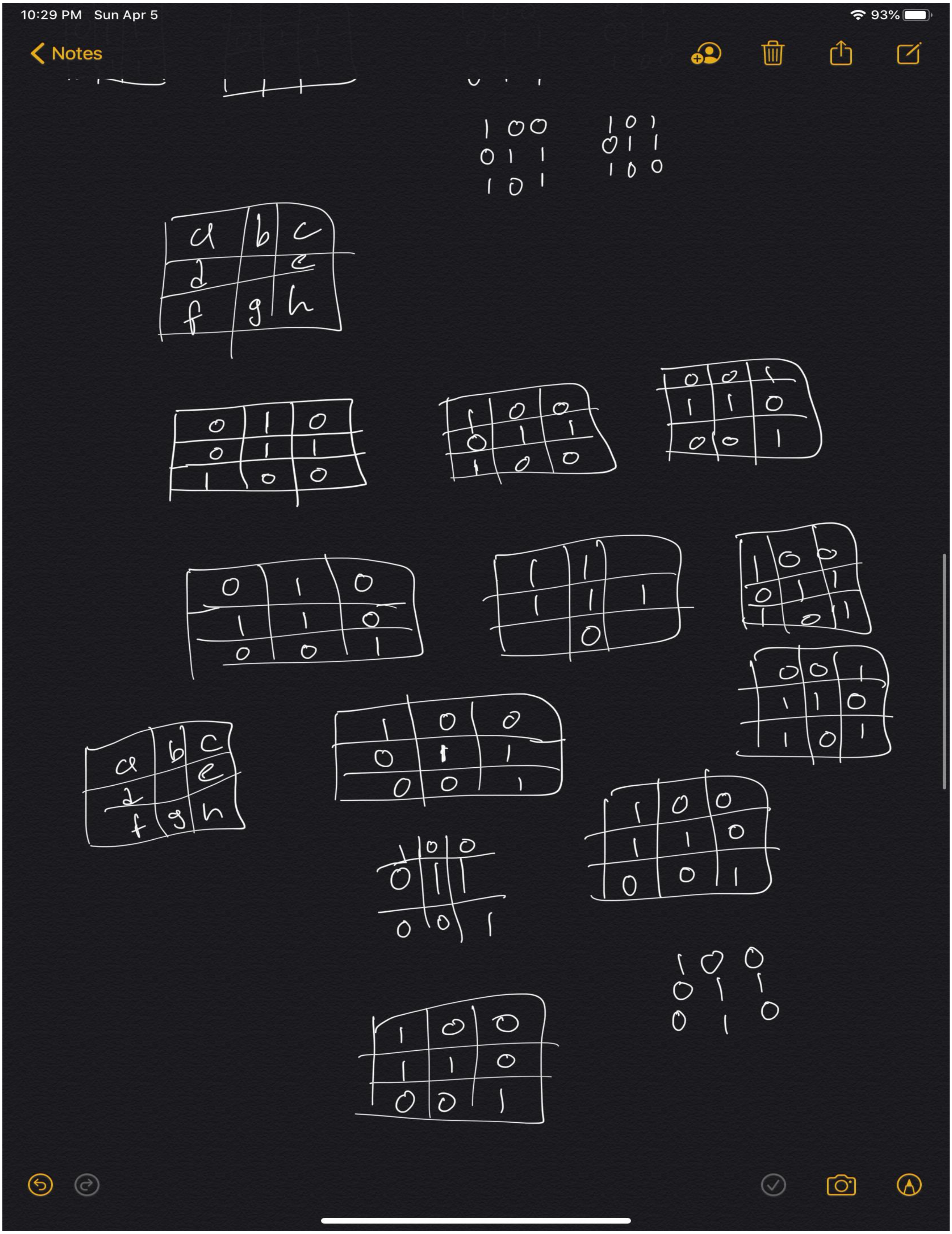
```
******************************************************************************************
CSCI 381-26                        Project 8: Thinning                        Language: C++

Name: Akshar Patel

Due date: Soft copy: 4/5/2020
          Hard copy: 4/5/2020

Submission date: Soft copy: 4/5/2020
                 Hard copy: 4/5/2020

******************************************************************************************
```

Part 1: Algorithm

```
*******************************
I. main (…)
*******************************
step 0:    inFile ← open from argv
          outFile1,  outFile2← open from argv

step 1:    numRows, numCols, minVal, maxVal ← read from inFile
           outFile1 ← output  numRows, numCols, minVal, maxVal to outFile1
           dynamically allocate firstAry of size numRows + 2 by numCols + 2.
           dynamically allocate secondAry of size numRows + 2 by numCols + 2.
step 2:  zeroFrame(firstAry) zeroFrame(secondAry)
step 3: loadImage (inFile, firstAry)
step 4: prettyPrint (firstAry, outFile2) // This print is before thinning
step 5: changeFlag ← 0
step 6: doThinning (firstAry, secondAry, changeFlag)
Step 7: prettyPrint (firstAry, outFile2)
Step 8: repeat step 5 to step 7 while changeFlag > 0
step 9: outFile1 ← output firstAry from [1][1] *without* extra rows and cols
step 10: close all files
```





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Notes

1 0 0
0 1 1
1 0 1

1 0 1
0 1 1
1 0 0

a	b	c
d		e
f	g	h

0	1	0
0	1	1
1	0	0

1	0	0
0	1	1
1	0	0

0	0	1
1	1	0
0	0	1

0	1	0
1	1	0
0	0	1

1	1	
1	1	1
	0	

1	0	0
0	1	1
1	0	1

0	0	1
1	1	0
1	0	1

a	b	c
d		e
f	g	h

1	0	0
0	1	1
0	0	1

1	0	0
1	1	0
0	0	1

1	0	0
0	1	1
0	0	1

1 0 0
0 1 1
0 1 0

1	0	0
1	1	0
0	0	1

Part 2: Source code

```
#include <iostream>
#include<fstream>

using namespace std;

class ThinningSkeleton{
public:
	int numRows, numCols, minVal, maxVal, changeFlag , cycleCount;
	int** firstAry;
	int** secondAry;
	void zeroFrame(int** Ary){
		for(int i = 0 ; i < numRows + 2 ; i++){
			for(int j = 0 ; j < numCols + 2 ; j++){
				Ary[i][j] = 0;
			}
		}
	}

	void prettyPrint(int** Ary, ofstream& file){
		for(int i = 0 ; i < numRows + 2 ; i++){
			for(int j = 0 ; j < numCols + 2 ; j++){
				if(Ary[i][j] > 0){
					file<<Ary[i][j]<<" ";
				}
				else{
					file<<"  ";
				}
			}
			file<<endl;
		}
	}

	void loadImage(ifstream& file, int** Ary){
		for(int i = 1 ; i < numRows + 1 ; i++){
			for(int j = 1 ; j < numCols + 1 ; j++){
				file>>Ary[i][j];
			}
		}
	}

	void doThinning(int** firstAry,int** secondAry,int &changeFlag){
		northThinning(firstAry, secondAry, changeFlag);
		copyArys(firstAry, secondAry);
		southThinning(firstAry, secondAry, changeFlag);
		copyArys(firstAry, secondAry);
		westThinning(firstAry, secondAry, changeFlag);
		copyArys(firstAry, secondAry);
		EastThinning(firstAry, secondAry, changeFlag);
		copyArys(firstAry, secondAry);
	}

	void northThinning(int** firstAry, int** secondAry, int &changeFlag){
		for(int i = 1 ; i < numRows + 1 ; i++){
			for(int j = 1 ; j < numCols + 1 ; j++){
				secondAry[i][j] = firstAry[i][j];
				if(firstAry[i][j]  > 0 && firstAry[i-1][j] <= 0){
					if(check3n4Conditions(firstAry, i, j, "north") == true){
						secondAry[i][j]  = 0;
						changeFlag++;
					}
				}
			}
		}
	}

	void southThinning(int** firstAry, int** secondAry, int &changeFlag){
		for(int i = 1 ; i < numRows + 1 ; i++){
			for(int j = 1 ; j < numCols + 1 ; j++){
```

```
                    secondAry[i][j] = firstAry[i][j];
                    if(firstAry[i][j]  > 0 && firstAry[i+1][j] <= 0){
                          if(check3n4Conditions(firstAry, i, j, "south") == true){
                                secondAry[i][j]  = 0;
                                changeFlag++;
                          }
                    }
              }
        }
  }

  void westThinning(int** firstAry, int** secondAry, int &changeFlag){
        for(int i = 1 ; i < numRows + 1 ; i++){
              for(int j = 1 ; j < numCols + 1 ; j++){
                    secondAry[i][j] = firstAry[i][j];
                    if(firstAry[i][j]  > 0 && firstAry[i][j-1] <= 0){
                          if(check3n4Conditions(firstAry, i, j, "west") == true){
                                secondAry[i][j]  = 0;
                                changeFlag++;
                          }
                    }
              }
        }
  }

  void EastThinning(int** firstAry,int** secondAry,int &changeFlag){
        for(int i = 1 ; i < numRows + 1 ; i++){
              for(int j = 1 ; j < numCols + 1 ; j++){
                    secondAry[i][j] = firstAry[i][j];
                    if(firstAry[i][j]  > 0 && firstAry[i][j+1] <= 0){
                          if(check3n4Conditions(firstAry, i, j, "east") == true){
                                secondAry[i][j]  = 0;
                                changeFlag++;
                          }
                    }
              }
        }
  }

  void copyArys(int** firstAry,int** secondAry){
        for(int i = 1 ; i < numRows + 1 ; i++){
              for(int j = 1 ; j < numCols + 1 ; j++){
                    firstAry[i][j] = secondAry[i][j];
              }
        }
  }

  bool check3n4Conditions(int** firstAry, int i, int j, string whichside){
        int a = firstAry[i-1][j-1], b = firstAry[i-1][j], c = firstAry[i-1][j+1], d = firstAry[i][j-1];
        int e = firstAry[i][j+1], f = firstAry[i+1][j-1], g = firstAry[i+1][j],  h = firstAry[i+1][j+1];
        if(whichside == "north" && g == 1 && (a + c + d + e + f + g + h) >= 4){
              if((a + c + d + e + f + g + h) == 4 && ((d == 0 && f == 0 && c == 0 ) || (a == 0 && e == 0
                && h==0)) ){
                    return false;
              }
              else
              {
                    return true;
              }
        }
        if(whichside == "south" && b == 1 && (a + b + c + d + e + f + h) >= 4){
              if((a + b + c + d + e + f + h) == 4 && ((e == 0 && f == 0 && c == 0 ) || (a == 0 && d == 0
                && h==0)) ){
                    return false;
              }
              else
              {
                    return true;
              }
```

```
            }
            if(whichside == "west" && e == 1 && (a + b + c + e + f + g + h) >= 3){
                  if(a==0 && g==0 && h==0){
                        return false;
                  }
                  if((a + b + c + e + f + g + h) == 4 && (b==0 && c==0 && g==0) ){
                        return false;
                  }
                  if(b==0 && c==0 && g==0 && h==0){
                        return false;
                  }
                  if(b==0 && c==0 && f==0 && h==0){
                        return false;
                  }
                  return true;
            }
            if(whichside == "east" && d == 1 && (a + b + c + d + f + g + h) >= 3){
                  if(b==0 && a==0 && g==0 && f==0){
                        return false;
                  }
                  if((a + b + c + d + f + g + h) == 4 && (b==0 && a==0 && g==0) ){
                        return false;
                  }
                  if(c==0 && a==0 && g==0 && f==0){
                        return false;
                  }
                  if(b==0 && c==0 && f==0 && g==0){
                        return false;
                  }
                  return true;
            }
            return false;
      }
};

int main(int argc, char** argv){
      ThinningSkeleton TS;
      string inputName = argv[1];
      ifstream inFile;
      inFile.open(inputName);
      string outputName1 = argv[2];
      ofstream outFile1;
      outFile1.open(outputName1);
      string outputName2 = argv[3];
      ofstream outFile2;
      outFile2.open(outputName2);

       if(inFile.is_open()){
            if(outFile1.is_open() && outFile2.is_open()){
                  inFile>>TS.numRows>>TS.numCols>>TS.minVal>>TS.maxVal;
                  outFile1<<TS.numRows<<" "<<TS.numCols<<" "<<TS.minVal<<" "<<TS.maxVal<<endl;
                  TS.firstAry = new int* [TS.numRows + 2];
                  TS.secondAry = new int* [TS.numRows + 2];
                  for( int i = 0; i < TS.numRows + 2; i++ ){
                        TS.firstAry[i] = new int[TS.numCols + 2];
                        TS.secondAry[i] = new int[TS.numCols + 2];
                  }
                  TS.zeroFrame(TS.firstAry);
                  TS.zeroFrame(TS.secondAry);
                  TS.loadImage(inFile, TS.firstAry);
                  outFile2<<"----------This print is before thinning----------"<<endl;
                  TS.prettyPrint(TS.firstAry, outFile2);
                  int i = 1;
                  while(TS.changeFlag > 0){
                        TS.changeFlag = 0;
                        TS.doThinning(TS.firstAry, TS.secondAry, TS.changeFlag);
                        outFile2<<"----------This print is after pass: "<<i<<" ----------"<<endl;
                        TS.prettyPrint(TS.firstAry, outFile2);
                        i++;
            }
            for(int i = 1 ; i < TS.numRows + 1 ; i++){
                for(int j = 1 ; j < TS.numCols + 1 ; j++){
                    outFile1<<TS.firstAry[i][j]<<" ";
                }
                outFile1<<endl;

            }
            inFile.close();
            outFile1.close();
            outFile2.close();
        }else{cout<<"Error!! Could NOT create output file"<<endl ;}
    }else{cout<<"Error!! Could NOT open input file"<<endl;}
}
```

Part 3: Output

- **For image1**
- **outFile2**

```
----------This print is before thinning----------

                                        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 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 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 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
    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 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 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 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 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 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 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 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 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 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 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 1 1 1 1 1 1 1 1 1 1 1 1 1 1
```

```
----------This print is after pass: 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 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 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 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 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 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 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 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 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
          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 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
```

```
----------This print is after pass: 2 ----------

                                        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 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                                 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 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 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 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 1 1 1 1 1 1                           1
        1 1 1 1 1 1 1 1 1 1 1
    1 1                       1
  1                             1
```

```
----------This print is after pass: 3 ----------

                                        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 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 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 1 1                           1
              1 1 1 1 1 1 1                             1
        1 1 1               1
    1 1                       1
  1                             1
```

```
----------This print is after pass: 4 ----------

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

```

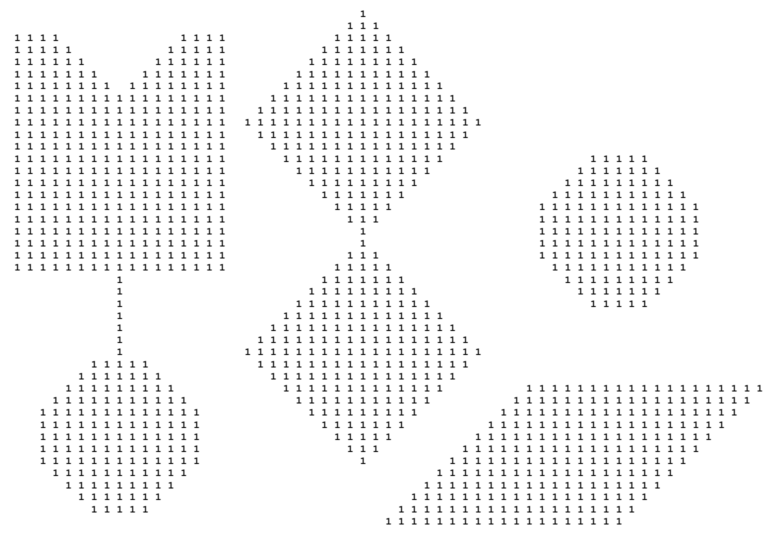
```
----------This print is after pass: 5 ----------

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

```

- **outFile1**

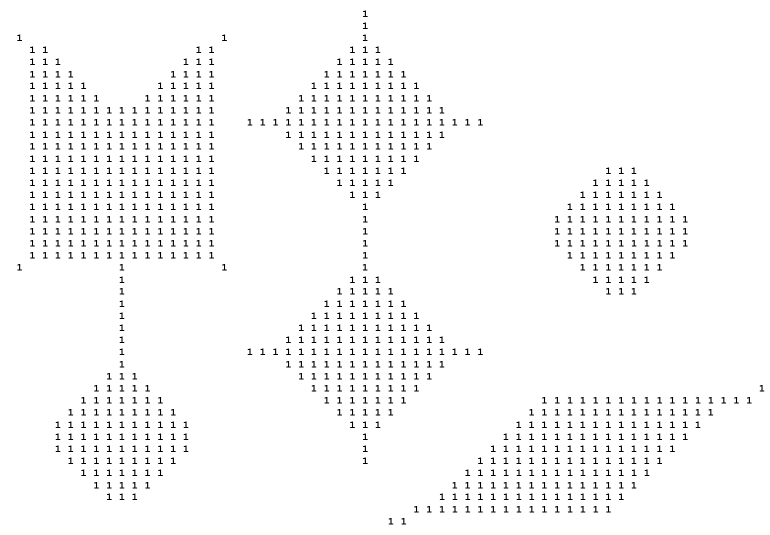
```
30 40 0 1
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 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 1 0 0 0 0 0 0 0 0 0 0 0 0 0 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 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 1 1 1 1 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1
0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 1 1 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 1 1 1 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 1 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 1 1 1 1 0 0 0 0 0 0 0 0 0 0 0
0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 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 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 1 0 0 0 0 0 0 0 0 0 0 0 0 0 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 1 0 0 0 0 0 0 0 0 0 0 0 0 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 1 0 0 0 0 0 0 0 0 0 0 0 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 1 1 1 1 1 1 1 1 1 1 1 1 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 1 0 0 0 0 0 0 0 0 0 0 0 0 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 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 1 1 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 1 1 1 0 0 0 0 0 0 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 1 1 0 0 0 0 0 0 0 0 0 0 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 1 0 0 0 0 0 0 0 0 0 0 0 0 0 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 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

- **For image2**
    - **outFile2**

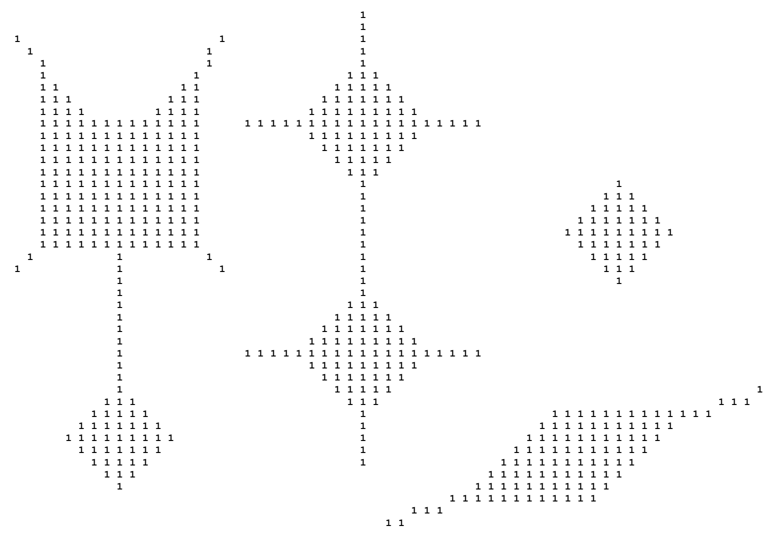
----This print is before thinning----------



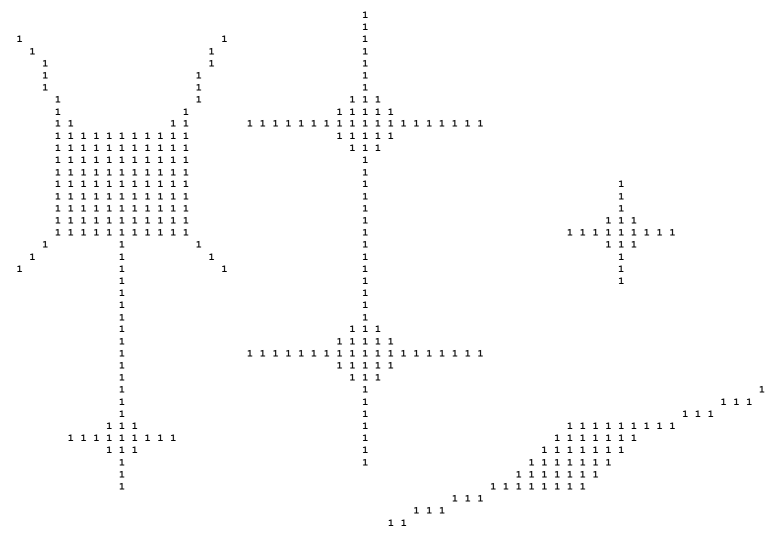
----------This print is after pass: 1 ----------



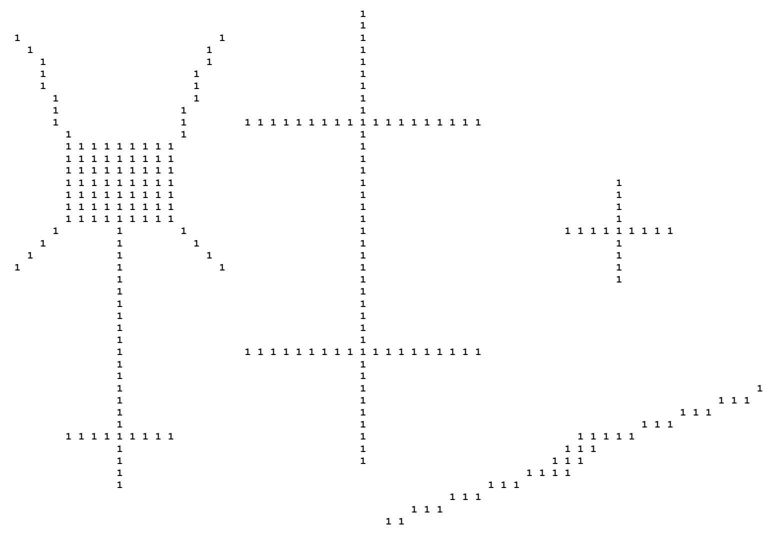
----This print is after pass: 2 ----------



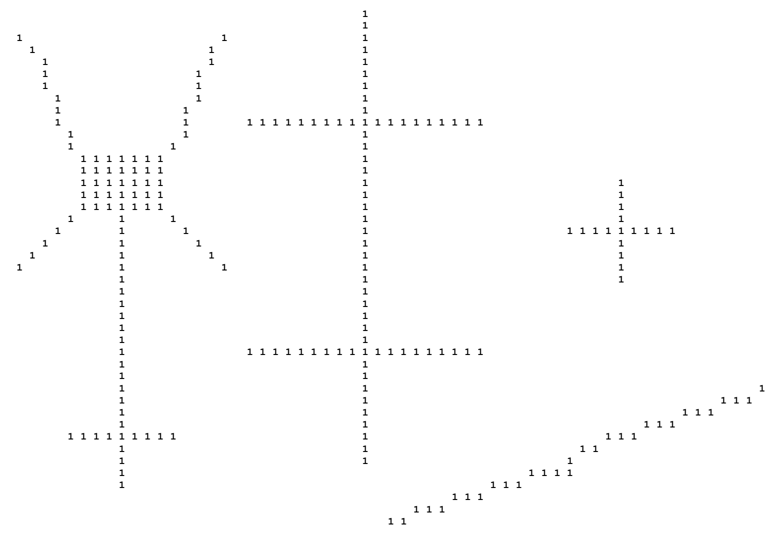
----------This print is after pass: 3 ----------



----This print is after pass: 4 ----------



----------This print is after pass: 5 ----------



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-----This print is after pass: 6 ----------



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      1                               1                     1
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----------This print is after pass: 7 ----------



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-----This print is after pass: 8 ----------



                                                            1
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      1                               1                     1
        1                           1                       1
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          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                 1                           1
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- **outFile1**

```
49 64 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 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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```
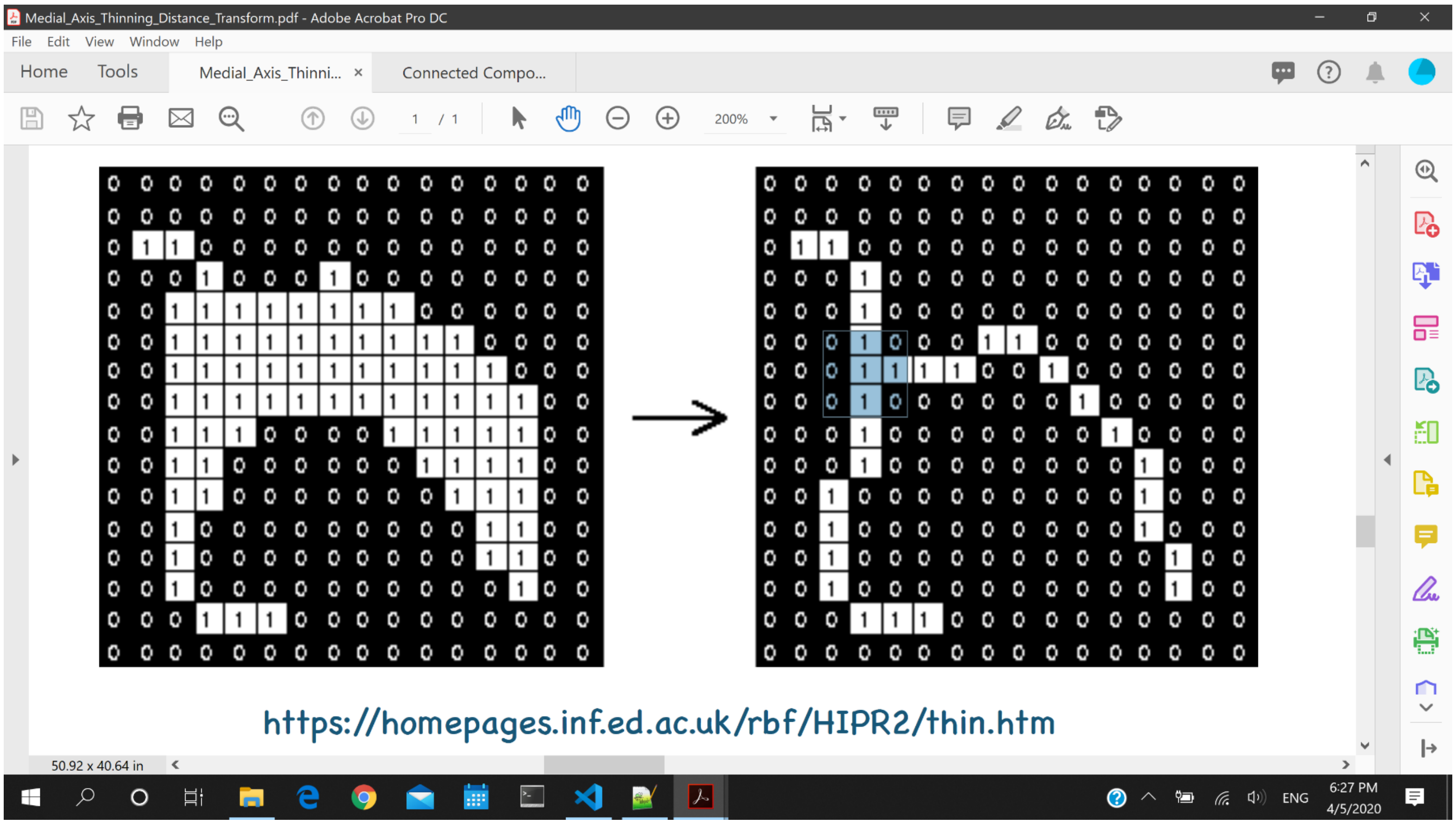

Note:-


Medial_Axis_Thinning_Distance_Transform.pdf - Adobe Acrobat Pro DC
File Edit View Window Help
Home Tools Medial_Axis_Thinni... Connected Compo...
1 / 1
200%
50.92 x 40.64 in
ENG
6:27 PM
4/5/2020

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	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0
0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0
0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0
0	0	1	1	1	1	1	1	1	1	1	1	1	0	0	0
0	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0
0	0	1	1	1	0	0	0	0	1	1	1	1	1	0	0
0	0	1	1	0	0	0	0	0	0	1	1	1	1	0	0
0	0	1	1	0	0	0	0	0	0	0	1	1	1	0	0
0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	0
0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	0
0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0
0	0	0	1	1	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

$\longrightarrow$

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	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0
0	0	0	1	1	1	1	0	0	1	0	0	0	0	0	0
0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0
0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0
0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0
0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0
0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0
0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0
0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0
0	0	0	1	1	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

https://homepages.inf.ed.ac.uk/rbf/HIPR2/thin.htm

Since we check for all 8-neighbor's, if we do west-thinning algorithm shouldn't be middle pixel be 0 in above (selected part on second image.) since, it satisfied all conditions (sum of neighbors is 3 and still stays in one object), if not could you please explain I was bit confuse doing check3n4Conditions method.