CV Final Exam Q2 Java

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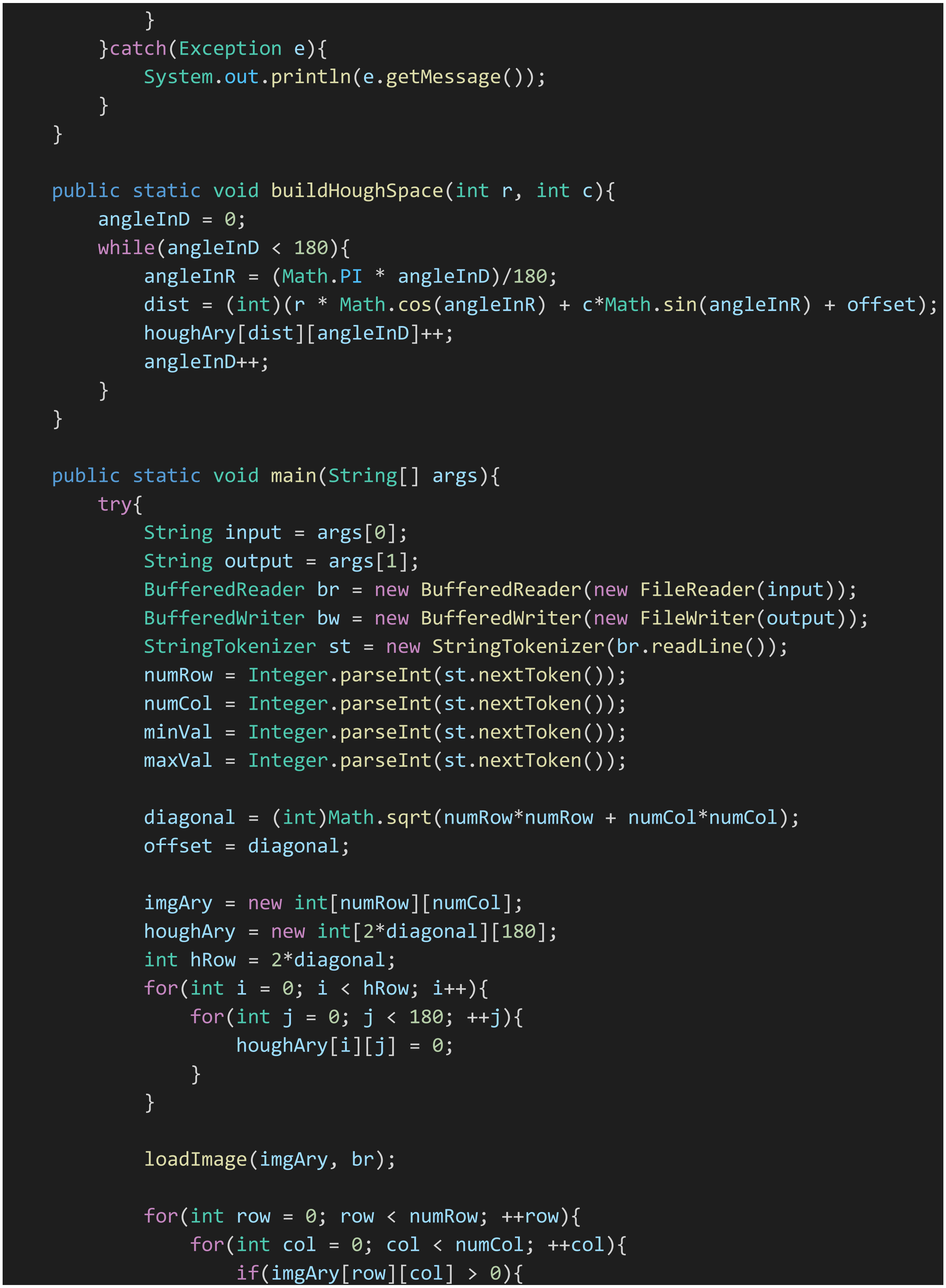
Algorithm steps for Main given an input file and an output file:

```
1. inFile, outFile ← args[]
2. numRows, numCol, minVal, maxVal ←inFile
3. diagonal ←sqrt(numRows*numRows + numCols*numCols)
4. offset ← diagonal
5. imgAry ←dynamically allocated size of numRows by numCols
6. houghAry ← dynamically allocated size of 2*diagonal by 180
7. loadImage()
8. For-Each row and column in imgAry:
9. If imgAry[row][col] > 0:
10. buildHoughSpace(row, col)
11. End-if
12. End-For-Each
13. prettyPrint(houghAry, outFile)
14. close all files
```

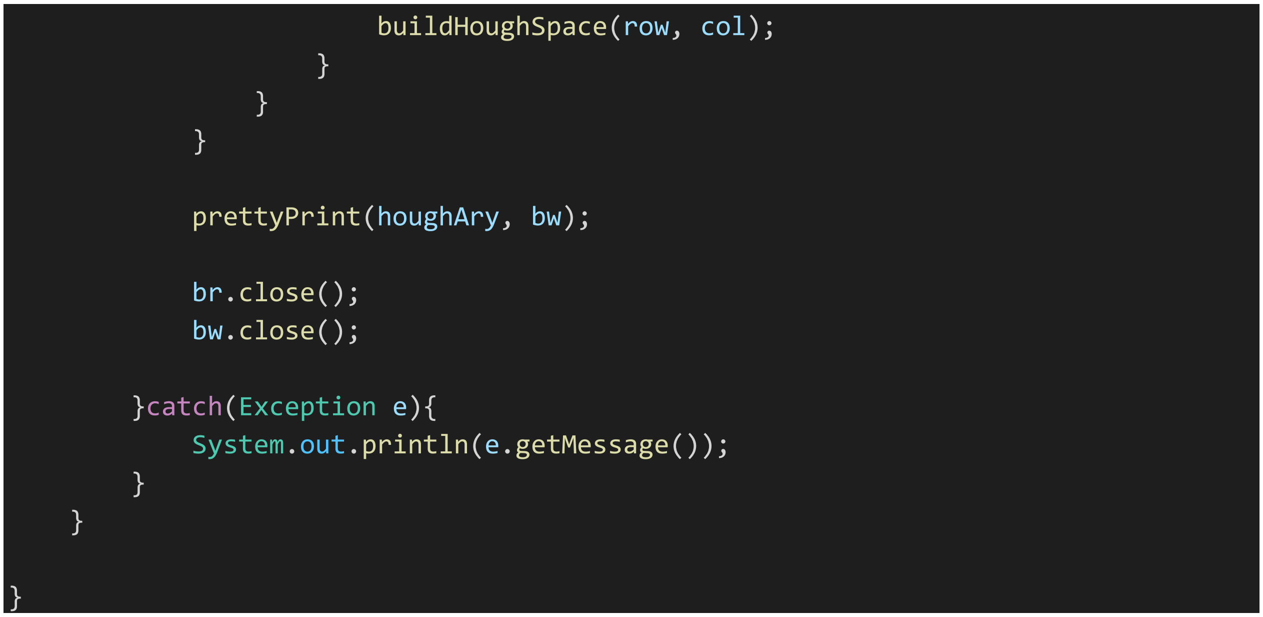
Algorithm steps for buildHoughSpace given a row and col into imgAry:

```
1. angleInD ← 0
2. angleInR ← (angleInD / 180) *PI
3. dist ←( row*cos(angleInR) + col*sin(angleInR))
4. houghAry[dist][angleInD]++
5. angleInD++
6. repeat 2 to 5 while angleInD < 180
```

```java
import java.io.BufferedReader;
import java.io.BufferedWriter;
import java.io.FileReader;
import java.io.FileWriter;
import java.util.StringTokenizer;

public class Q2_Main{
    public static int numRow, numCol, minVal, maxVal;
    public static int[][] imgAry;
    public static int[][] houghAry;
    public static int angleInD;
    public static double angleInR;
    public static int offset;
    public static int diagonal;
    public static int dist;
    public static void prettyPrint(int[][] ary, BufferedWriter outp){
        int houghR = 2*diagonal;
        int houghC = 180;
        try{
            for(int row = 0; row < houghR; row++){
                for(int col = 0; col < houghC; ++col){
                    if(ary[row][col] > 0){
                        outp.write(Integer.toString(ary[row][col]));
                        //banking that no hough space with > 2 digits
                        if(ary[row][col] < 10) outp.write("  ");
                        else outp.write(" ");
                    }
                    else outp.write(".  ");
                }
                outp.write("\n");
            }
        }catch(Exception e){
            System.out.println(e.getMessage());
        }

    }

    public static void loadImage(int[][] ary, BufferedReader input){
        StringTokenizer st;
        try{
            for(int i = 0; i < numRow; ++i){
                st = new StringTokenizer(input.readLine());
                for(int j = 0; j < numRow; ++j){
                    ary[i][j] = Integer.parseInt(st.nextToken());
                }
```



```
            }
        }catch(Exception e){
            System.out.println(e.getMessage());
        }
    }

    public static void buildHoughSpace(int r, int c){
        angleInD = 0;
        while(angleInD < 180){
            angleInR = (Math.PI * angleInD)/180;
            dist = (int)(r * Math.cos(angleInR) + c*Math.sin(angleInR) + offset);
            houghAry[dist][angleInD]++;
            angleInD++;
        }
    }

    public static void main(String[] args){
        try{
            String input = args[0];
            String output = args[1];
            BufferedReader br = new BufferedReader(new FileReader(input));
            BufferedWriter bw = new BufferedWriter(new FileWriter(output));
            StringTokenizer st = new StringTokenizer(br.readLine());
            numRow = Integer.parseInt(st.nextToken());
            numCol = Integer.parseInt(st.nextToken());
            minVal = Integer.parseInt(st.nextToken());
            maxVal = Integer.parseInt(st.nextToken());

            diagonal = (int)Math.sqrt(numRow*numRow + numCol*numCol);
            offset = diagonal;

            imgAry = new int[numRow][numCol];
            houghAry = new int[2*diagonal][180];
            int hRow = 2*diagonal;
            for(int i = 0; i < hRow; i++){
                for(int j = 0; j < 180; ++j){
                    houghAry[i][j] = 0;
                }
            }

            loadImage(imgAry, br);

            for(int row = 0; row < numRow; ++row){
                for(int col = 0; col < numCol; ++col){
                    if(imgAry[row][col] > 0){
```



```
                        buildHoughSpace(row, col);
                    }
                }
            }

            prettyPrint(houghAry, bw);

            br.close();
            bw.close();

        }catch(Exception e){
            System.out.println(e.getMessage());
        }
    }

}
```

OUTPUTS 1, 2, and then 3