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SUBJECT:DATA STRUCTURES/EXPERIMENT 1/FINAL REPORT

PROGRAMMING LANGUAGE:ANSI C

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1.ALGORITHM

1.1 The program want two argumans from user.One of them is for iteration time and the other one is n value for $n*n$ square matrix.

1.2One dimesional array,possibilityArray, was defined for keeping the number of open boxes as double, for each iteration .

1.2.1This program is going to continue for the number of iteration times.

1.2.2The two dimensional array,matrixShape was defined to construct the matrix.This array keeps the elements of matrix.All items in the matrix are going to be zero(ground) at first definition.

1.2.3All items are zero.But we have to deliver the water(2) to the bottom.So the program have to change the value of items.

1.2.3.1The program is going to assign 1(air) to the boxes that values are zero,randomly.If it try to assign 1 to the box that values is two or one,it won't assign and will choose any other random value.This will continue until at least one item on the last row will be two.

1.2.3.1.1 If the random box is in first row,the value will be assigned as 2(water).And then the program is going to check the sides of this box.If any item arrive the last row of matrix,the program will out of the loop.When each box was opened,the number of open boxes are increased by 1.

1.2.3.1.1.1 The sides of water box is going to be controlled.If there is any box that value is 1,this will be set as 2. And if the value is changed,the changing values are going to follow all these control steps. And this will be apply for all possible sides.And if at least one box at the last row is 2,the function will control this box and then set the values that stay the sides of this box.And then the function will return 0.This means that the iteration was finished.

1.2.3.1.2 If the random box isn't in first row,it will be assigned as 1. And then the program is going to check the sides of this box. If any item arrive the last row of matrix,the program will out of the loop. When each box was opened,the number of open boxes are increased by 1.

1.2.3.1.2.1 The sides of air box is going to be controlled.If there is any box that value is 2,the air box will be set as 2.And if the air box is changed,the changing box is going to follow all these control steps.And this will be apply for all possible sides.And if at least one box at the last row is 2,the function will control this box and then set the values that stay the sides of this box.And then the function will return 0.This means that the iteration was finished.

1.1.4In every new iteration the number of open box that is over by $n*n$ will be assign to an element of possibilityArray.

1.1.5 If the number of iteration is equal to last iteration,the shape of matrix and the result of mean and standart deviation is going to be printed. And after all these operations,we will use free function that take possibilityArray and matrixShape as an arguman to leave free the memory blocks.

1.1.6In every iteration the number of iteration(counter) is going to be increased by 1.

1.3The program is going to finish here,at the end of the main function.

2.FUNCTION EXPLANATIONS

void printToFile(int matrixShape,int matrix,double mean,double stddev);**

This function is going to prints every result to the output.txt.

int control(int matrixShape,int matrix,int x,int y);**

This function is going to control the sides of randomly opened boxes.

void assignRandomly(int matrixShape,int matrix,double *numberOfOpenBoxes);**

This function is going to assign 1 to the random place on the matrix.

double mean(double* possibilityArray,int iteration);

This function is going to calculate the mean value.

double standartdev(double* possibilityArray,double meanValue,int iteration);

This function is going to calculate the standart deviation value.

double sqroot(double square);

This function is going to calculate the square root.We haven't got permission to use sqrt function in math.h because of that I used this one instead of sqrt() function.

int controlRightSideForWater(int matrixShape,int matrix,int x,int y);**

This function is going to control the right side of box that filled with water(2).If there is a box that filled with air,this box is going fill with water.And it will invoke the control function.

int controlRightSideForAir(int matrixShape,int matrix,int x,int y);**

This function is going to control the right side of box that filled with air(1).If there is a box that filled with water,our box is going to fill with water. And it will invoke the control function.

int controlLeftSideForWater(int matrixShape,int matrix,int x,int y);**

This function is going to control the left side of box that filled with water(2).If there is a box that filled with air,this box is going fill with water.And it will invoke the control function.

int controlLeftSideForAir(int matrixShape,int matrix,int x,int y);**

This function is going to control the left side of box that filled with air(1).If there is a box that filled with water,our box is going to fill with water. And it will invoke the control function.

int controlTopSideForWater(int matrixShape,int matrix,int x,int y);**

This function is going to control the top side of box that filled with water(2).If there is a box that filled with air,this box is going fill with water.And it will invoke the control function.

int controlTopSideForAir(int matrixShape,int matrix,int x,int y);**

This function is going to control the top side of box that filled with air(1).If there is a box that filled with water,our box is going to fill with water. And it will invoke the control function.

int controlBottomSideForWater(int matrixShape,int matrix,int x,int y);**

This function is going to control the bottom side of box that filled with water(2).If there is a box that filled with air,this box is going fill with water.And it will invoke the control function.

int controlBottomSideForAir(int matrixShape,int matrix,int x,int y);**

This function is going to control the bottom side of box that filled with air(1).If there is a box that filled with water,our box is going to fill with water. And it will invoke the control function.

3.PERFORMANCE MEASURE

N=10 T=10 → 0.01015 seconds

N=10 T=100 →0.01177 seconds

N=10 T=1000 → 0.02602 seconds

N=100 T=10 → 0.04637 seconds

N=100 T=100 → 0.1622 seconds

N=100 T=1000→ 1.364 seconds

N=200 T=10 → 0.1111 seconds

N=200 T=100 → 0.5974 seconds

N=200 T=1000 → 4.752 seconds