



Write a program to find the minimal moves in an N queens problem implemented in JAVA

Lab Assignment-5

CSE3002 : Artificial Intelligence

Submitted by:

Jayakumar MHK (18BCE7031)

Under the Guidance of

Prof. Manomita Chakraborty

SCOPE

VIT-AP

Task:

Write a program to find the minimal moves in an N queens problem

Solution:

I have used the Backtracking approach to solve this problem using Java to get the minimal moves for the given problem.

Below is the source code of the same.

```
import java.util.Scanner;
public class lab5{

    public static void main(String [] args){
        Scanner sc=new Scanner(System.in);
        System.out.println("Enter N value ");
        int n=sc.nextInt();
        if(n<4){
            System.out.println("Solutions are not possible for N = "+n);
            System.exit(0);
        }
        System.out.println("Minimal moves for N = "+n+" queen problem is
");
        char [][] board=new char[n][n];
        fillboard(board);
        solveNqueen(0,board);
    }
    public static void fillboard(char [][] board){
        for(int i=0;i<board.length;i++){
            for(int j=0;j<board[0].length;j++){
                board[i][j]='#';
            }
        }
    }

    static int moves=0;
    public static void solveNqueen(int r,char [][] board){
        if(r==board.length){
            System.out.println("=> "+moves);
        }
    }
}
```

```

        System.exit(0);
        return;
    }
    for(int c=0;c<board[0].length;c++){

        if(isSafe(r,c,board)){
            moves++;
            board[r][c]='Q';
            solveNqueen(r+1, board);
            board[r][c]='#';
        }
    }
}

public static boolean isSafe(int r,int c,char [][] board){

    for(int i=r,j=c;i>=0 && j>=0;i--,j--){
        if(board[i][j]=='Q'){
            return false;
        }
    }

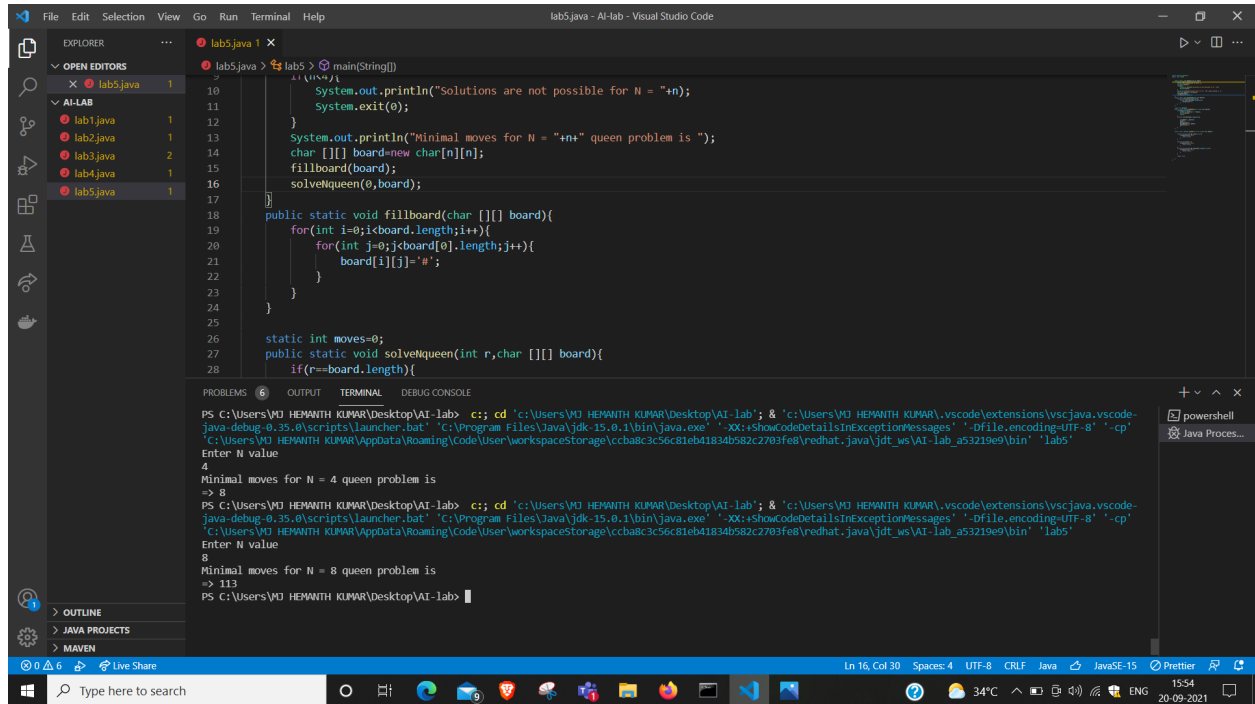
    for(int i=r;i>=0;i--){
        if(board[i][c]=='Q'){
            return false;
        }
    }
    for(int i=r,j=c;i>=0 && j<board[0].length;i--,j++){
        if(board[i][j]=='Q'){
            return false;
        }
    }

    return true;

}
}

```

Output below :



```
File Edit Selection View Go Run Terminal Help
lab5.java - AI-lab - Visual Studio Code

EXPLORER
  OPEN EDITORS
    lab5.java 1
  AI-LAB
    lab1.java 1
    lab2.java 1
    lab3.java 2
    lab4.java 1
    lab5.java 1

lab5.java 1
10  // main(String[])
11  {
12      System.out.println("Solutions are not possible for N = "+n);
13      System.exit(0);
14  }
15  System.out.println("Minimal moves for N = "+n+" queen problem is ");
16  char [][] board=new char[n][n];
17  fillboard(board);
18  solvetqueen(0,board);
19  }
20  public static void fillboard(char [][] board){
21      for(int i=0;i<board.length;i++){
22          for(int j=0;j<board[0].length;j++){
23              board[i][j]='#';
24          }
25      }
26  }
27  static int moves=0;
28  public static void solvetqueen(int r,char [][] board){
29      if(r==board.length){
30          moves++;
31          return;
32      }
33      for(int i=0;i<board[0].length;i++){
34          board[r][i]='Q';
35          solvetqueen(r+1,board);
36          board[r][i]='#';
37      }
38  }
39  }

PROBLEMS 6 OUTPUT TERMINAL DEBUG CONSOLE
PS C:\Users\MD HEWANITH KUMAR\Desktop\AI-lab> c++; cd 'c:\Users\MD HEWANITH KUMAR\Desktop\AI-lab'; & 'c:\Users\MD HEWANITH KUMAR\.vscode\extensions\vscjava.vscode-
java-debug-0.35.0\scripts\launcher.bat' 'C:\Program Files\Java\jdk-15.0.1\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionMessages' '-Dfile.encoding=UTF-8' '-cp'
'C:\Users\MD HEWANITH KUMAR\AppData\Roaming\Code\User\workspacestorage\coba8c3c56c81eb41834b582c2703fe8\redhat.java\jdt_ws\AI-lab_a53219e9\bin' 'lab5'
Enter N value
4
Minimal moves for N = 4 queen problem is
=> 8
PS C:\Users\MD HEWANITH KUMAR\Desktop\AI-lab> c++; cd 'c:\Users\MD HEWANITH KUMAR\Desktop\AI-lab'; & 'c:\Users\MD HEWANITH KUMAR\.vscode\extensions\vscjava.vscode-
java-debug-0.35.0\scripts\launcher.bat' 'C:\Program Files\Java\jdk-15.0.1\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionMessages' '-Dfile.encoding=UTF-8' '-cp'
'C:\Users\MD HEWANITH KUMAR\AppData\Roaming\Code\User\workspacestorage\coba8c3c56c81eb41834b582c2703fe8\redhat.java\jdt_ws\AI-lab_a53219e9\bin' 'lab5'
Enter N value
8
Minimal moves for N = 8 queen problem is
=> 113
PS C:\Users\MD HEWANITH KUMAR\Desktop\AI-lab>
```