

Programming Project 2

Solving N-queens problem using hill-climbing and its variants

Note: You can work alone or in a team of THREE max

You are to solve the n-queens problem by using hill-climbing search and its variants. Read the slides or textbook carefully for the basic hill-climbing algorithm as applied to the 8-queens problem. However, your program should treat the number of queens as a variable n and allows the user to input the value of n . Using any programming language of your choice, implement the followings:

- Hill climbing search (slides 9 - 10, 22)
- Hill-climbing search with sideways move (slides 23 and 24)
- Random-restart hill-climbing with and without sideways move (slides 28 -30)

Your program should report the following with respect to the 8-queens problem

- A. Implement Hill climbing search
 - a. Run several times, say 100 to 500, and report success and failure rates
 - b. The average number of steps when it succeeds
 - c. The average number of steps when it fails
 - d. The search sequences from four random initial configurations
- B. Hill-climbing search with sideways move
 - a. Run several times, say 100 to 500, and report success and failure rates
 - b. The average number of steps when it succeeds
 - c. The average number of steps when it fails
 - d. The search sequences from four random initial configurations
- C. Random-restart hill-climbing search
 - a. The average number of random restarts required without sideways move
 - b. The average number of steps required without sideways move
 - c. The average number of random restarts used with sideways move
 - d. The average number of steps required with sideways move

Your program should be well documented, and you should turn in the following in **hard copy**:

1. An external documentation describing the n -queens formulation, the program structure, global variables, the function/procedure to compute the heuristic function, and other functions/procedures, etc.
2. Your program source codes (with necessary inline documentation);
3. The execution results as specified above.

In addition, each member should also upload everything (e.g. report, code, etc.) to Canvas.

Warning: Any form of cheating will subject you to severe disciplinary act.