# Homework Assignment 3

## (250 points)

### Assigned Date: Thursday, October 2, 2008

### Due Date: 4:00 PM Thursday, October 16, 2008

**Educational Goal**

Become familiar with hill-climbing algorithm, a local search algorithm of informed search.

**Requirements**

- Implement the 8-queens example (Lecture "Informed Search and Exploration Part II", Slides 22, 23 and 24). You may use the same *h* function defined in Slide 24, or you can invent your own objective function. The initial state should be generated randomly. The goal is to place 8 queens on a chessboard such that no queen attacks any other. A queen attacks any piece in the same row, column or diagonal. The successor function returns all possible state generated by moving a single queen to another square in the same column (each state has 7 * 8 =56 successors).

- Solve the problem using a random-restart hill-climbing algorithm (Lecture "Informed Search and Exploration Part II", Slide 21, and Lecture "Informed Search and Exploration Part III", Slide 5). The program should output the initial state for each try and eventually one final goal state. Mark the location of the 8 queens using (col, row) coordinate. For example, the 8 queens positions in Slide 24 of "Informed Search and Exploration Part II" are (1,5), (2,6), (3,7), (4,4), (5,5), (6,6), (7,7), (8,6).

- Based on your experimental results, write a one-page report with minimum 200 words to discuss the performance of your algorithm. For example, how many iterations on average your algorithm need to find a goal state, any adjustment that you have done to improve the algorithm, or any interesting experiences or lessons learned in this assignment.

**Submission Requirements**

1. Follow the language requirements for programming assignments posted at
   http://www.cs.umb.edu/~ding/classes/470_670/student.htm
2. Your program should be well-documented. Variable names and function names should be self-descriptive. Major functions should be explained clearly in comments.
3. Turn in the paper copy and soft copy of all the files **including your program code and results of at least one successful run**. Submit **a single zipped file** of all the files of this assignment through your UMassOnline account at http://boston.umassonline.net/index.cfm. Submit the paper copy along with the cover page in class. Paper copy should be bound firmly together as one pack (for

example, staple, but not limited to, at the left corner). 5 points will be deducted for unbounded homework.

4. Name your file with AI_ lastname_firstname_hw3. For example, student John Smith should name his file as AI_Smith_John_hw3.zip.

5. No hard copies or soft copies results in 0 points.