Introduction to Artificial Intelligence

Program – The n-Queen Problem

Mar 24, 2025

Objectives

Practice and get familiar with the way to solve problem by searching. In this assignment you need to make use of the taught subject matters about Informed Search and Exploration (ch. 4) and Genetic Algorithm (ch. 4.3.5).

Program

Write programs (in C/C++/Python) to solve **the n-queen problem**.

1. Use Iterative Deepening Search (IDS) or Bidirectional Search
2. Use Hill Climbing (HC)
3. Use Genetic Algorithm (GA)[1]

Report

Execute your codes of the above methods to solve the n-queen problem. Due to randomness, HC and GA require statistical results from 30 runs.

1. For the **8**-queen problem ($n = 8$):
   (a) List all the results (**average #attacks** in the final configuration) from the three methods.
   (b) Compare the **average running time** for the three methods to get a solution.
   (c) Compare the **success rate** (SR) of HC and GA.

$$\text{SR} = \frac{\text{Number of times obtaining the } \textbf{optimal} \text{ solution}}{\text{Number of trials}} .$$

2. For the **50**-queen problem ($n = 50$) provided a 50×50 chessboard:
   Answer the above questions.

Must describe your methods and list their parameter settings for the experiments.

[1] Choosing Representation, Mutation, and Crossover in Genetic Algorithms, *IEEE Computational Intelligence Magazine*, 17(4):52–53, 2022. `https://ieeexplore.ieee.org/document/9942691/interactive`

Submission

- **2025/04/13 24:00 (degrade by 10 points for each day delay)**
- Source code + Report (no longer than **six** A4 pages)
- Upload the source code and report to eeclass.

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