Bu-Ali Sina University – Evolutionary Computing Course

Solving the N-Queen Problem Using Genetic Algorithms

SEMESTER I Assignmnet 1

Aban 1403 Assignment Deadline: 30 Aban

Problem Definition

Question 1. (100 marks)

The n-queens problem involves placing n queens on an n x n chessboard such that no two queens threaten each other. A queen can attack another queen if they are in the same row, column, or diagonal. The goal is to find a configuration where no queens threaten each other.

(i) Define a chromosome and decide on an appropriate representation for the queens' positions on the chessboard.

(ii) Design a fitness function that evaluates the quality of a solution based on the number of non-attacking pairs of queens.

(iii) Implement a crossover mechanism that combines segments of two parent chromosomes to produce offspring.

(iv) Implement a mutation mechanism that alters parts of a chromosome to maintain diversity in the population.

(v) Use a selection method to choose parents for crossover based on their fitness values.

(vi) Set up the workflow for the genetic algorithm, including the generation of the initial population, iterative application of genetic operators, and the termination condition.

BONUS: Create a way to visualize the solution on a chessboard at different stages of the algorithm.

1. Note that both implementation and report are required.

2. Please provide great visualization for validating and showing your progress.