Assignment 2 (20 marks)
Soft Computing (7168) & Soft Computing PG (7197)
Semester 2- 2024

Task Description

We have a company with 80 employees and 50 departments. Each department receives certain types of job requests from clients. Fast processing of job requests is important for customer retention. As such, we need to find the optimal assignment of the employees to the departments to minimise the average time a client waits before their job requests are finished. Also, to avoid poor reviews from angry clients, we need to minimise the maximum time any client might have to wait before their jobs are finished.

We don't have data about the expected numbers of clients for each department. However, we have a simulator that simulates the operation of the company for a given assignment of employees. You can use this simulator to assess how well a given assignment of employees achieve your objectives. We provide three versions of the simulator; you will need to use only one of them depending on the version of Python you use (read the ReadMe.txt file).

Requirements

You are required to design a genetic algorithm (GA) to find the best employee assignment to achieve the following two objectives *simultaneously*:

- Minimise the average waiting time (importance 80%) AND
- Minimise the maximum waiting time (importance (20%)

Your GA needs to perform all the steps described in week 10 lecture. Your design decisions need to be informed by experiments. For example, if you decide to use single-point crossover in your submitted code, you should show that you tried another type of crossover and it didn't perform better. Same for mutation, parent selection, and GA parameters. Make sure to read the assignment rubric on Canvas.

Notes

This assessment needs to be done individually. GenAI can only be used for the following purposes:

- Brainstorming
- Help analysing the problem
- Assistance with secondary programming tasks (e.g., reading file, logging & plotting figures)

Use of GenAI or any opensource code needs to be referenced with clear description of the scope of use.

Deliverables & Submission

This assignment needs to be submitted by the deadline indicated on Canvas. You need to:

- Upload a zipped file named **lastname_firstname_assignment2.7z** (where lastname & firstname should be replaced by your own names) which contains the following:
    - the source code of your Genetic Algorithms used to solve the problem

    - a 3-page report including the following: a. A brief description of the GA formulation used including the key design decisions; b. the methods used for deciding on the key decisions (e.g., any experiments used to select the appropriate parent selection, crossover, mutation and techniques and the corresponding parameters) c. the results (similar to week 10 lab & any other useful results) d. the best employee assignment found by your GA printed using the python print function (print(employee_setting)).
- Attend your oral discussion to discuss your submission. This is a compulsory part of the assignment. We won't be able to mark your assignment if you don't attend the oral discussion. An announcement will be posted about the schedule for oral discussions.