Search and Optimisation/ Machine Learning 1, Course Project 2018

Very important – Read before starting

- The deadline for completing <u>and submitting</u> your assignment is strictly Friday 25th May 2018 at 18:00.
- <u>VLE will be set up to not accept late submissions</u> meaning that you will get <u>zero marks if late</u>.
    - o Please plan ahead (it is recommended that you try and <u>upload and verify your work a day before</u>).
    - o Technical problems, internet connectivity issues, lost backups, cats eating laptops, etc… are not valid excuses.
- You must complete the project completion form (shown later) and include it in your report. <u>Submissions without the statement of completion will not be considered.</u>
- You must complete a plagiarism declaration form and include it in your report. <u>Submissions without the form will not be considered.</u>
- <u>Projects must be submitted using VLE only.</u> Physical copies or projects (including parts of) sent by email will not be considered.
- For your convenience, a draft and final submission area will be set up in VLE. <u>Only projects submitted in the final submission area will be graded.</u> Projects submitted to the draft area are not considered.
- It is suggested that after submitting your project, you re-download it and check it just in case. <u>It is your responsibility to ensure that your upload is complete, valid, and not corrupted.</u> You can re-upload the assignment as many times as you wish <u>within the deadline</u>.
- <u>Your project must be submitted in ZIP format</u> with<u>out</u> passwords or encryption. Project submitted in any other archiving format will not be considered.
- The total size of your ZIP file should not exceed 38 megabytes.
- Your submission should include your report in PDF format, your source code, and executable file(s).
- It is expected that you submit a quality report with a proper introduction, discussion, evaluation of your work, and conclusions. Also, make sure you properly cite other people's work that you include in yours (e.g. diagrams, algorithms, etc…).
- In general, I am not concerned with which programming language you use to implement this project. However, unless you develop your artifact in BASIC, C, C++, Objective C, Swift, Go, Pascal, Java, C#, Matlab, or Python, please consult with me to make sure that I can correct it properly.
- This is not a group project.
- Plagiarism will not be tolerated.

Project

This assignment is about using Genetic Algorithms (GAs) and Ant Colony Optimisation (ACO) to solve instances of the Travelling Salesman Problem (TSP).

TSPLIB is a library of TSP instances that you should use as datasets for this assignment. See the dataset FAQs for how to interpret the data. Link: http://elib.zib.de/pub/mp-testdata/tsp/tsplib/tsplib.html

Requirements:

- Design and implement a GA to solve **<u>symmetric</u>** TSP instances imported from TSPLIB.
- Design and implement an ACO-based method to solve TSP instances imported from TSPLIB.
- Evaluate the performance of both the GA and the ACO-based methods using at least four instance sizes (number of cities) of your choice for each method – <u>choose your sizes wisely so that your evaluation makes sense</u>. Structure your evaluation as follows:

  Instance name: burma14.tsp
  GA method: *<setup>*
  ACO method: *<setup>*
  Results: *<your evaluation, comparison, interpretation>*
  …
  …

  Instance name: bays29.tsp
  GA method: *<setup>*
  ACO method: *<setup>*
  Results: *<your evaluation, comparison, interpretation>*
  …
  …
  and so on…

Report:
- Describe how you used GAs to tackle the problem (design, chromosome, encoding, operators, parameters, etc…).
- Describe how you used ACO to tackle the problem (parameters, etc…).
- Must contain an evaluation contrasting and comparing the results, strengths, weaknesses, and limitations of both methods. I expect proper experimental procedure discussing your setup, expected outcomes, results, and a good discussion.

Statement of completion – MUST be included in your report

Item	Completed (Yes/No/Partial)
Implemented GA	
Implemented ACO	
Evaluated GA vs ACO for selected instances	
Described GA architecture in report	
Described GA architecture in report	