DM63 – Common Mistakes to Avoid in DM63 Exam Project

1 Overall:

Reasons for not getting the sufficiency: Central significant elements missing: ex, testing and analysis. Reproducibility not guaranteed.

2 Algorithms:

Application of base knowledge


2. Misunderstanding of the methods: e.g., halting a local search before reaching local optima (if it takes too long restrict the neighborhood!)

3. Algorithm specific: the design of the algorithm based on a certain metaheuristic is too simplistic. E.g., crossover operator in Evolutionary Algorithm does not seem to exploit building blocks, lack of local search, etc.

4. The application of the metaheuristic is different from the standard application and no remark is given to clarify why it is designed so.

5. Theoretical error. Different kind of errors can fall in this category. Example: the examination of a kind of move when it is clear that it cannot lead to the desired effect; the possibility to cycle among solutions.

Accuracy/Soundness

6. Absence of a rationale behind the decision taken in the design of the algorithm. Justification not provided or not plausible.

7. No attempt to apply Occam’s razor. Quite complicated methods are applied but their use is not justified. It is not shown that they do better than other simpler methods. (Complexity should be added only if strictly needed).

Extent/Amplitude

8. Insufficient extent: the number of algorithms implemented is less than those required.

9. No attempt to speed up the delta evaluation function in local search.

10. Minimal extent. No way to overcome local optima is added on the top of the algorithm developed.

11. There is no care spent in making local search procedures efficient, e.g., no care put in choosing convenient data structure.

Competitiveness

12. Scarce competitiveness. Results are not competitive. The chosen algorithm is not even able to beat the weakest conceivable algorithm.

13. Impossible to determine as no numerical evidence on benchmark instances is reported.

Functional knowledge (originality)

14. Minimal functional knowledge: The material is applied summarily to a problem different from those studied in the lectures. That is, no adaptation and exploitation of knowledge of the problem at hand is done.

3 Analysis:

Logical organization

1. There is no component-wise study.

2. Lack of fairness: the algorithms are tested with different allocation of resources.

3. Lack of logic order in the presentation of the experiments. The soundness does not depend by the number of experiments carried out but by the quality of insights.
4. Lack of arguments behind the tests.
5. Lack of explanation of the setting up of the experiments
6. Lack of comments on the results

**Extent and originality**

7. Lack of comparison with the null-metaheuristic, that is, the minimal requirement for an algorithm to do better, (e.g., simple random restart of construction heuristic + local search).
8. No account of the trade-off time vs. quality is given.
9. No discussion on tuning of the algorithms. In this case the statement “on the basis of preliminary” experiments is unsatisfactory. In the course attention was posed to solve this issue in a systematic manner. The values assigned to the parameters are not justified.

10. There is only a minimal amount of experiments carried out. The organization of the experiments does not take into account the lack of time. E.g., the number of replicates must be chosen such that the experiments can be finished within the deadline.
11. The membership of the instances to different instance classes is neglected and thus also the possibility to refer to some structure of the instances to explain the differences in the performance of the algorithms.
12. For some metaheuristics like SA or ACO there is not attempt to verify that the algorithm profile develops as wished.
13. Lack of attempt to visualize results in graphics.
14. Lack of numerical tables to produce numerical benchmarks.

**Complexity analysis in the main procedures**

15. Absent.
16. Wrong or imprecise.

**Application of base knowledge**

17. No method for tuning is used.

**Reproducibility**

18. In the Figures more details should be given: e.g., which are the measure units, etc.
19. Some details are missing which undermine the possibility to replicate the experiment.

**Correctness**

20. The conclusions are completely subjective. No element is added to support (or define the meaning of) expressions such as “most tests produce good results”. Which quantitative data justify a qualitative statement?
21. Instances with very different features are aggregated and no motivation for this choice is given.
22. Conclusions not supported by data
23. Uninformative table.
24. Too few data collected to make reliable the statement that the means of the performance of the two algorithms differ.
25. The tuning and configuration problems are solved without a clear methodology and result not completely correct.
26. Use of different parameters for each instance. This is considered over-fitting and it useless if no a priori information is available to recognize the instance.
27. Bad choice of graphics. Examples: use of bar plots to compare populations: bar plots compare single statistics of the population and hence add nothing to a simple table. Boxplots permit instead to visualize the whole distribution of data).
28. The correctness of some numerical results is doubtful.

**Report:**

**Length**

1. Although the length limits are satisfied, the report is lengthy. There is abundance of details which are irrelevant and could have been cut out (e.g., the formula for the average value and
the standard deviation, or the biological background of ACO). No attempt to point out only the relevant information.

2. The report is apparently within the limits. However, in the main body there are pages left white with no reason and the inclusion of code in the appendix is to be avoided.

Writing style and clarity

3. Spelling problems. With current technology the pervasive presence of spelling mistake is a strong indicator that little care was put in the project.

4. Language is sloppy

5. Use of the same notation to indicate more than one thing.

Structure

6. No structure in the description of the algorithms is recognized.

7. Lack of structure overall the report.

Extent

8. Not all parts required are present

Correctness of description


10. Algorithmic sketches are not precise enough. The algorithm does not produce the output declared or it does not stop. It also should not allow for misinterpretation.

11. Descriptions are summary, imprecise and vague (this being also a consequence of the scarce use of formal notation). Terminology not is not explained, e.g., “hardest instances to solve” (with respect to what?).

12. Notation problem in a formula

5 Code:

Correctness

1. The program is functional but must contain a flaw, as some results are not reproducible.

2. Problems due to real/integer numbers