### C:\Dropbox\DMU\Lessons\IMAT 1221-2 - Linear Algebra I - II\Phase Tests\2018-2019\Phase Test - Resit\dmulogo.pngCSIP5304 - Fuzzy Logic & Evolutionary Computing

### MSc Artificial Intelligence, 2023-2024

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# Weekly Exercises 1 - Evolutionary Computing

1. **Min One problem.** Run the Binary GA code provided on the VLE shell for solving the Min One problem and consider the run as Benchmark A, noting the number of iterations needed to reach the theoretical minimum and providing a cost vs iterations graph. You can repeat the experiment several times and take the median value of the number of iterations needed.
2. **Effect of parameters.** Report the effect of different values of all used parameters, e.g. maximum iterations, population size, crossover probability, mutation probability etc and state the combination of values for the most efficient run. Consider this run (or median) as Benchmark B.
3. **Effect of operators.** Select one operator from the Binary Genetic Algorithms presentation slides for each operator category, different from what already exists in the code and implement them. Thus, you need to implement one selection, one crossover, one mutation and one survivor operator that are not already implemented in the code. Determine the combination of parameter values, including any new parameters introduced in the new operators, that lead to the most efficient run. Consider this run (or median) as Benchmark C.
4. **Comparison.** Compare the Benchmarks A, B and C of the Min One problem. Report on the common and different behaviours between the old and new operators, and on the operators and parameters with the greatest effect. Interpret the results, provide recommendations for further improvement, and draw conclusions.

## Important notes

* Create a report that answers the above questions. The report will be evaluated based on its comprehensive but concise way to analyse, compare, present results, and draw conclusions.
* Please aim for 2-3 pages of text using Arial font and minimum size 11, excluding code, output, and graphs. The MATLAB code, output, if used, and some additional graphs can be included in an appendix, however the main part of the project, which includes the text and the main graphs, should independently provide the main points.
* The modified code should be copied as text in the report and also as separate .m files.
* Ensure that the code has optimum **performance** (e.g. avoid calculating the same formulas more than once where not necessary).
* Improve the **readability** (e.g. add some **comments** in commands, variables, and functions to explain what they do, even those included in the original code).
* Make the programme as **parameterised** as possible. This means that any constant should be defined in the main script file (e.g. app1.m) once, and then only the variable name should be passed to the function.

## Deliverables

You should submit your report via VLE > Weekly Exercises 1 by the provided deadline.

Please submit directly, using multiple files if needed, rather than in a compressed file.