Particle Swarm Optimization

1   WORK DURING THE LAB

1. Implement the **Particle Swarm Optimization (PSO)** algorithm to find the optimum of the *Sphere function*.
    a. Initialization of particles
    b. Compute position, velocity, fitness
    c. Compute local best and global best
2. Test the algorithm using different parameter settings.

Points for the work during the lab: **25p**

2   ASSIGNMENT A7

1. Implement and test **two variants of PSO** for the *Sphere function* and *one other function* [same as the one selected for the previous lab].
2. Perform experiments to compare the two PSO variants selected.
    (see for example the review T. M. Shami, A. A. El-Saleh, M. Alswaitti, Q. Al-Tashi, M. A. Summakieh and S. Mirjalili, "Particle Swarm Optimization: A Comprehensive Survey," in *IEEE Access*, vol. 10, pp. 10031-10061, 2022, doi: 10.1109/ACCESS.2022.3142859. https://ieeexplore.ieee.org/document/9680690)

Deadline to submit A7: **Lab 8**

Points for A7: **25p**

3   REQUIREMENTS

1. Source code (notebook) needs to be documented.
2. Algorithms have to be tested for several parameter values (sufficient to clearly determine performance).
3. Experiments must be performed for all available problem instances and results compared for diferent parameter settings.
4. Results of the experiments need to be saved in output files, indicating solution quality, parameter values used, number of runs.
5. A report should capture the following: problem definition, algorithm used (name, steps/pseudocode), parameter setting, comparative results of experiments, discussion of results.