ECEN935 – Computational Intelligence
Fall 2024

Homework # 3 Particle Swarm Optimization (PSO)

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Consider the following six hump camelback function where x and y both lie between [−5, +5]. The objective is to minimize z.

$$z = \left(4 - 2.1x^2 + \frac{x^4}{3}\right)x^2 + xy + (-4 + 4y^2)y^2$$

1. Code a PSO to solve the problem, i.e., find the optimal solution(s) of (x, y) which leads to the minimum value of z.
2. Run your PSO.
3. Perform the following changes to your PSO code (one by one) and compare the results.
   - Different numbers of particles.
   - PSO without the maximum velocity limit and with different maximum velocity limits.
   - PSO without the inertia constant and with different inertia constants.
   - Different combinations of the acceleration constants (zero acceleration constants should be investigated).

Please include the following in your report.

1. Describe your algorithm.
2. Attach a copy of your MATLAB code as an annexure at the end of your report.
3. Generate appropriate figures and/or tables to compare the results for each case.
4. Draw conclusions on each case and summarize your findings on the changes of PSO for each case.
5. Write the optimal solution(s) of (x, y) and the corresponding global minimum value of z.

Note: Points will be given for well-presented results and well-reasoned evaluation of results. Describe every decision you take, and the reason for taking it. Your report should be no more than 10 pages (excluding appendix). The minimum font size used in your report is 11.