

COSC 3P71: Assignment 3

Particle Swarm Optimization

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Test Configurations

Swarm Size = 30, Number of iterations = 500

1,2,3,4 use vanilla PSO with no velocity clamping.

1. $\omega = 0.729844$, $c1 = c2 = 1.496180$
2. $\omega = 0.4$, $c1 = c2 = 1.2$
3. $\omega = 1.0$, $c1 = c2 = 2.0$
4. $\omega = -1.0$, $c1 = c2 = 2.0$
5. Randomized search

Randomized Search:

Search 500 * 30 random values, equal to the number of points that a swarm of size 30 checks for 300 iterations.

Results

Mean, Median and mode for each configuration from 5 runs.

	Config 1	Config 2	Config 3	Config 4	Random
Mean	64.71638093	125.2238863	448.3118323	454.4446055	346.0730588
Median	74.28997847	130.4667418	491.8214191	497.7530664	344.5134138
Standard Deviation	14.59221101	3.791887124	31.72153507	37.65318232	18.54640817

Config 1 performed the best followed by config 2. config 2 is expected to be more susceptible to converging on a local minima due to its lower value of ω , which might be the reason for the observed result.

Config 3 and config 4 performed worse than random search.

For test 3, the high value of ω could be making the velocity too less susceptible to changes from local or global best values, hence leading it to wander off away from the solution.

For config 4, a possible reason it performs even worse than config 3 could be that the negative value of ω instead of helping the particle maintain it's direction, works towards reversing its direction on every update.