LAB-3

Particle Swarm Optimization.

Pseudocode :-

1. Particle initialization ()
2. For i = 1 to max
3. for each particle p int P do
   fp = f(p)
4. If fp is better than f(pbest)
   pbest = p;
5. end
6. end
7. gbest = best p in P
8. for each particle p in P do.
9. $V_i^{t+1} = \underbrace{V_i^t}_{\text{inertia}} + \underbrace{c_1 U_1^t (pb_i^t - p_i^t)}_{\text{Personal influence}} + \underbrace{c_2 U_2^t (gb^t - p_i^t)}_{\text{social influence}}$
10. $p_i^{t+1} = p_i^t + V_i^{t+1}$
11. end
12. end

Application problem

Rastrigin Function.

$$f(x) = A \cdot n + \sum_{i=1}^{n} [x_i^2 - A \cdot \cos(2\pi x_i)]$$

$A = 10$

n is dimensionality of search space

PSO Output

Best x: [-0.001982, 0.002997, 0.990737, -0.004
0.004635]

Best f(x): 1.0100547917422347

Iterations: 200, Particles: 50

First 5 history values:
[57.773033, 57.778033, 44.799763, 34.955516,
20.492025]

Last 5 history values:
[1.05493, 1.040874, 1.040874, 1.010055, 1.010055]