1 pso intro

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PSO = particle swarm optimization it is a meta heuristic algorithm

What are metaheuristic algos?

is a high-level problem-solving strategy designed to find **good enough solutions** for complex optimization problems where finding the absolute best solution is too difficult or time-consuming

PSO is inspired by social behavior of birds , where the particles are acting like birds

This solves the problem by having a population(swarm) of candidate solutions(particles) to our objective problem

These particles (birds) are tyring to find the only one source of food

None of the birds know where the food is but they know how far they are from to the food(cost fucntion is known)

The statergy is to follow the bird nearest to the food

Each particle has a velocity

- Particle updates its Velocity and Position.
- Particles can Update their position by : $x_i^{t+1} = x_i^t + v_i^t * t$
- Velocity of the particle is given by: $v_{k+1}^i = wv_k^i + c_1 r_1 (xBest_i^t - x_i^t) + c_2 r_2 (gBest_i^t - x_i^t)$
- *xBest* = best particle position
- *gBest* = best group position
- Parameters ω [inertia weight],
- c_1, c_2, = two positive constants
- r_1 and r_2 = two random parameters within [0, 1].

Using swarm intelligence for feature selection

The objective here to find the subset which results in the highest perfomance of our classifier

We do binary encoding to signify which features we are selecting and which we are not

Feature Subset	Representation
{X1}	10
{X2}	01
{X1,X2}	11
None	00

Now apply feature selection algorithm and then decode the binary coding found to figure out which features to use

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