Particle Swarm Optimization

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PARTICLE SWARM OPTIMIZATION (PSO)

EBERHART AND KENNEDY (1995)

- Multi dimensional search

James Kennedy and Russell Eberhart. Particle swarm optimization. In Proceedings of the IEEE International Conference on Neural Networks, volume IV, pages 1942–1948, Piscataway, NJ, 1995

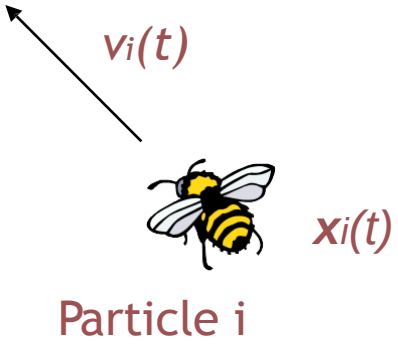
PARTICLE SWARM OPTIMIZATION (PSO)

- EACH CANDIDATE SOLUTION IS CALLED PARTICLE
- The population is set of vectors and is called SWARM
- The particles change their components and move (fly) in a space
- They can **evaluate** their actual position using the function to be optimized
- The function is called FITNESS FUNCTION

PARTICLE SWARM OPTIMIZATION (PSO)

EACH PARTICLE IS CHARACTERIZED BY

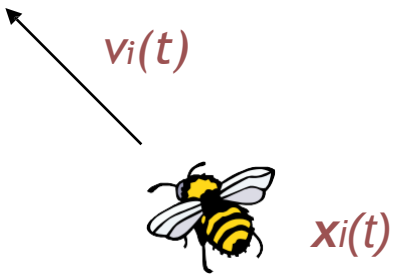
- Position vector….. $x_i(t)$
- Velocity vector……$v_i(t)$



PARTICLE SWARM OPTIMIZATION (PSO)

EACH PARTICLE HAS

- Individual knowledge ***pbest***
  - its own best-so-far position
- Social knowledge ***gbest***
  - gbest is pbest of its best neighbour



Particle i
pbest & gbest

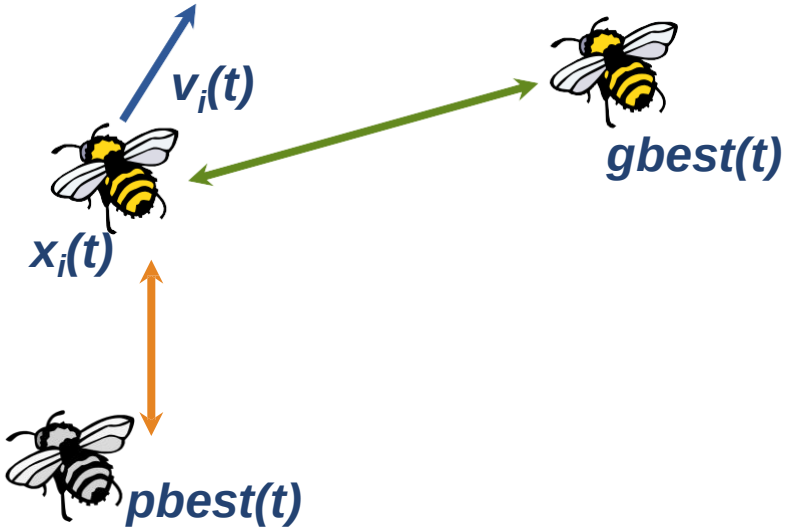
PARTICLE SWARM OPTIMIZATION (PSO)

VELOCITY UPDATE:

$$v_i(t+1) = w \times v_i(t) + c_1 \times rand \times (pbest(t) - x_i(t)) + c_2 \times rand \times (gbest(t) - x_i(t))$$

- Position update:

$$x_i(t+1) = x_i(t) + v_i(t+1)$$



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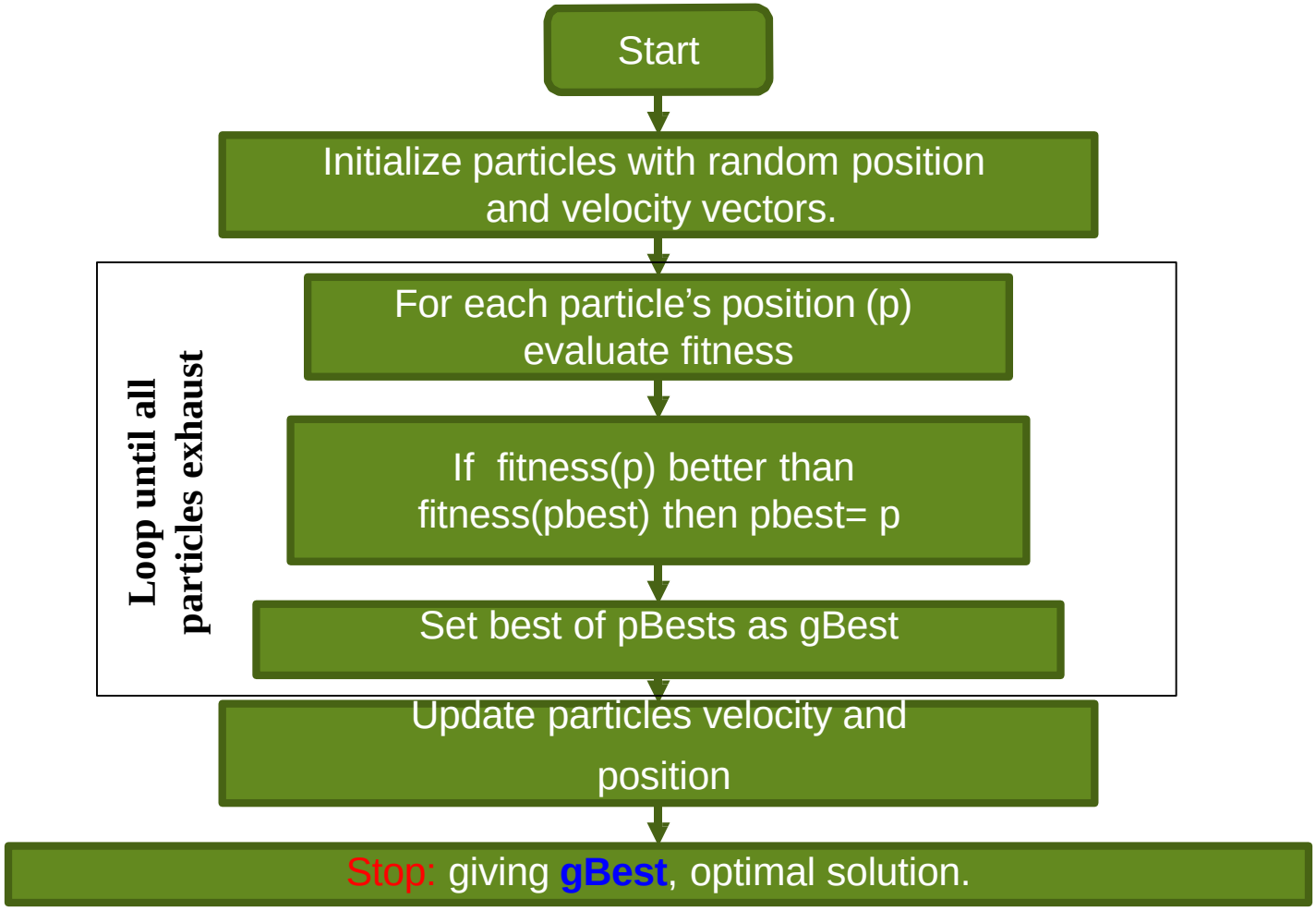

THANK YOU