PSO velocity and new position

VELOCITY

$$v^{t+1}_{ij} = w \cdot v^{t}_{ij} + c_1 \cdot r_1 \cdot (pBest_{ij} - x^{t}_{ij}) + c_2 \cdot r_2 \cdot (gBest_j - x^{t}_{ij})$$

v_max = 20% of the search space range!

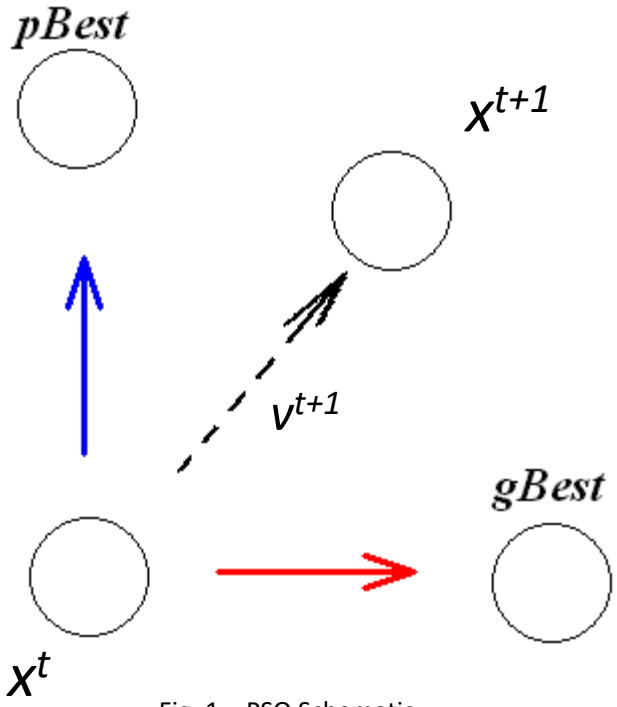

Fig. 1 – PSO Schematic

NEW POSITION

$$x_{ij}^{t+1} = x_{ij}^{t} + v_{ij}^{t+1}$$

PSO inertia weight

- Inertia weight: $w = w_{start} - \frac{\left(\left(w_{start} - w_{end}\right) \cdot i\right)}{n}$

- w_{start} = 0.9; w_{end} = 0.4; i – current iteration index; n – number of iterations

- Still! *v_max* = 20% of the search space range !

PSO topology

- Global
  - Everyone shares the gBest knowledge
- Ring (neighborhood size *N*)
  - gBest information shared only between *N* particles „to the left“ and *N* particles „to the right“.
  - Social neighborhood is based on an ID of a particle, not its position in a search space (e.g. Particle ID 40 with neighborhood size *N* = 2 has neighbors 38, 39, 41 a 42).