Swarm-PI Documentation

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Parameters:

**Population:**

Number of boids in the flock

-> total number across all flocks must be < 1000

**Speed:**

Multiplier on the final speed (magnitude) after all velocity components are added. (Note: This allows boids to travel faster than the max speed- why? Do we want that?)

Range: 1.0 - 8.0

**Max:**

Upper bound on boid speed (except for speed parameter)

Range: 3.0 - 10.0

**Min:**

Lower bound on boid speed (except for speed parameter)

Range: 0.5 - 5

**Inertia:**

The resistance of boids to change speed and direction. ~Mass of the boids

->Calculated by multiplying the old direction by the inertia, and dividing all the other components by the inertia.

->Inertia seems related to acceleration

Range: 6-15

**Accel (not currently used):**

Acceleration is based on neighbor positions only (not attractors). Is related to the speed of the. How to incorporate this?

-> Should this be used to somehow limit the magnitude at each timestep?

**Center:**

Component of velocity -- Boids feel attraction to the average position of their neighbors.

Range: 0-15

**Attract:**

Component of velocity -- Boids feel attraction to the closest attractor (based on flocks)

->Possible future work would be to have attraction level based on the attractor, not the flock or some combination.

Range: 0-15

**Match:**

Component of velocity -- Boids feel attraction to the average direction of their neighbors. Same as center but with direction instead of position

Range: 0-15

**Separation Dist:**

Closest boids can be to their neighbors (if they are less than this, a separation component of velocity will kick in)

Ranges: (World is 10x10x10)

Close cohesion with flock = 0.05 - 0.2

Far cohesion with flock = 0.2-0.5

Avoidance of other boids = >4

**Separation Wt:**

Component of velocity -- How much boids will try to maintain the specified Separation Dist

Range: 0-15

**NRadius:**

How far away from themselves in the simulation boids will have neighbors

Range: 0-25 (World is 10x10x10)

**Age:**

Number of timesteps boids in this flock will stay alive

->Live forever = -1

**\*\*\***NOTE: For the parameters that are components of velocity, the absolute value does not seem to matter so much as its relationship to the other components of velocity. **\*\*\***

External Outlets:

**Outlet #1 - Boid Info Matrix**

Note: The dimensions of this matrix and its contents depend on the mode, which is documented in the max patch. This is what the planes are for Mode 0:

Plane 0 - X position

Plane 1 - Y position

Plane 2 - Z position

Plane 3 - Flock ID

**Outlet #2: Boid Counts**

Outputs the number of boids in each flock (one per plane)

**Outlet #3: Attractor Info**

Format:

Plane 0 - X position

Plane 1 - Y position

Plane 2 - Z position

Plane 3 - Attractor ID

Plane 4 - Attractor Strength

**Outlet #4: Matrix with lines connecting neighboring boids**

Format:

Plane 0 - boid1, X position

Plane 1 - boid1, Y position

Plane 2 - boid1, Z position

Plane 3 - boid2, X position

Plane 4 - boid2, Y position

Plane 5 - boid2, Z position

Plane 6 - Flock ID

Note: connecting lines are only drawn between boids of the same flock