

Autonomic Networks

Arthur Escriou

Lecture 10

Swarm algorithms

Swarm algorithms

- Separation

All agents are isolated

- Alignment

All agents share the same goal

- Cohesion

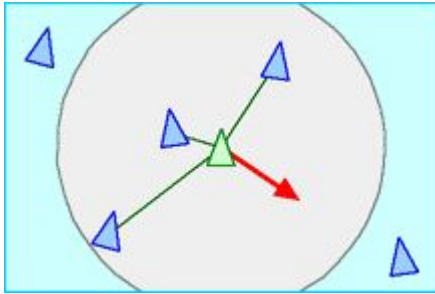
All agents move towards the goal together

Swarm algorithms example

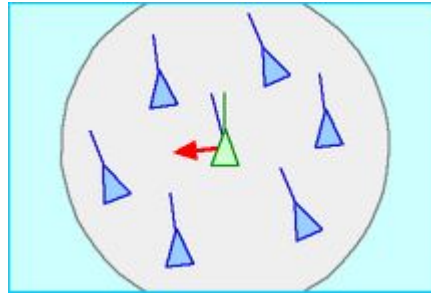
- ant colony optimization
- evolutionary algorithm
- particle swarm optimization

Birds flock simulation

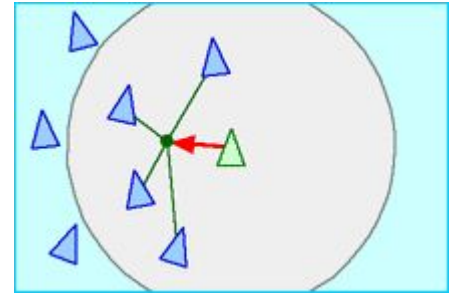
Separation



Alignment



Cohesion

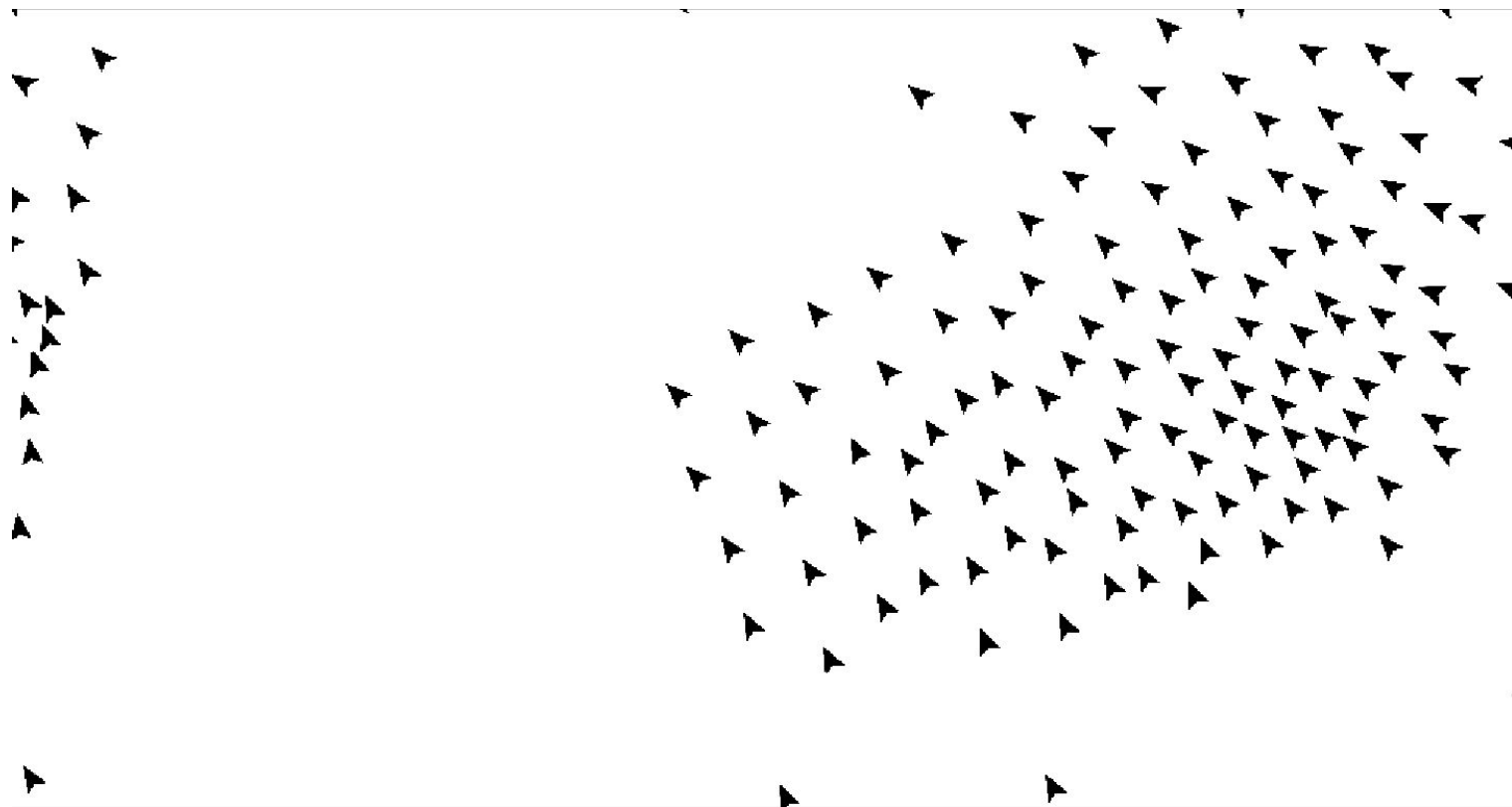


Birds flock simulation

Agent behavior :

- get the 3 nearest birds
- compute the mean angle of those birds
- change your own angle to look like the other birds

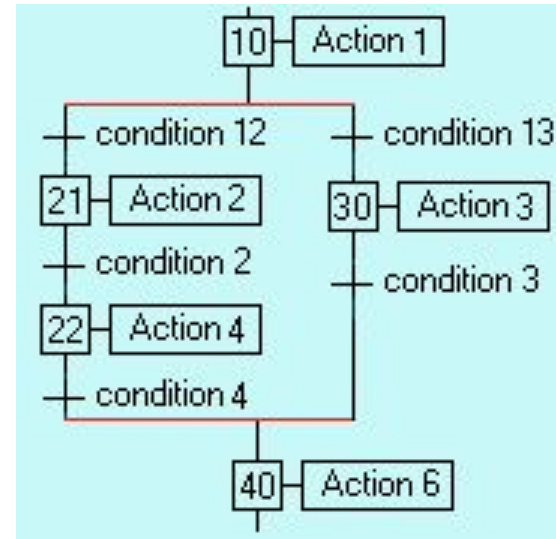
Birds flock simulation



Grafcet norm 60848.

- actions

- conditions



SVB Simulation

- Separation

All ship have their own code and don't share memory

- Alignment

In a team all ship goal are the same (destroy enemy ships)

- Cohesion

To work together ships can communicate through radio

SVB Simulation - algorithm idea

With all the same ships :

- thrust to a speed of 10%
- when a enemy ship is detected in radar range turn to aim it and communicate its position in the radio
- when another ship send an enemy position turn to aim it

SVB Simulation - algorithm idea

pro :

- our ships outnumber other ships in fight

con :

- you have to verify to be in range
- what happened when our swarm detects more than one ship?

SVB Simulation - some ideas

- split your swarm in different area to be sure to cover all the space
- give different role to ships (some can for example go forward to scout)
- communicate only to the N nearest ships when you detect enemies

Some additional resources

- https://www.youtube.com/watch?v=GOFws_hhZs8
- https://en.wikipedia.org/wiki/Ant_colony_optimization_algorithms
- <https://en.wikipedia.org/wiki/Boids>
- <https://www.youtube.com/watch?v=5CaVhGTG8eA> (fr)