

Spike: 7**Title:** Emergent Group Behaviour**Author:** Steven Efthimiadis, 1627406**Goals / deliverables:**

Create agent group behaviour which must be affected by group steering forces

- Include steering behaviours
 - o Cohesion
 - o Separation
 - o Alignment
- Use a weighted sum to combine these steering forces
- Apply the weighted sum on top of the wandering behaviour
- Ability to adjust each parameter when the program is running

Technologies, Tools, and Resources used:

- Knowledge of python
 - o <https://docs.python.org/3/tutorial/>
- Python Interpreter
 - o Visual Studio
 - <https://www.visualstudio.com/downloads/>
- Knowledge of how an agents can interact in groups
 - o https://ilearn.swin.edu.au/bbcswebdav/pid-6302928-dt-content-rid-34403398_2/courses/2017-HS1-COS30002-220387/Autonomously%20Moving%20Agents.ppt.pdf

Tasks undertaken:

- Created a function which groups agents together.
 - o Must be within a radius of agent 0
 - o Change colours once in the radius
- Created force variables for separation, cohesion and alignment within the world.
- Created functions for separation, cohesion and alignment
- Added each force individually to the agent.
 - o Then applied the amount force from the world to increase/ decrease the factor of each force
- Added the ability to increase/ decrease each of the forces and radius

What we found out:

- The agents will wander around until they are within the radius of agent 0
 - o Once they become neighbours they change to the colour blue
 - o When they leave the neighbourhood, they turn back to orange
- You can increase and decrease the radius and the separation/ cohesion / alignment forces
- When you increase the separation force:
 - o If an agent wanders into the radius. Bot agents react and separate
 - o If there are multiple agents, they all go separate ways
 - o When the separation factor is high enough the agents will be frozen to avoid people
- When you increase alignment:
 - o If an agent wanders into the radius it aligns itself with agent 0
 - o These agents traverse north east across the world
- When you increase cohesion:
 - o When an agent wanders into the radius it will aligns it's heading with agent 0
- For the best result you need to apply all forces and have 2 dominate behaviours which will show a better group behaviour on how each behaviour affects the agent individually

Open issues/ Risks:

- When you increase the separation factor, agent 0 likes to hide in the corners of the world if the world is made larger 800x600
- In cohesion it looks like they have an increased jitter value even when you don't increase it
- Make sure you're applying the forces to the agent

Notes:

Agent Modes

1. Seek (default)
2. Neighbourhood

Key Binds

A – Append agent

Q – Increase separation

W – Decrease separation

E – Increase cohesion

R – Decrease cohesion

T – Increase alignment

Y – Decrease alignment

U – Increase radius

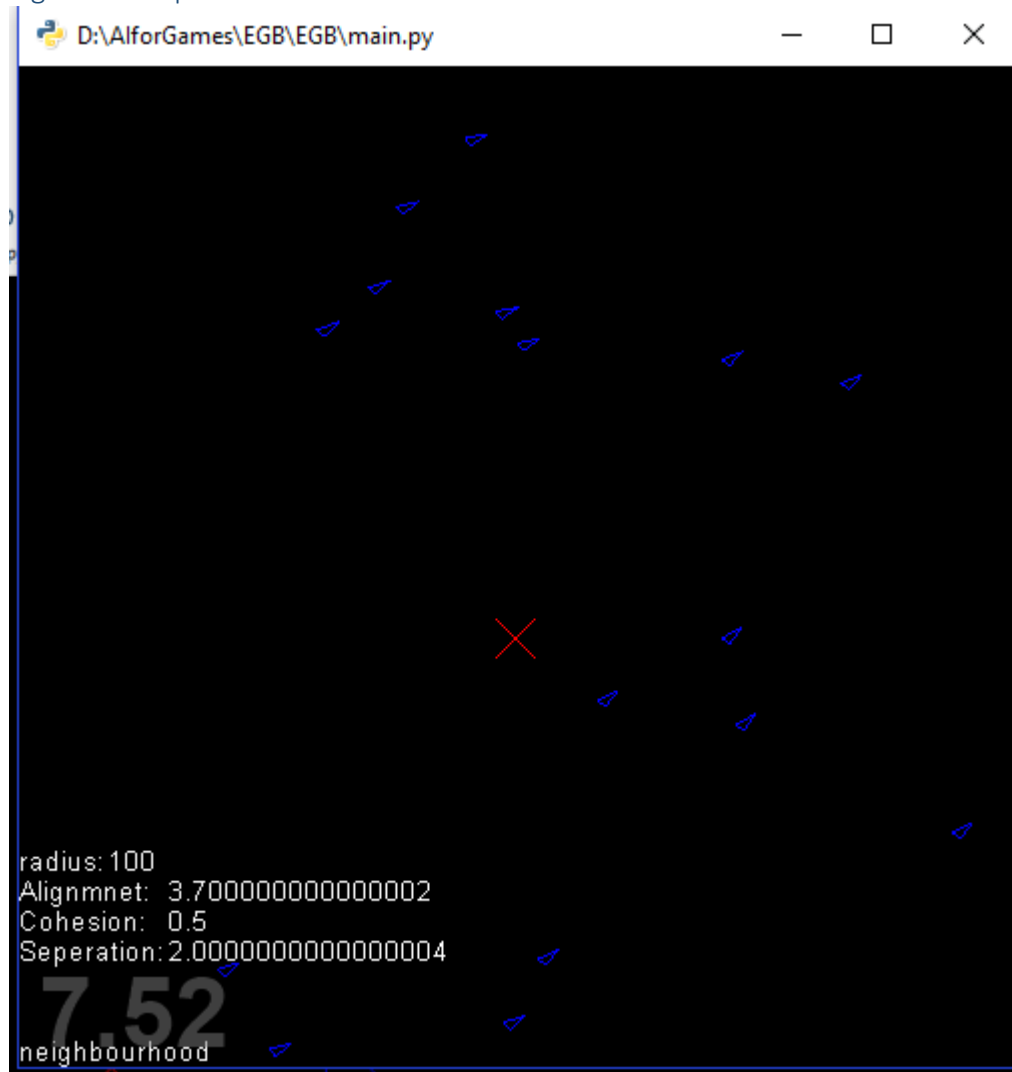
I – Decrease radius

O – Reset to beginning values

J – Show agent information

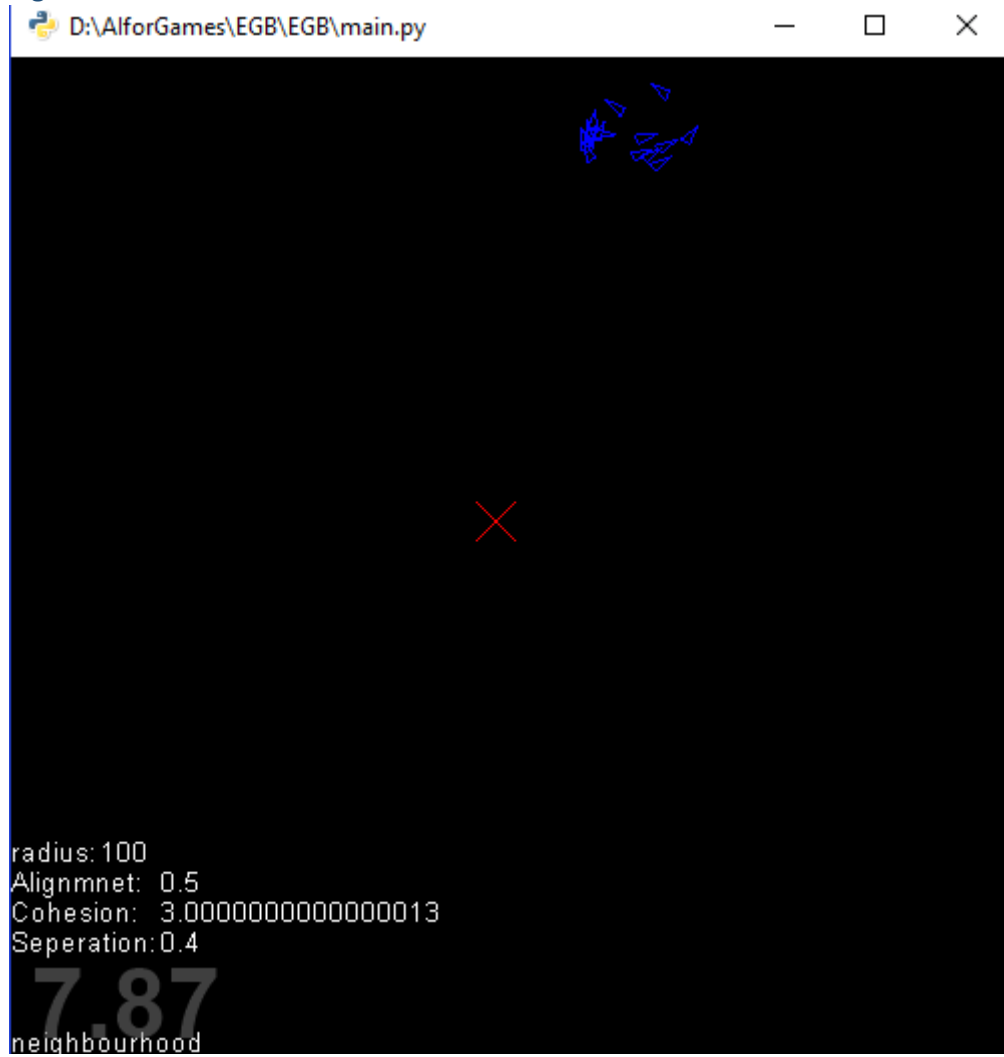
Appendix

Figure 1.1 Separation



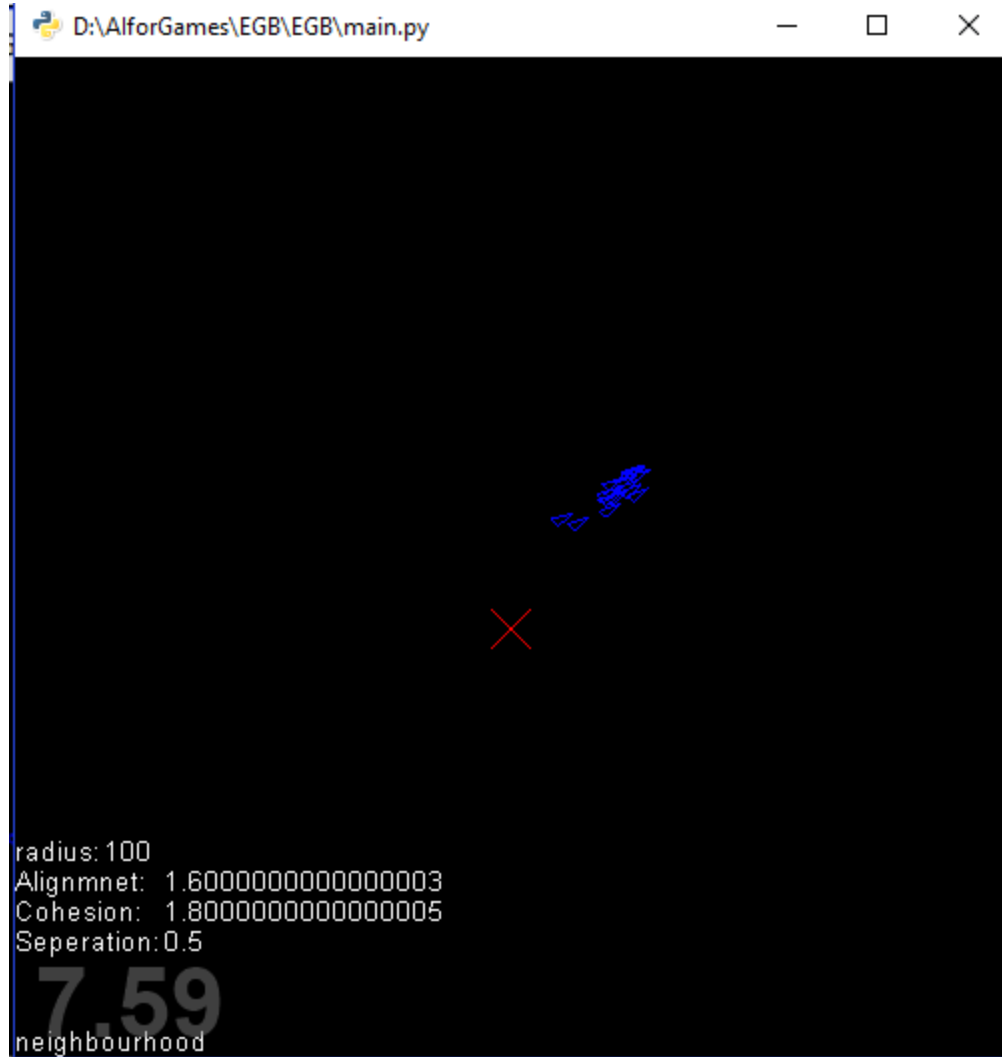
As we see from above when you apply separation and alignment together. The agents still align to the top right but are outside each other's personal space

Figure 1.2.1 Cohesion



When you just apply cohesion to the agents they will still wander around trying to finds the centre point

Figure 1.3 Alignment



When you apply alignment, and add cohesion to it. You will notice that the agents group together and align to the top right corner