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COMP3180 Playtesting Report

Overview

My project this semester was a fish flocking and movement algorithm highly based on the BOIDs algorithm outlined in Craig Reynold's (1987) paper; the goal being to realistically simulate the movement of schools of fish. A survey was conducted to evaluate the success of the algorithm.

Methodology

Respondents were given an overview of the project and its goal. Afterwards, they were presented with the BOIDs simulation running in the unity engine and the survey, and were instructed to constantly switch between the two. For machines that did not have Unity installed, a windows build (.exe) of the scene was used.

Section One:
The first section of the survey was a consent form. Participants could not proceed to the next section unless they gave their consent.

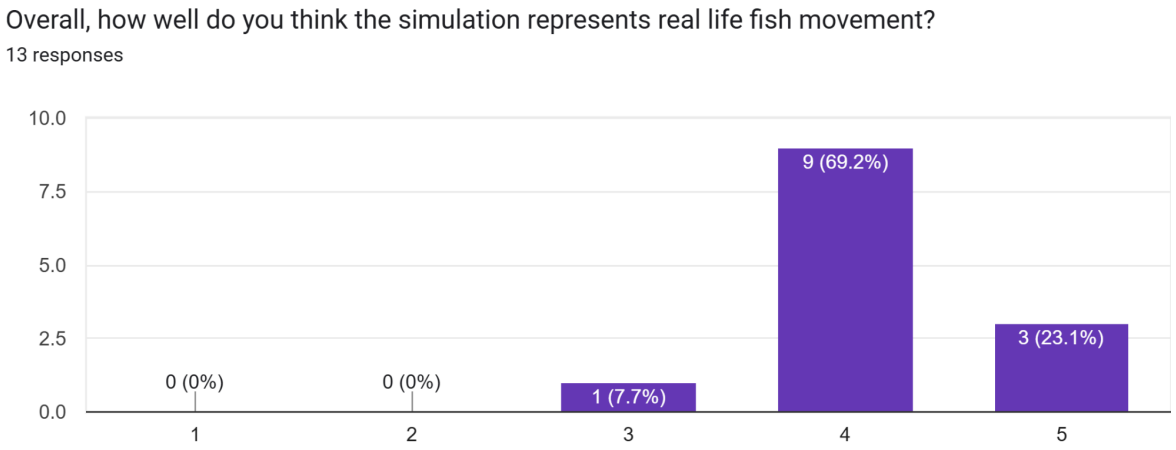
It's important to note, that the consent form was added to the survey midway through the evaluation phase. As such, only later responses have answers to this question.

Section Two:
Respondents were instructed to observe the simulation for a few minutes, and were told how to move obstacles in the scene if they wanted to experiment with it. Afterwards, they answered a number of Likert-Scale questions gauging their satisfaction with different aspects of the BOIDs movement.

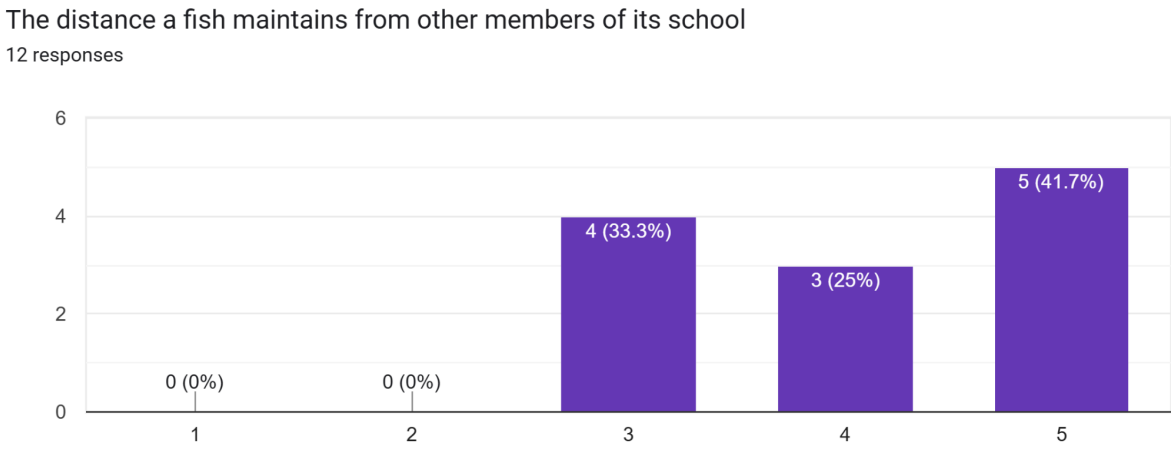
Section Three:
Respondents were introduced to the parameters panel, and were asked to tweak the values to their liking. If they were happier with the simulation as a result, they were asked to upload a screenshot of their parameters panel.

Results

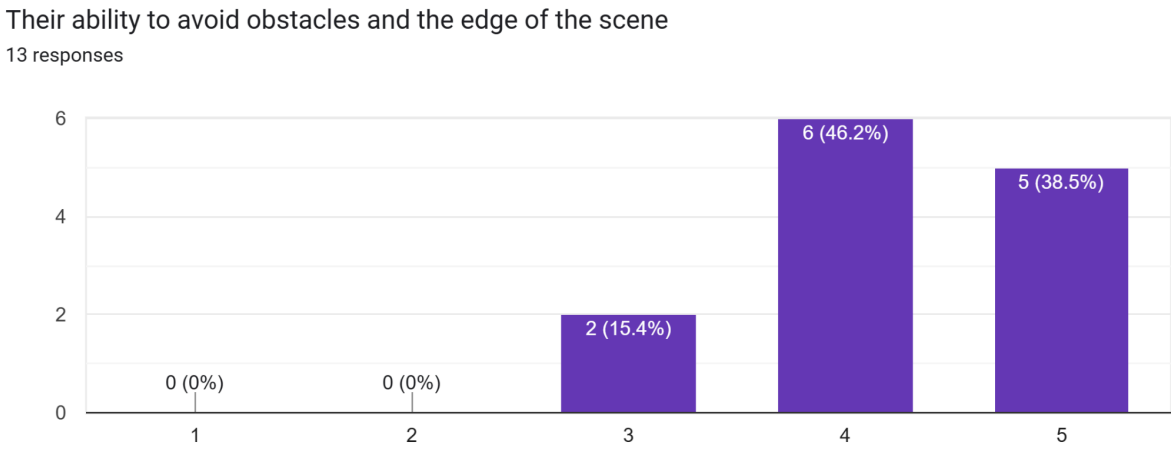
The simulation was received very positively, with none of the respondents giving a 1 or 2 (unsatisfactory response) on any of the likert-scale questions. Respondents agreed that the simulation was overall fairly realistic.



The lowest rated aspects of the simulation were the BOIDs' separation and obstacle avoidance weight.



This question is asking about separation



This mirrors some of the respondents qualitative answers describing the fish as too "orderly" and requesting less distance between them:

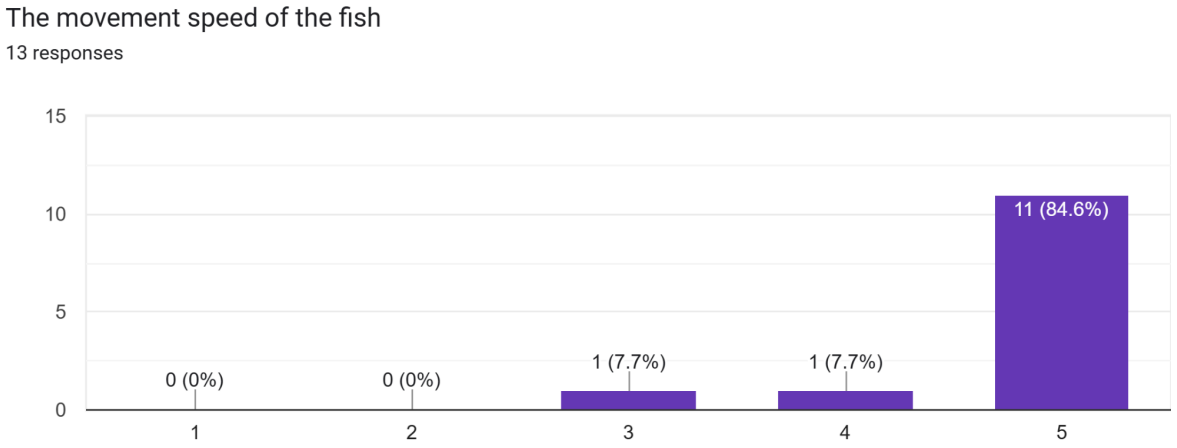
> “ I think that they could stand to be closer to each other at times, or be more okay with proximity and overlapping. There are times when the groups are left alone too long, they start to look a bit too orderly and equidistant.”
>
> “I also feel like it could be a little more disorderly or free”

However, some complained the opposite: that the fish overlap each other too much:

> “I notice that the fish appear to swim into each other if different schools overlap.”

Additionally, among the 7 submissions for Section 3, respondents on average increased separation.

Another aspect that respondents seemed divided on was the movement speed of the fish. Although the likert scale responses were positive, when given the ability to tweak the values 3 out of 7 significantly decreased their speed while 2 out of 7 significantly increased it.



Likert-Scale responses for movement speed

Lastly, a number of respondents commented on the “jitteriness” of the individual BOIDs’ movement when in a group:

> “When fish are together, there is an awkward stiff wobble on the Y-axis.”
> “Fish movement a little bit jerky, could be a little smoother”

Apart from those, respondents were quite satisfied with the other aspects of their movement. All other questions had 0-1 neutral (score of 3) responses, with the rest giving scores of 4 or 5.

Conclusion

Based on feedback, The project was very successful in simulating realistic fish flocking behaviours, as all aspects of their movement averaged a score of 4 or 5 (5 being the highest).

Respondents were very satisfied with their flocking abilities overall, as the BOIDs' ability to form and maintain schools, as well as the shape of the schools that they formed, were the highest rated aspects of their movement.

The part of the algorithm that needs the most work is their separation code, which was the lowest rated aspect of the BOIDs. Respondents were seemingly divided on whether it should be higher or lower. In the future, perhaps separation calculations could be further tweaked to have the fish stay closer together yet decrease their chances of overlapping. Additionally, the separation vector is also the source of the jittery movement that individual BOIDs exhibit when in a group.

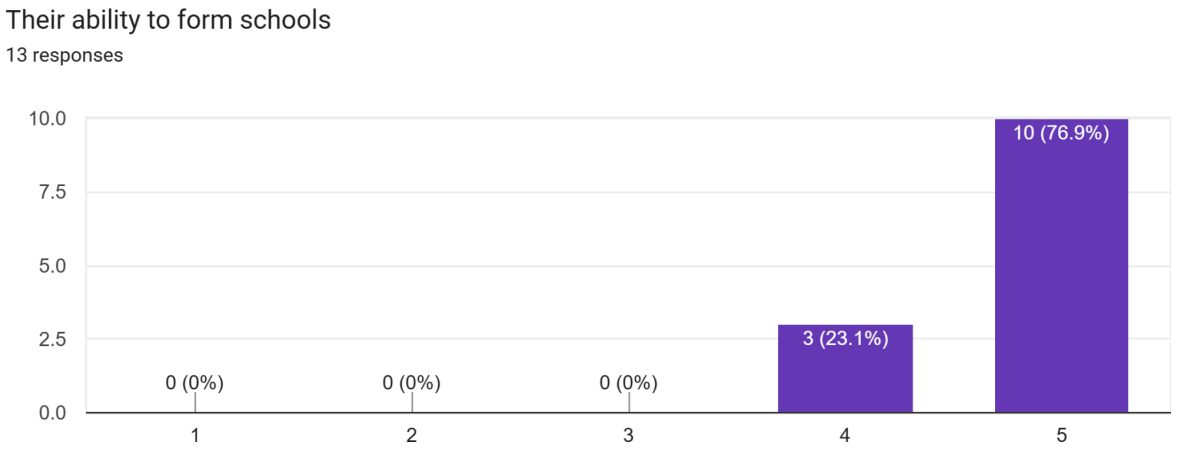
Although not part of the evaluation, there is also a lot of room to optimise the algorithm to have more BOIDs on screen.

Appendices

Pasted below are graphs representing responses to all likert-scale questions in order. 1 is very unsatisfactory, while 5 is very satisfactory.

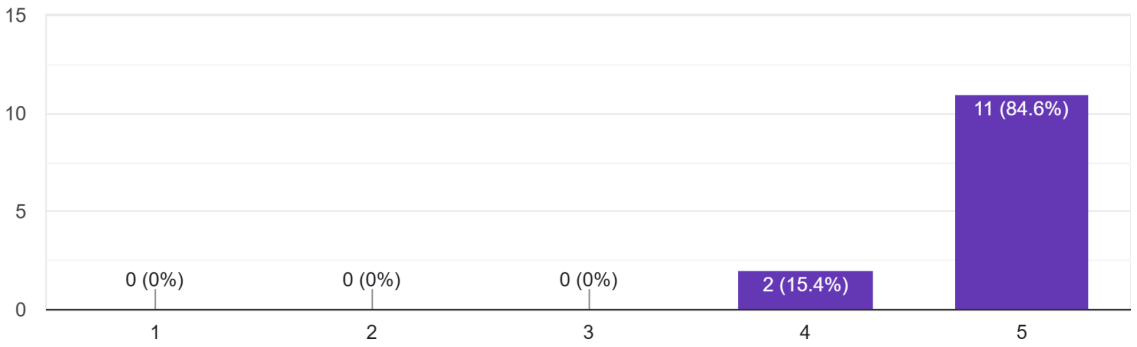
Qualitative answers can be found in this spreadsheet:
https://github.com/COMP3180-24s2/final-project-KitKat5100/blob/bea1cf62d5bc9892453dfb99fc21cf825479de23/BOIDs%20Evaluation%20Spreadsheet.xlsx

Photos uploaded for Section 3 can be found here:
https://drive.google.com/file/d/1ofXf9MHhtEIlr8wGAumVH5Mgo0_YIxvb/view?usp=sharing



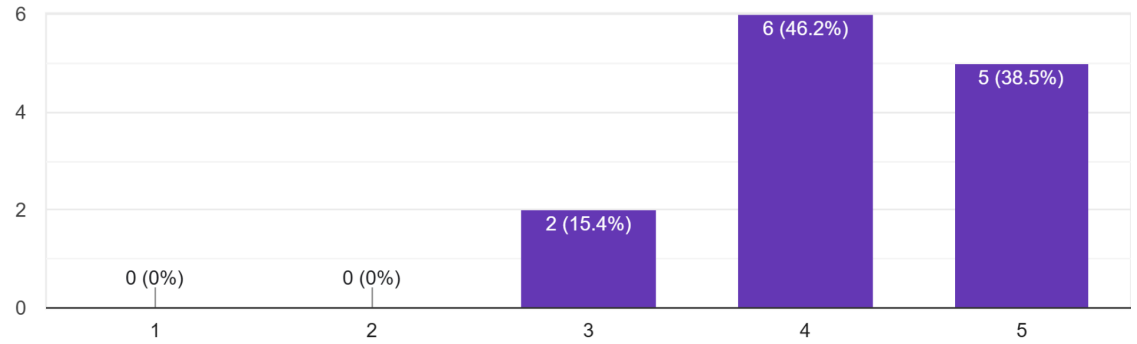
Their ability to follow the movement direction of their current school

13 responses



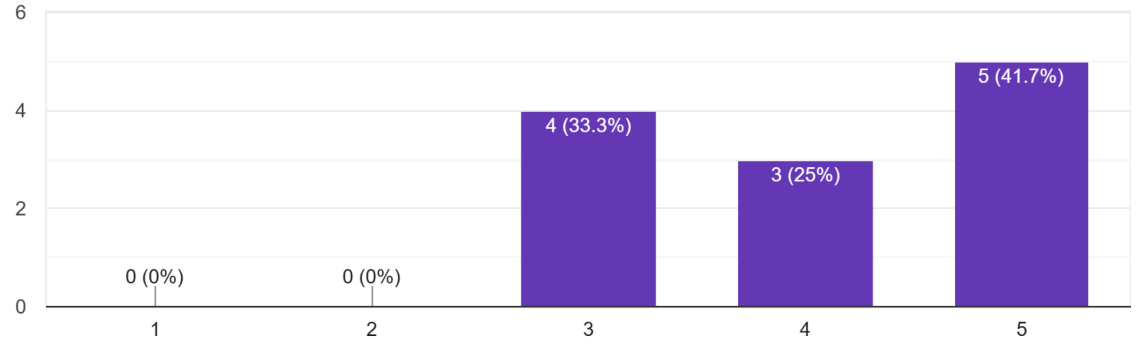
Their ability to avoid obstacles and the edge of the scene

13 responses



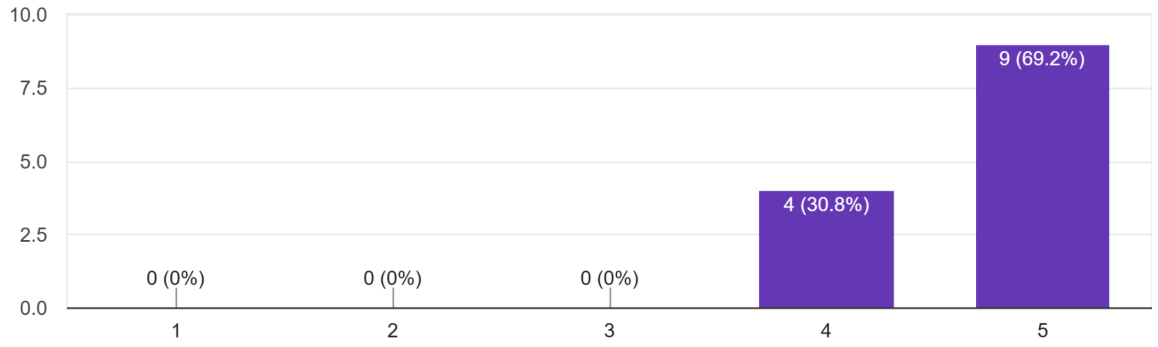
The distance a fish maintains from other members of its school

12 responses



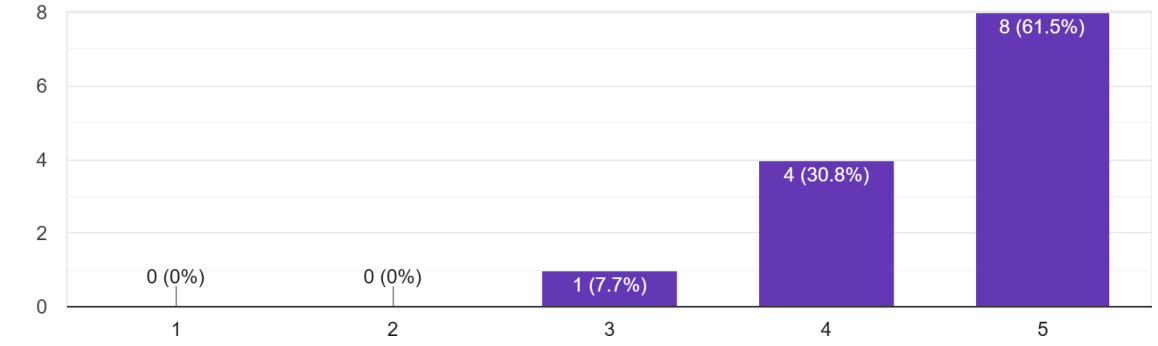
The shape of the schools they form

13 responses



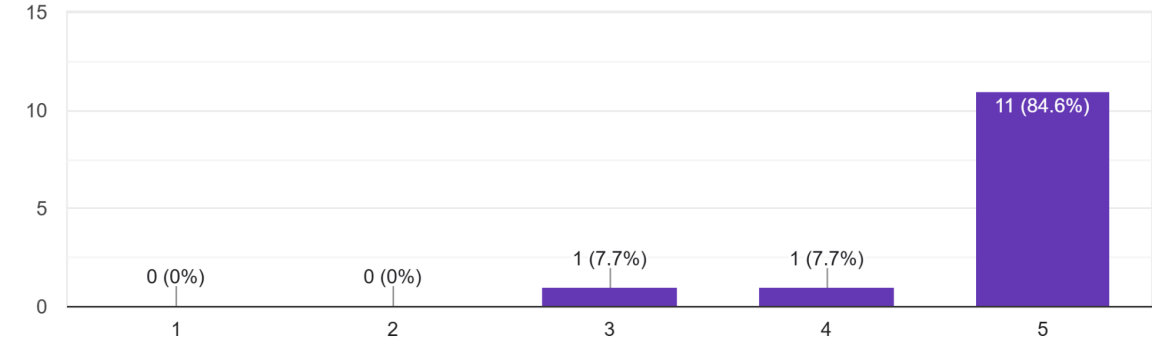
The ability for schools of fish to stick together as they swim, turn, and encounter obstacles.

13 responses



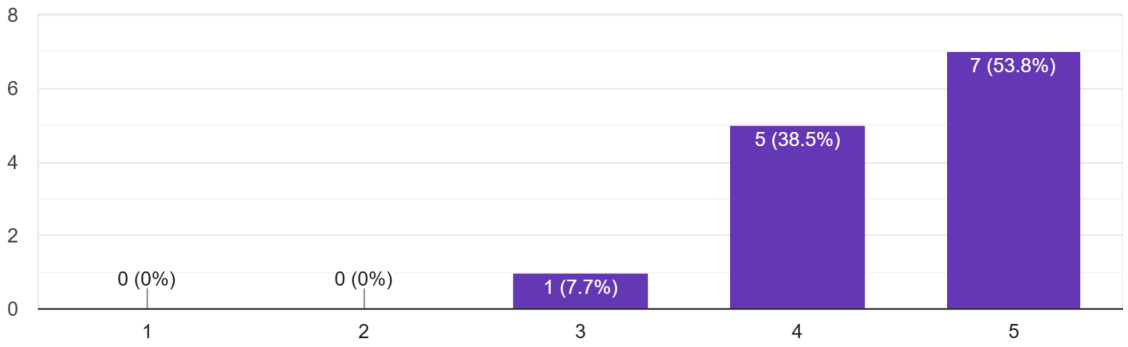
The movement speed of the fish

13 responses



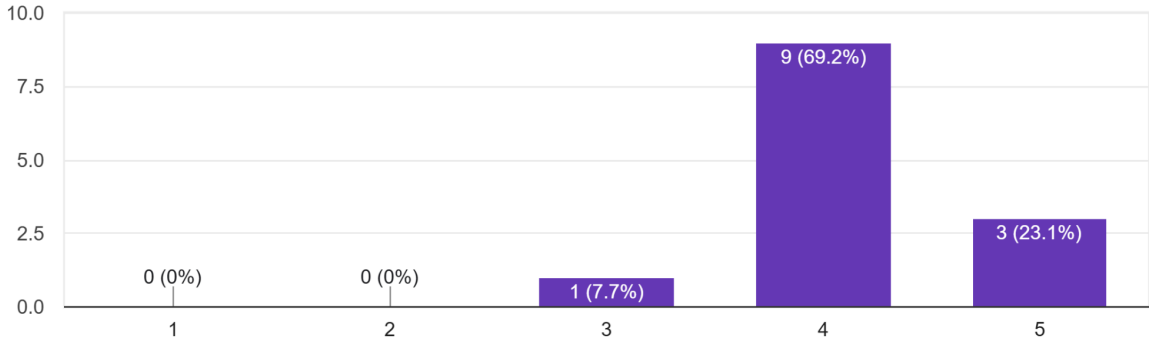
The movement of each individual fish

13 responses



Overall, how well do you think the simulation represents real life fish movement?

13 responses



References

Reynolds, C. (1987). Flocks, Herds and Schools: A Distributed Behavioural Model. *Computer Graphics, 21(4)*. https://dl.acm.org/doi/abs/10.1145/37401.37406