Assignment 1: Monash Virtual Zoo

Due Date: Sunday Week 7 (21st April, 11:55PM) - Weight: 20%

Brief:

For this assignment, you will be building a Virtual Zoo using AI techniques learnt up through to week 6 of semester. The Zoo must be built on a 2D plane with a number of walls surrounding the map and providing obstacles for the animals to navigate around (Gates and Doors are NOT required).

All animals present in the game should have the following information:

- Health
- Speed (Affects movement speed positively)
- Size (Affects movement speed negatively)
- Attack Damage
- Natural Defences
- Range of Sight

The values for each of these are outlined below or left to your discretion.

The assignment must contain AT LEAST THREE animal archetypes present in the simulation. These archetypes can be built using either Finite State Machines OR Behaviour Trees. They MUST NOT use Blueprints and instead C++ code. The archetypes expected are as follows.

Each of the animal archetypes must have a unique look to them. You may use any models that you see fit to achieve this provided you properly reference them.

The Gatherer (Moderate Strength & Defence):

This archetype of animal seeks out food pellets placed around the map to eat. Eating food pellets fills up a happiness meter. Upon reaching full happiness the creature will spawn a child next to its position. These food pallets should also heal the gatherer

The position of these food pallets should be randomized around the zoo each time the application is run. No less than 30 should be spawned. The Gatherer should not know the location of these food pallets automatically. It should roam until they enter a sight range of no more than 50 meters

HD REQUIREMENT
In order to achieve a grade of HD on the assignment gatherers should be designed so that they flock together upon finding each other.

The Hunter (Strong and Defenceless):

This archetype of animal seeks out either Gathers or Hiders to consume them. Upon detecting a suitable animal, the Hunter should chase the other animal down and attempt to consume it. Per attack the hunter should deal some damage and take damage from all other non-Hunters in a short radius (1m).

The Hunter should not have the ability to view the entire map and know where every animal is. It should have a sight range of no more than 30 meters in front of it and wander until another animal is detected.

Upon consuming at least two other animals the Hunter should spawn a child next to its position

HD REQUIREMENT
In order to achieve a grade of HD on the assignment hunters should be designed so that they use more advanced hunting techniques than just chasing the first animal it sees. This could be based on whether or not an animal is alone or co-ordinated with other hunters within range

The Hider (Weak but Strong Defence):

This archetype of animal roams the map attempting to avoid all other kinds of animals including other Hiders. Upon detecting another animal, it should attempt to flee in the opposite direction. If unable to flee it must attempt to attack the other animal.

Upon hiding successfully for more than 60 seconds it should spawn a child next to its position then flee.

Marking Criteria:

Your design specification needs to satisfy the following criteria

Performance of AI – 30 Marks

How well your AI performs in its tasks. Do each of the animals use good AI practices and algorithms to achieve their goals.

Advanced AI Techniques (Flocking & Hunter Tactics) – 20 Marks

This section is based off the implementation of flocking for Gatherer type animals and advanced hunting tactics used by the hunter archetype.

Efficiency, Quality and Completeness of Solution – 30 Marks

This section is marked based off how complete the solution is (Excluding flocking mentioned above). All archetypes and documentation should be included in the submission. The solutions provided should be efficient. This simulation is real time and should be playable.

Documentation – 20 Marks

Along with the project files you must submit a brief 2+ page document outlining your solution and the methodology used in building the AI. This should include which algorithms were chosen and why, any problems encountered and any known bugs in the application code. It is important that this is explicit and clear to your instructor.

Submission Requirements:

Your assignment will need to be submitted online via GitHub Classroom. To do this you must have a GitHub account with the ability to create private repositories. As a student you can obtain this for free at the following link https://education.github.com/pack. To create the repository for the assignment you must use the following link. https://classroom.github.com/a/xKKuQzP1.

As part of you submission you MUST include a readme with your full name, student ID and student email address.

Your submission will be marked according to the marking criteria described above. Your submission should be logically structured and free of grammatical and spelling errors. If you have any questions or concerns regarding any section of the design specification, feel free to post on the discussion forums on Moodle. Ensure that any external resources that you used to write your specification are referenced in the document. Failure to reference resources used can be considered as plagiarism and result in 0 marks being awarded for the assessment.

Failure to submit your assignment on time will result in a 5%-mark penalty for each day late (including weekends) up to a maximum of 7 days late. Submissions later than 7 days will receive a mark of 0.

If you are unable to submit your assignment on time due to circumstances beyond your control, you may be able to apply for special consideration. Special consideration applications should be made to the lecturer with a completed form and supporting documentation (see below) within two business days of the assignment deadline.

https://www.monash.edu/exams/changes/special-consideration#in-semester