

Animation Software Engineering

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Class Description and Diagram

1. Boid:

Creates boids using information about the initial position and size and assigns the starting velocity, acceleration and color for each boid. It defines the maximum speed of movement and maximum applicable force. All the possible boid behaviors are included in this class and the call to each behavior occurs via the flock() function. Also, initially all the boids will start off with a faded grey color till they reach a color source and acquire the color. The main implementation of the program lies with the run() method which will sequentially call, its flock() and update() method to update boid position, velocity, acceleration and color and borders() function to set ensure boids don't fly off screen. The flock() method will in turn call all the behaviors : seek, separation, alignment, cohesion, swarm, flow field and path following based on the choice provided by the user.

2. Flock:

This class sets up the initial lists of boids. The call to the runflock() is sent via paintGL in NGLScene which in turn calls run method of Boid and triggers the action. Apart from carrying the list of boids it also provides the facility to add new boids to the list via addBoid. The m_choice variable is the key in selecting the type of behavior to implement.

3. Target:

Target class defines the properties of the color source. Each target will have a target boundary. The target boundary is to set a limit which when a boid crosses target's color will be applied to the boid. The targets' own color will be set during target creation. The setTColor method allows us to change target's color and changePosition to shift existing targets if required.

4. colorPalette:

Just as flock contains information of all the boids, colorPalette contains the information of all the target colors. When the default constructor is called it sets up the initial target locations and their colors. This class is also responsible for adding new target colors to the palette

5. flowField:

This class sets up two kinds of flow fields: a cos, sin flow field with a fixed angle of 45 degrees and a randomly oriented flow field. The mesh for the flow fields is laid according the choice given by the user via ffchoice variable.

When the constructor is called, its divides the entire canvas into cells followed by a call to init() method which sets up the flow fields. The lookup () function returns the vector in the cell where boid is present and this vector is used by the boid as its desired velocity to move forward.

6. Path:

A very simple class with the only function being to set up target points for the boids. These target points are stored in a vector and are set up at the moment of constructor call. The addPoints() function is called when additional points are to be inserted to extend the path.

7. NGLScene:

The class is responsible for creating a valid openGL context via its initializeGL() method. paintGL() is responsible for painting everything that is actually displayed on screen, resizeGL() to scale the window size. The buildVAO() method is used to generate the boid shape.

8. WrapNGL (not shown in the class diagram):

An extension of NGL Vec3 class containing few additional functions for ngl::Vec3 variables like getting the angle between two vectors, finding clockwise and anticlockwise normal and calculating distance between two vectors.

