Bacteria Project One

COMP-4471, Winter 2021

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Description

This is a JavaScript program that implements a bacteria game using WebGL.

Contains the following mechanics:

- Bacteria spawn around disk randomly
- Bacteria grow uniformly out from it's origin
- Bacteria consume other bacteria and grow relative to the consumed bacteria relative to the bacteria's origin
- Eliminate bacteria by clicking them to administer 'poison'
- Score functionality
  - Adds score depending on how large the bacteria eliminated was
  - Subtracts score depending on how large the bacteria consumed was (divided by 2)
- Restart button (refreshes page)
- Lose conditions
  - One bacteria is too large (180 degrees)
  - There are too many bacteria (> 5)
- Random bacteria colour

Bacteria Rendering

Logically the bacteria uses **2 circles** for the **edges** of them and uses the **TRIANGLE_STRIP** from WebGL to render in between and connect the 2 edges. Every time render is called the bacteria will grow relative to how much time has passed since the last frame using the Date.now() function. Every time this function is called 2 vertexes for each side of the bacteria (4 total) are stored in the bacteria object to then later be rendered. The edge circles use TRIANGLE_FAN to display.

Detecting

```
    isWithin(angleNum) {
        if(angleNum >= this.minAngle && angleNum <= this.maxAngle) {
            return true;
        } else if(this.maxAngle < this.minAngle && (angleNum >= this.minAngle ||
angleNum
                                                    <= this.maxAngle)) {
            return true;
        } else {
            return false;
        }
    }
```

The above function is used when detection if a mouse click will intersect, if two bacteria are colliding with each other and whether a space if available to be spawned when a bacteria is created.

The function uses the angles that represent how big and where a bacteria is on the circle.

Consuming

When a bacteria is consumed by another bacteria first it is found which is larger when colliding, then a bacteria grows in size relative to how large the consumed bacteria was relative to the origin of that bacteria. Lastly, the consumed bacteria is removed from the rendered bacteria array.

```
    growTo(size) {
        var targetSize = this.getSize() + size;
        console.log("target: " + targetSize + "\tthis.getSize() " +
 this.getSize() + "\tsize: " + size);
        while(this.getSize() < targetSize) {
            this.growthFunction(0.008);
        }
    }
```
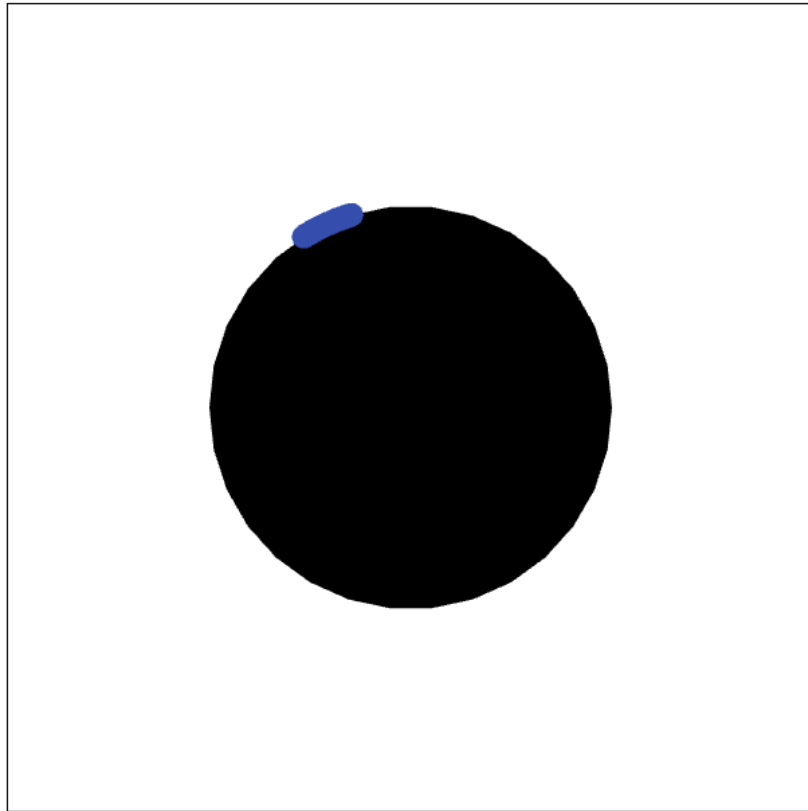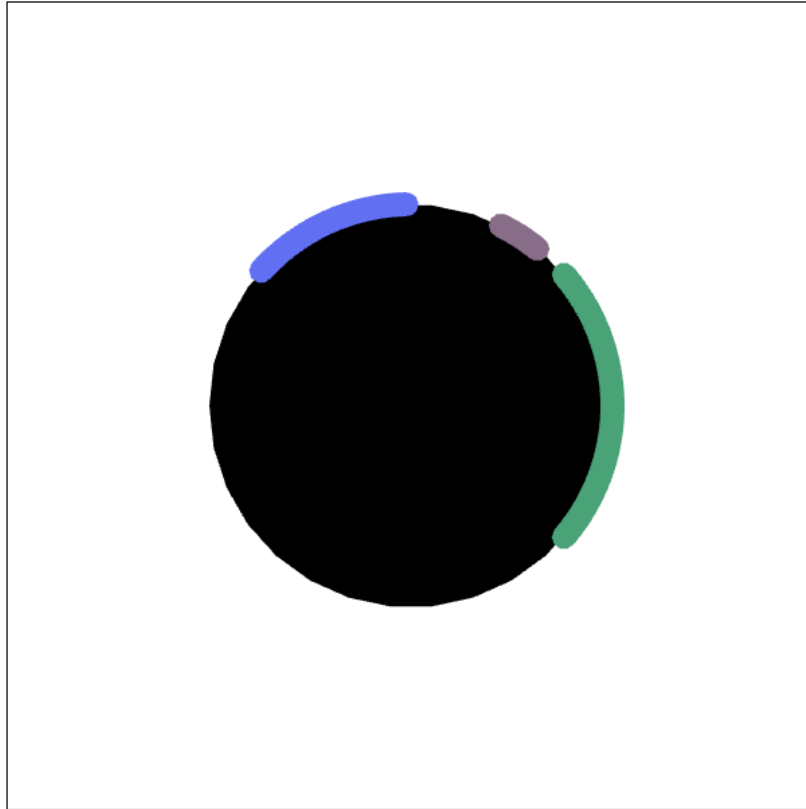
Screenshots

First Display

Score: 0

When the program is launched a score counter and canvas will be displayed. The canvas is outlined using css. The disk will be rendered using a TRIANGLE_FAN method using 32 vertices originating from 0, 0. The program waits for 4 seconds to spawn the first bacteria at a random point and spawns with a random colour and instantly begins growing.
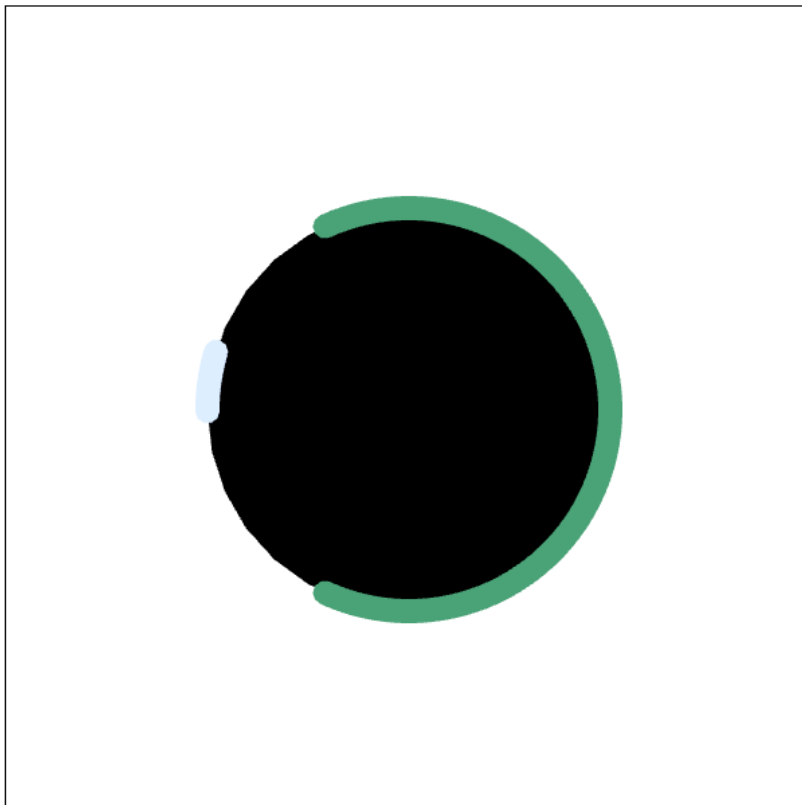
Bacteria Consuming

Score: 0

This screenshot shows after sometime 3 bacteria have spawned and the green bacteria on the right is about to consume the one above it and soon after that will consume the one above that.

## Now that's one huge bacteria! They're beyond your control
Final Score: -10

Restart

After this happens the bacteria grows in size exactly by how large the other 2 were and how much time passed while consuming them. This also shows one of the lose states which is when a bacteria is larger than 180 degrees. Also, the score is subtracted from every time a bacteria consumes another bacteria which is why it is negative. This also triggers the restart button to appear.
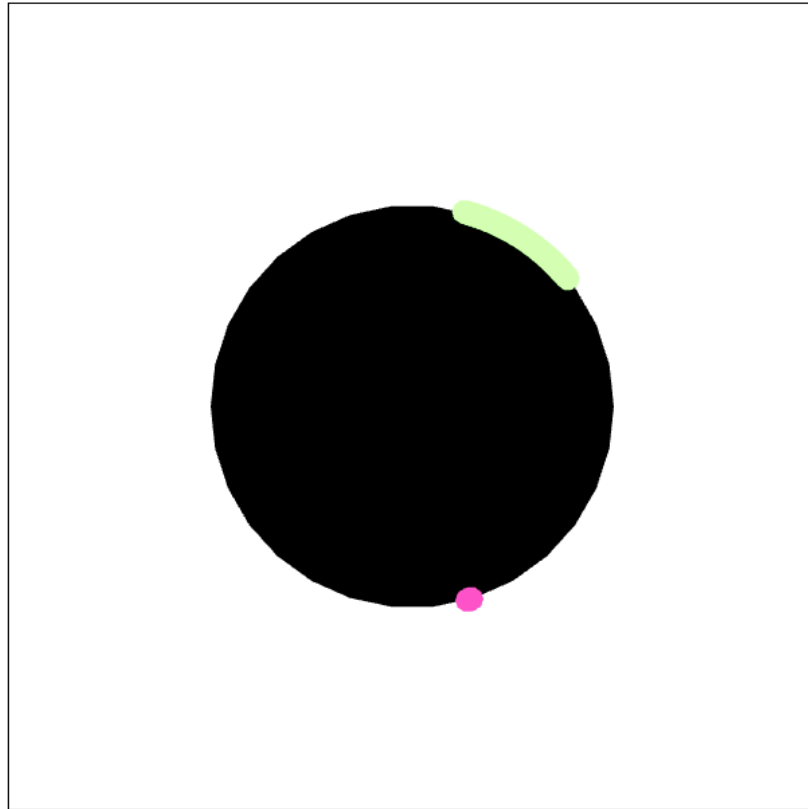
Eliminating Bacteria

Score: 0
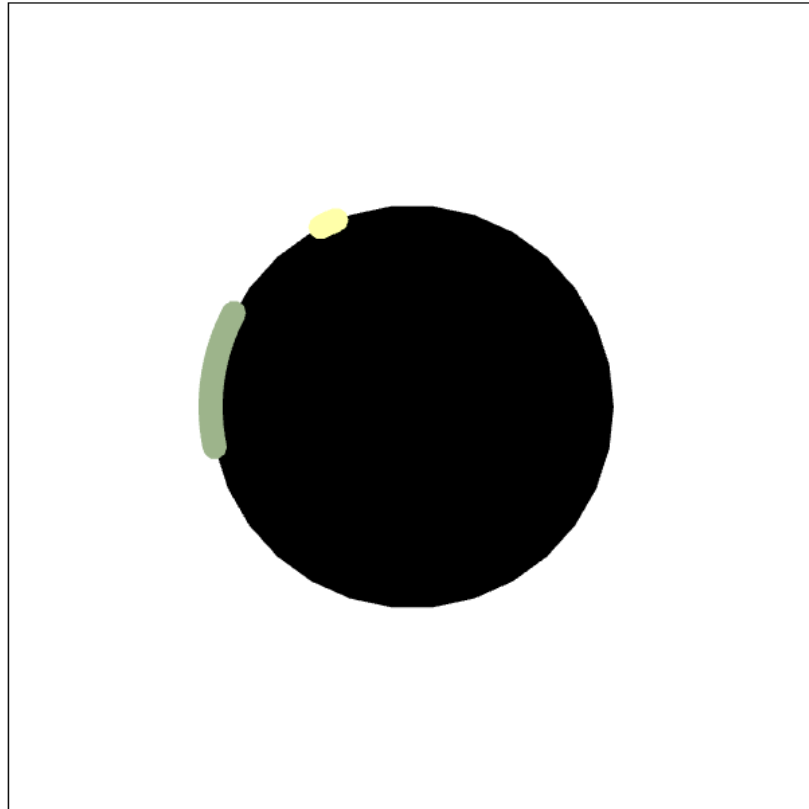
The player is about to click on the left bacteria right after it consumes the one above it.

Score: 19

After the player clicks on that bacteria and administers the poison to remove it, it disappears and 19 score is added to the players total score because it was so large. A smaller amount of score would be added if the player clicked on the pink bacteria at the bottom (most likely 1 or 2).