Metaball Musical Fountain

Introduction

* The metaballs homework assignment was an assignment where I had the opportunity to read about an interesting algorithm that could be extended in many ways to produce various creative results. This inherently is what motivated me to take up this project.

Goal

* With this project, I intend to achieve creating what looks like a magical musical fountain that utilizes metaballs. I hope to create an interesting visualization that incorporates music and has the metaballs simulation animate in such a way that reacts to the music.

Inspiration/Reference

* <http://www.ro.me/tech/metaball-playground>
* <http://jamie-wong.com/2016/07/06/metaballs-and-webgl/>
* <https://threejs.org/examples/webgl_marchingcubes.html>
* <http://www.createjs.com/docs/soundjs/modules/SoundJS.html>
* <https://github.com/CreateJS/SoundJS/blob/master/examples/07_WebAudioNodeInsertion.html>

Specification

* Metaballs
  + Metaballs will originate from a ground plane
  + The metaballs will move in specified directions according to the music
    - The goal is to have them move in a water fountain like fashion, where they sprout from one area and glide in an arch formation to another area (if velocity is given in a specific direction), or just have them drop straight back down in the area they originated from
* Music
  + Music will be set (not user inputted), and specific amplitudes of the music will define the velocity and color of the metaball simulation

Techniques

* Metaballs:
  + I’ll be referencing some of the resources we used for the initial metaballs assignment again to further understand the theory behind how metaballs are formed.
    - <http://paulbourke.net/geometry/polygonise/>
    - <https://developer.nvidia.com/gpugems/GPUGems3/gpugems3_ch01.html>
    - <http://jamie-wong.com/2014/08/19/metaballs-and-marching-squares/>
  + I’ll reference the following to learn how to incorporate variously shaped metaballs
    - <https://www.gamedev.net/resources/_/technical/graphics-programming-and-theory/exploring-metaballs-and-isosurfaces-in-2d-r2556>
    - <https://www.gamedev.net/resources/_/technical/graphics-programming-and-theory/exploring-metaballs-and-isosurfaces-in-2d-r2556>
* Music:
  + I will be referencing the SoundJS library (linked above) in order to incorporate music into my simulation. This means consulting its documentation and examples to program it into my project.

Design

[marching\_cube\_LUT.js]

* Marching Cube look up tables

[metaball.js]

* Implementation of metaball features

[music.js]

* Implementation of SoundJS library

[main.js]

* Incorporate GUI components

[framework.js]

* Implement javascript framework

[marching\_cubes.js]

* Implementation and set up of metaballs simulation

Timeline

* Milestone 1: Set up metaballs to sprout from a ground plane and have music’s amplitude change some simple feature(s) of the metaballs, such as music or velocity
* Milestone 2: Incorporate music more programmatically and add more choreography to the metaballs. Possibly experiment with different shapes for metaballs
* Till final submission: Polish the simulation with shaders