

Metaballs

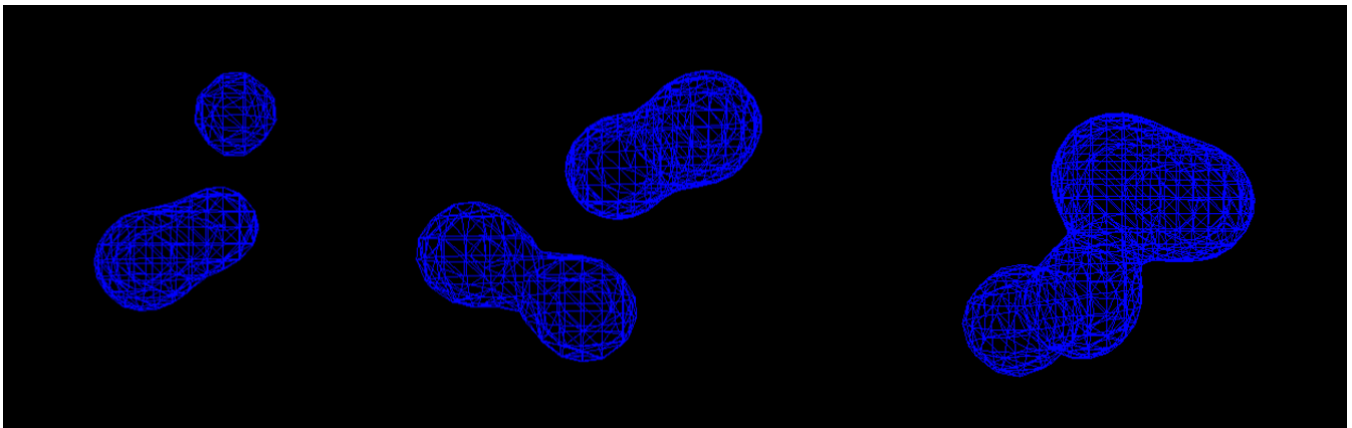
A metaball is an isosurface that divides an nD space into two sets. The volume enclosed by a metaball or a group of metaballs is determined by a threshold, i.e.,

$$\sum_i \text{metaball}_i(\mathbf{x}, \mathbf{y}, \mathbf{z}) \leq \text{threshold}$$

Functions defining metaballs should have finite support (it should go to zero at a maximum radius) and should be smooth. An example of such a function is

$$f(\mathbf{x}, \mathbf{y}, \mathbf{z}) = q / ((\mathbf{x} - \mathbf{x}_0)^2 + (\mathbf{y} - \mathbf{y}_0)^2 + (\mathbf{z} - \mathbf{z}_0)^2)$$

i.e., the electric field of a point charge. The Marching Cubes Algorithm is often used to generate a triangle mesh that approximates the resulting isosurface. A detailed description of the Marching Cubes algorithm can be found here: <http://paulbourke.net/geometry/polygonise/>



Implementation: <https://github.com/rohan-sawhney/metaballs>