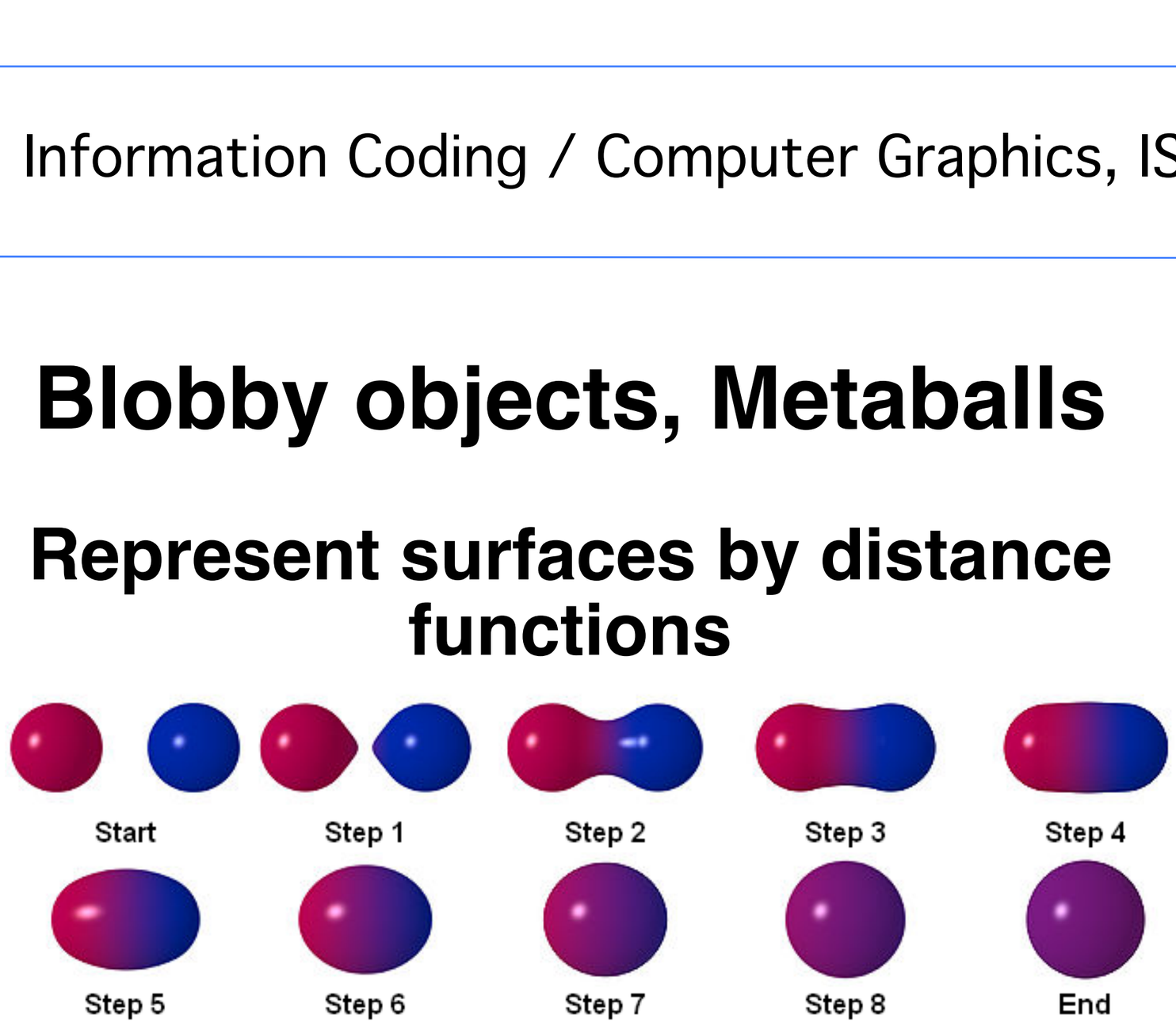
Blobby objects, Metaballs

Represent surfaces by distance functions

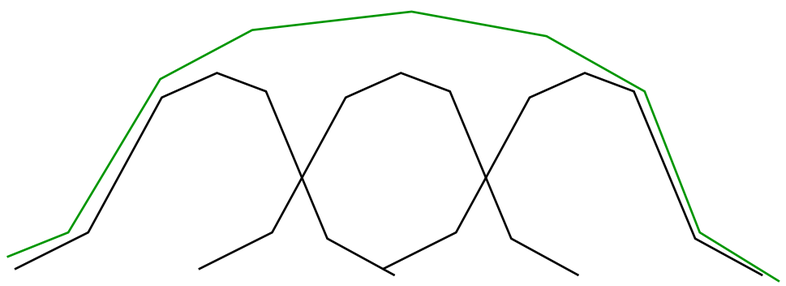


Yet another image stolen from Wikipedia

A shape = set of points + weights

Blobby objects

Gaussian functions (”Gaussian bumps”)



$$f(x) = \sum b_k * \exp(x - p_k)$$

Surface at f(x) = threshold

But Gaussians are not fast!

Blobby objects

A function that has a top at 1 and falls off to zero! Best if:

- Smooth

- Reaches zero at a known radius! (Why?)

Possible function:

$$f(x) = R / \mathrm{sqrt}((x - x_0)^2)$$

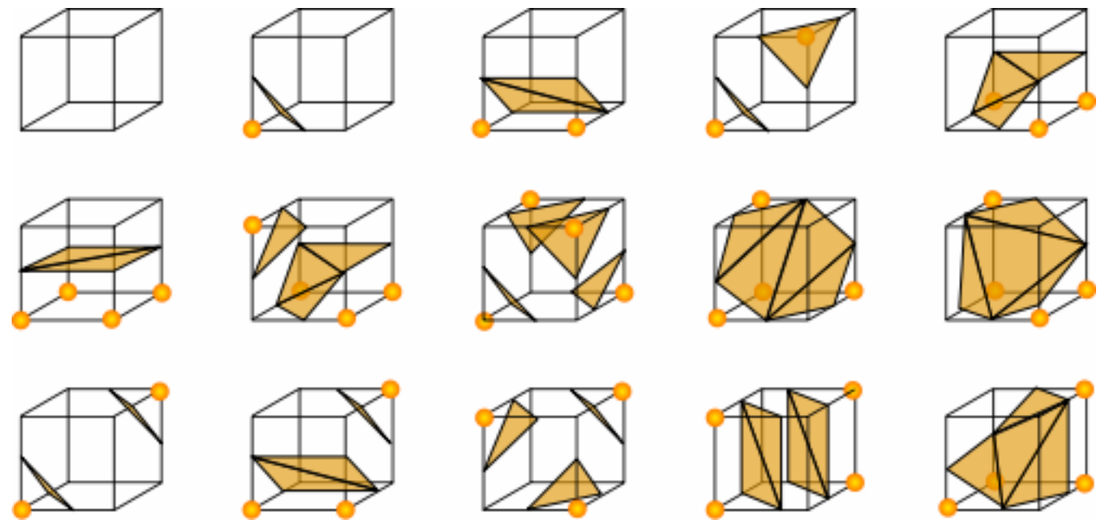
Even better if we can avoid division and square root

Rendering:

- **Raycasting**
- **Marching cubes**

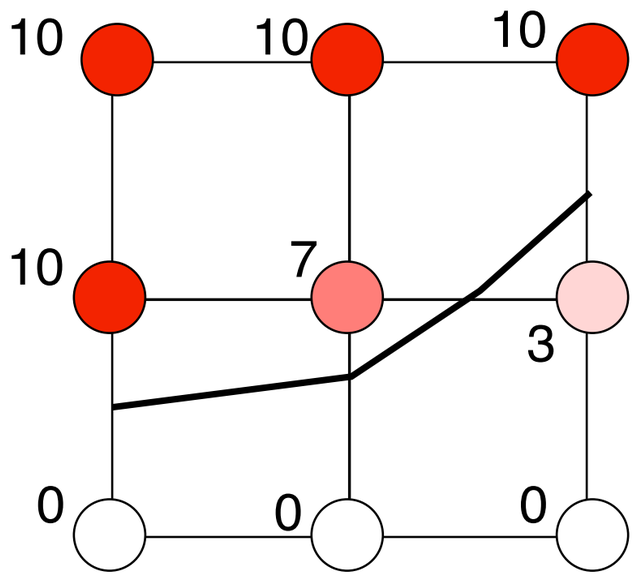
Marching Cubes

Creates a surface from a grid of density values



Example: Marching Squares

Marching Cubes in 2D



Surface at 5

Conclusions for blobby objects

Can be rendered in real time - preferrably by Marching Cubes

Compact representation for ”Gooey” materials

Famous for screen savers - but what else?

More related topics later

Fractals

Noise

Terrain generation