Marching Cubes: A High Resolution Surface Construction Algorithm

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Polygon Models

- Advantages
  - Explicit connectivity information
  - Easy to render
  - (Relatively) small storage

- Disadvantages
  - Topology changes difficult
  - Inside/Outside test hard
Implicit Representations of Shape

- Shape described by solution to $f(x) = c$

$$f(x, y) = x^2 + y^2 - 9$$
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Advantages

- No topology to maintain
- Always defines a closed surface!
- Inside/Outside test
- CSG operations
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Disadvantages

- Hard to render - no polygons
- Creating polygons amounts to root finding
- Arbitrary shapes hard to represent as an analytic function
- Certain operations (like simplification) can be difficult
Non-Analytic Implicit Functions

- Sample functions over grids
Non-Analytic Implicit Functions

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Data Sources
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2D Surface Reconstruction
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2D Surface Reconstruction
3D Surface Reconstruction
3D Surface Reconstruction
Fun Examples
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