# Marching Cubes: A High Resolution Surface Construction Algorithm

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Computer
Science

# 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 $f(x)=c$

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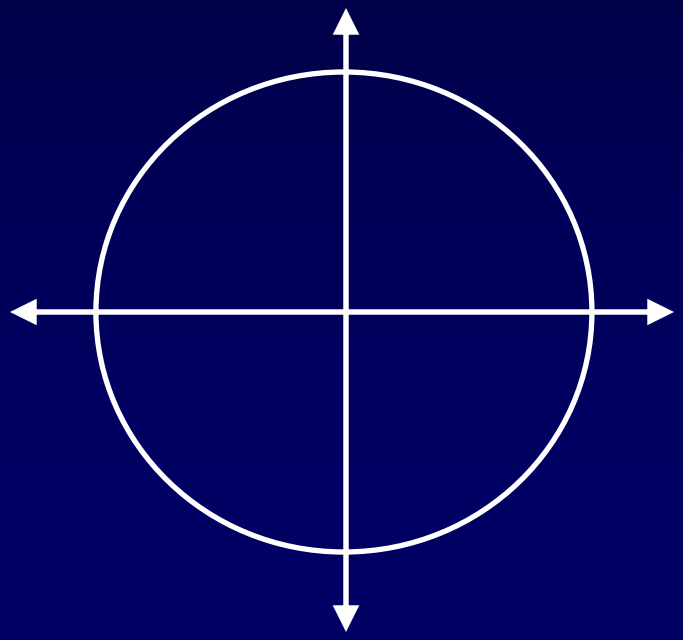

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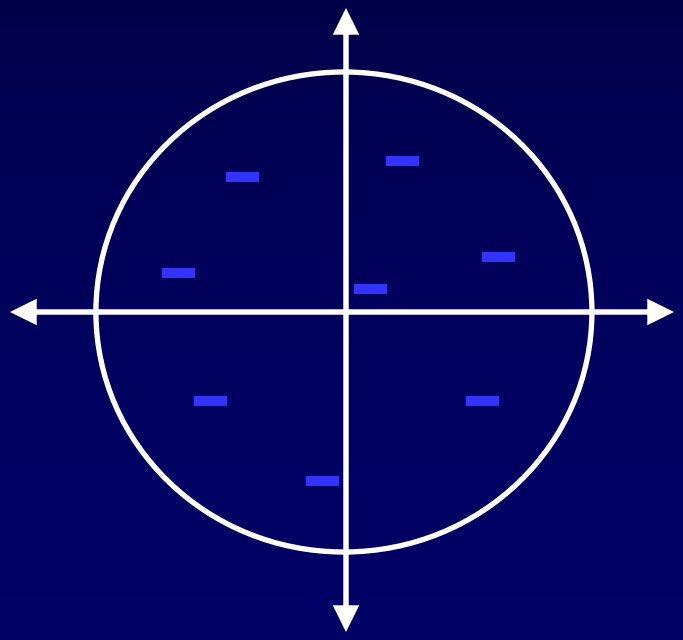

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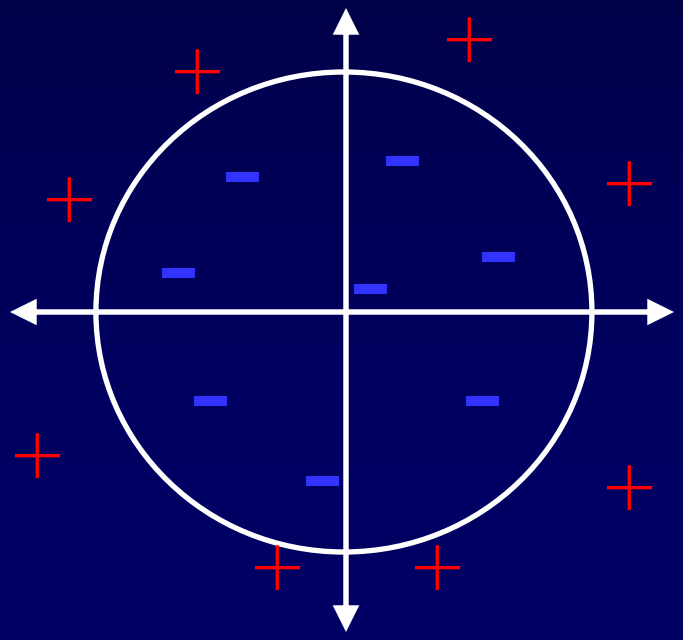

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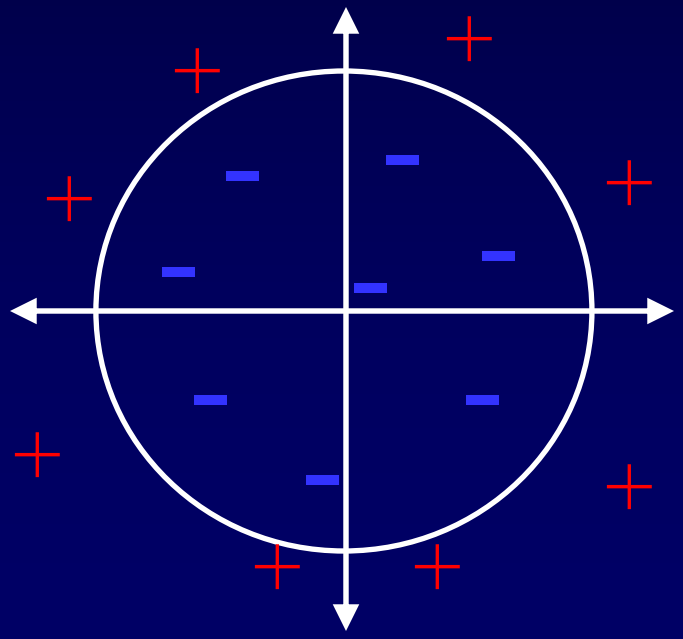

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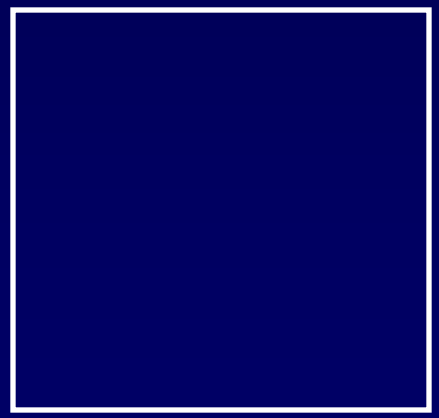

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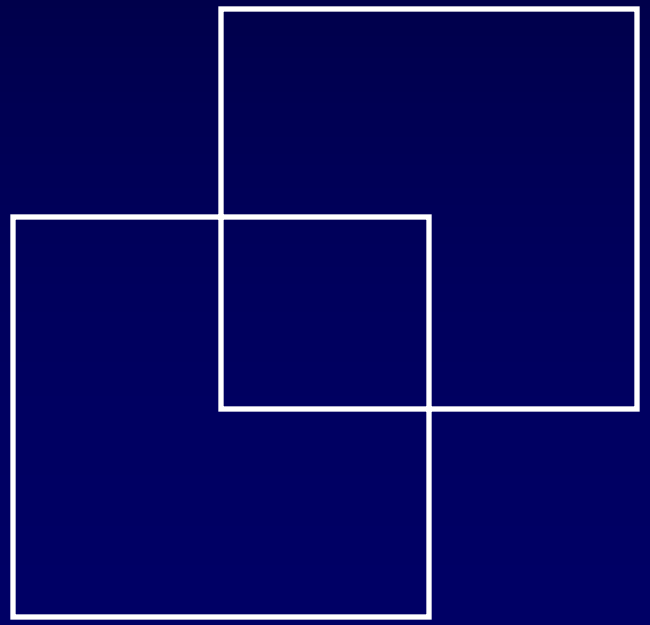

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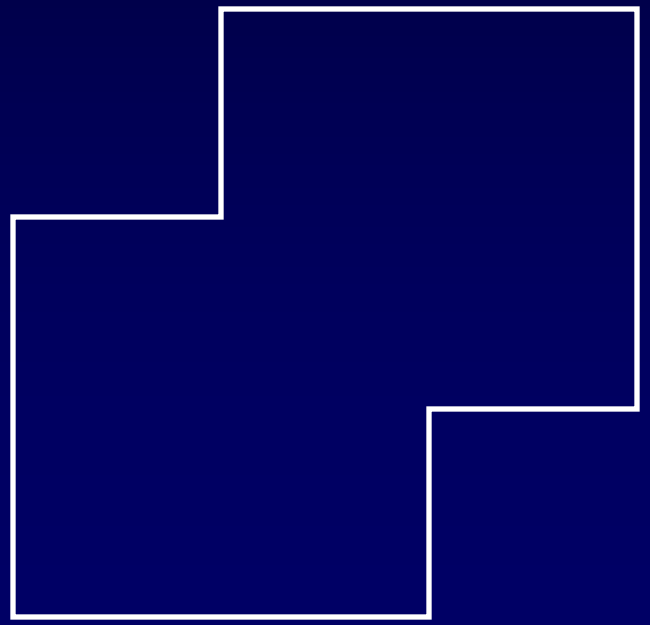

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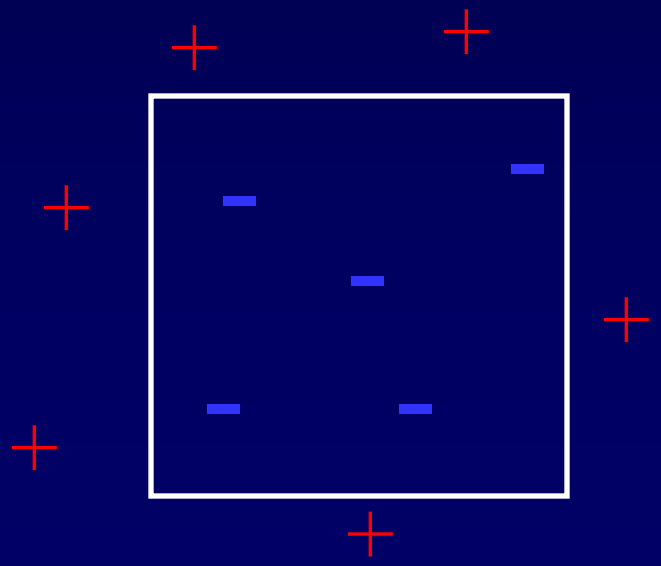

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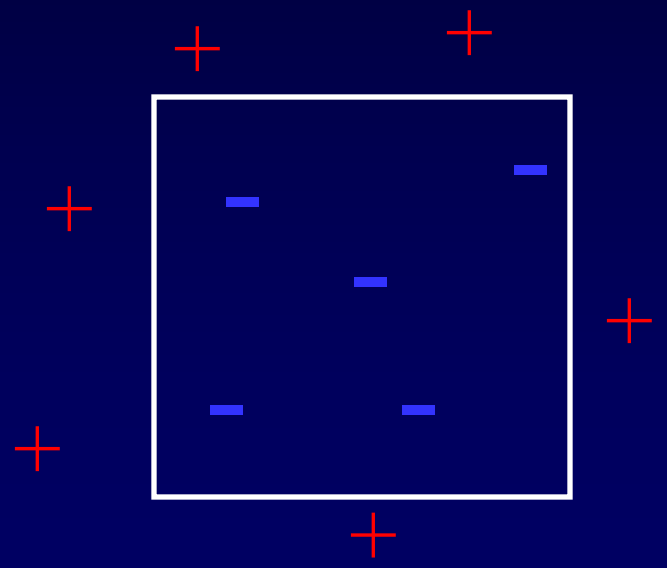

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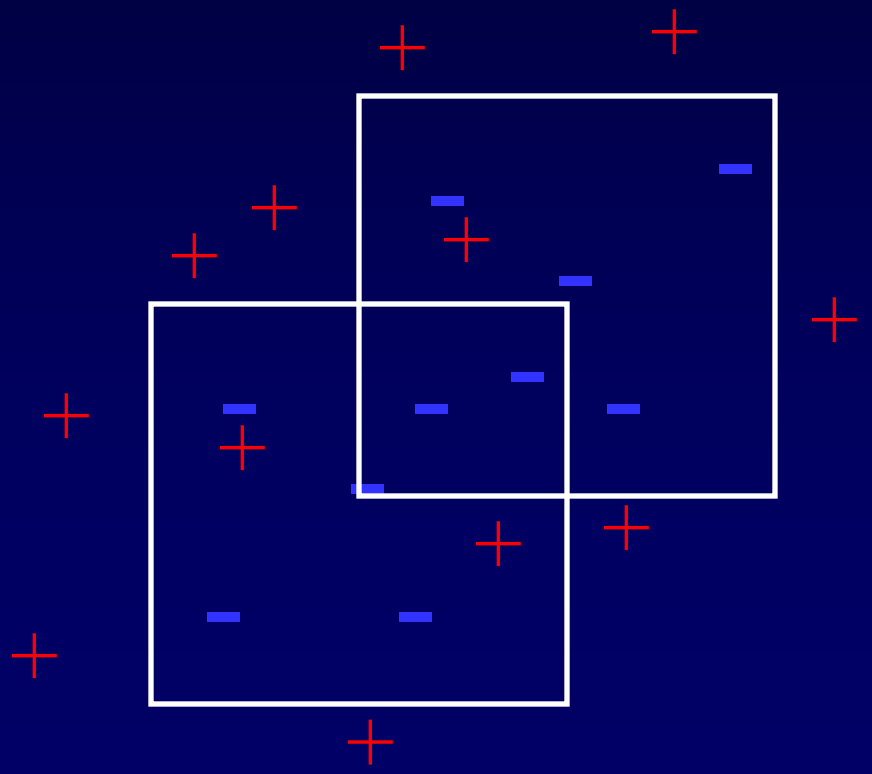

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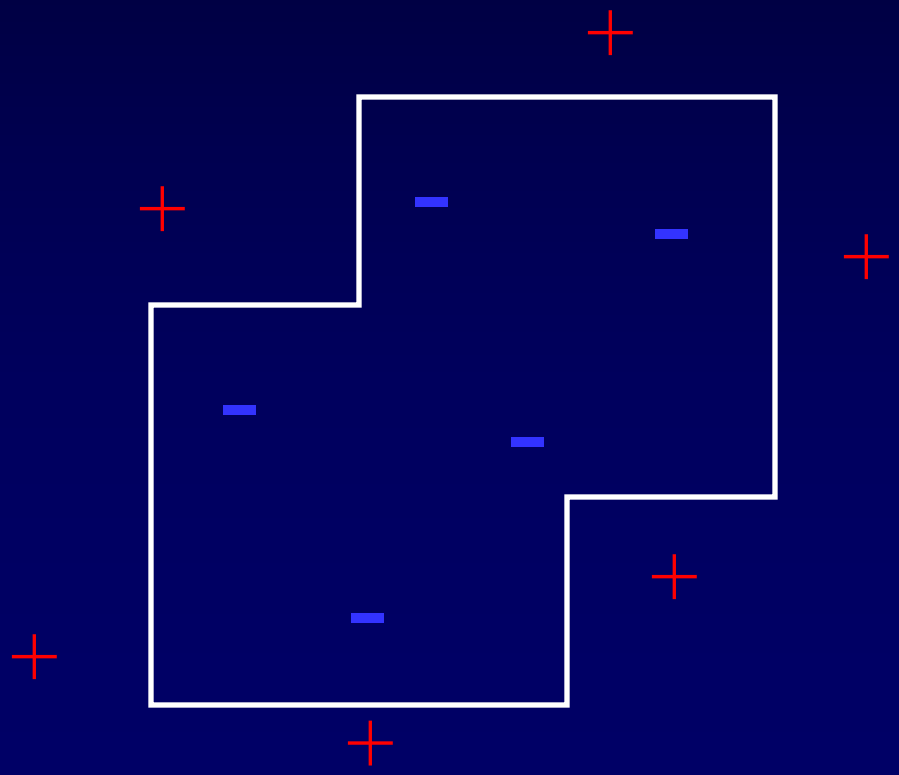

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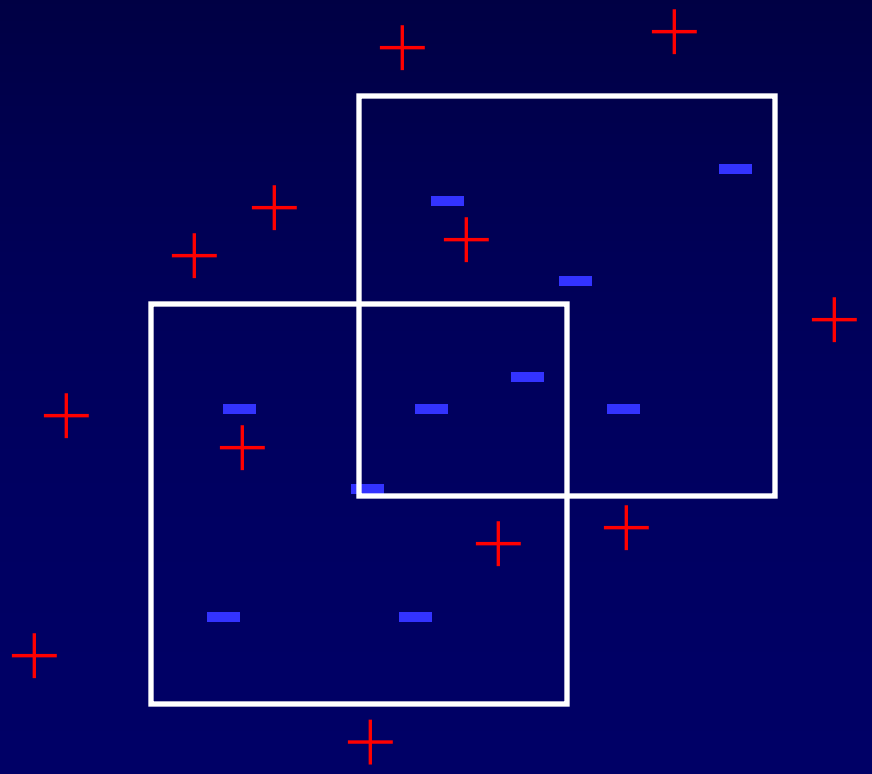

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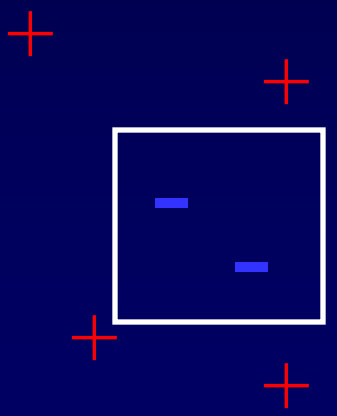

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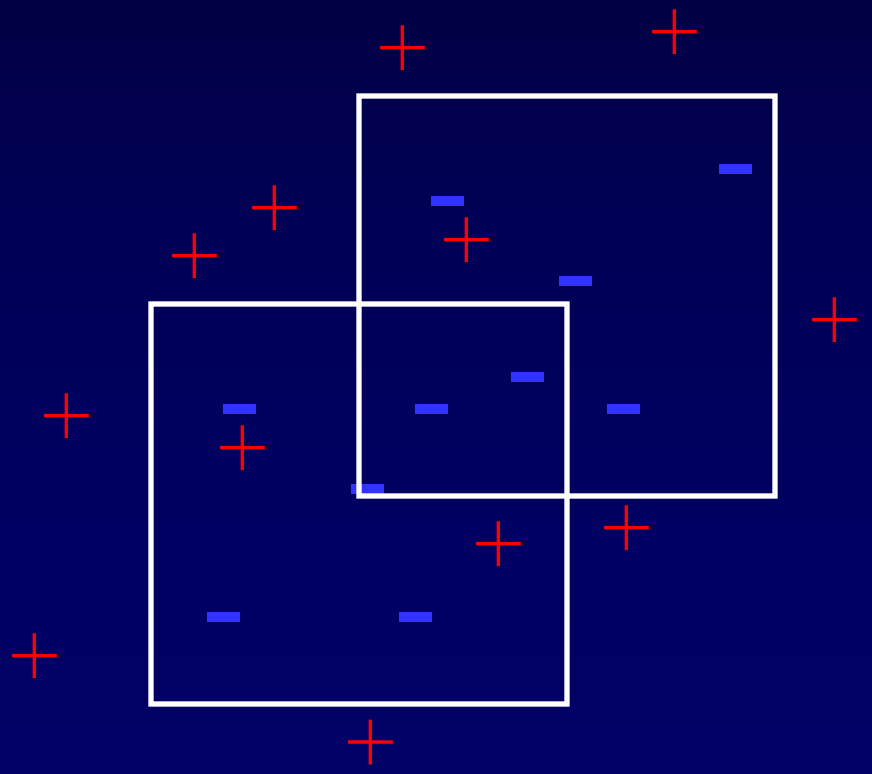

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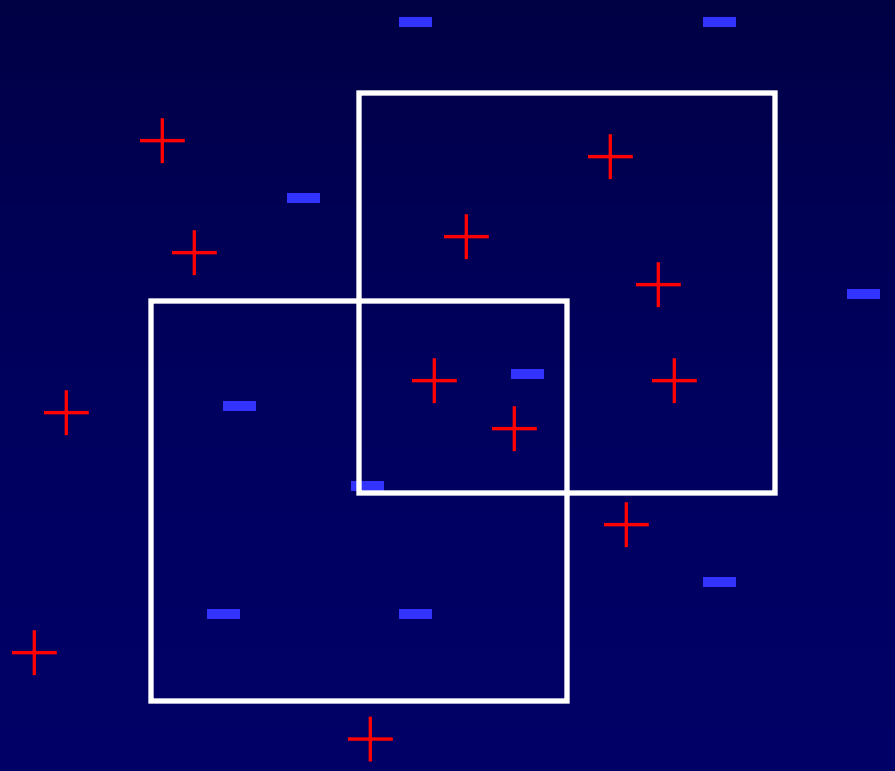

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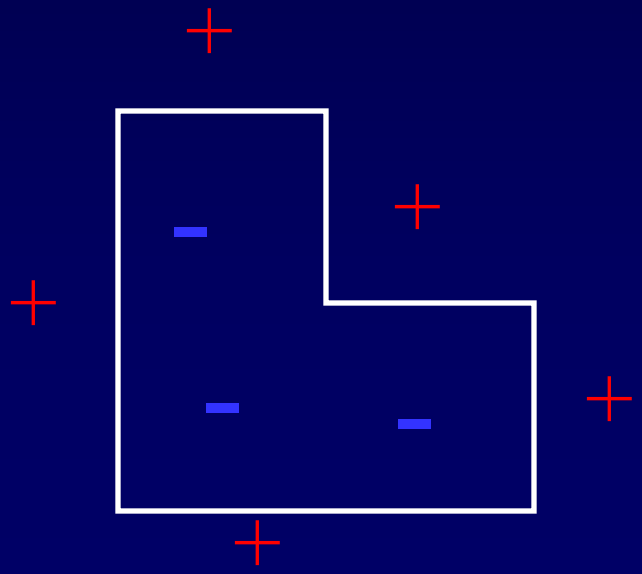

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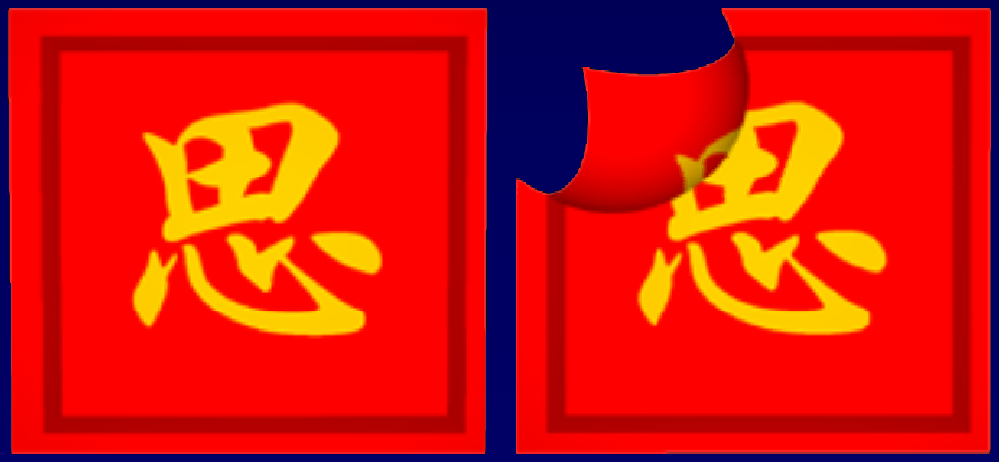
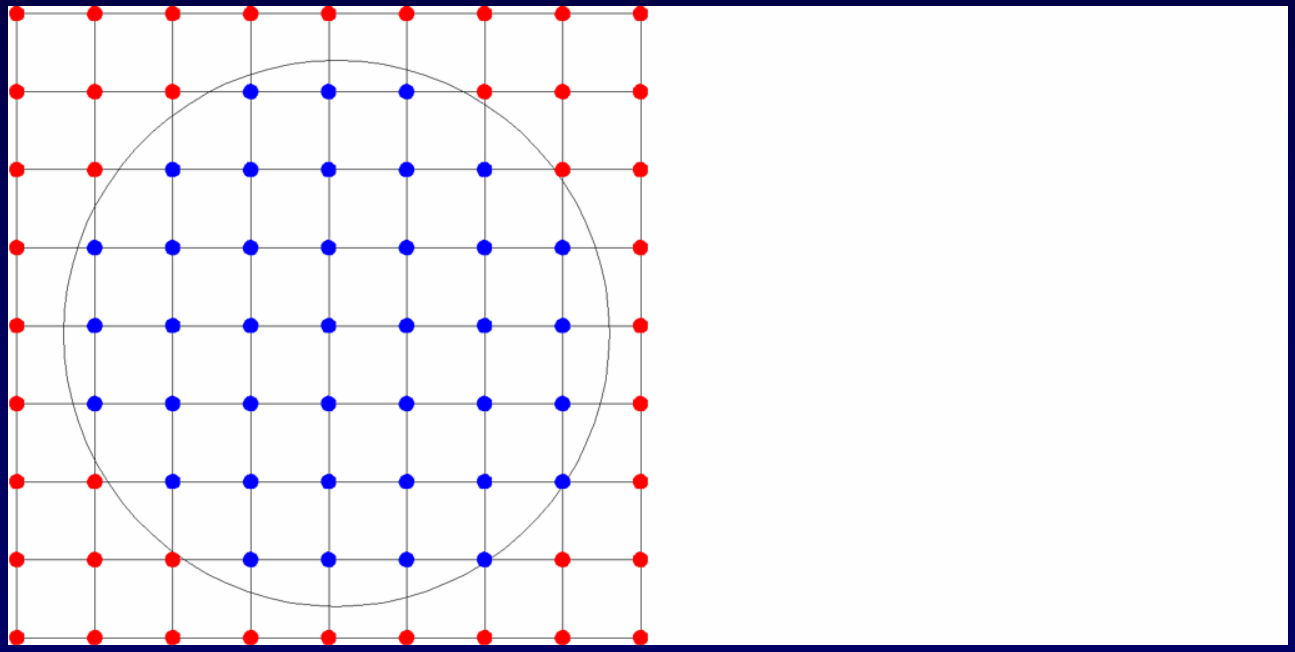


# Disadvantages

- 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



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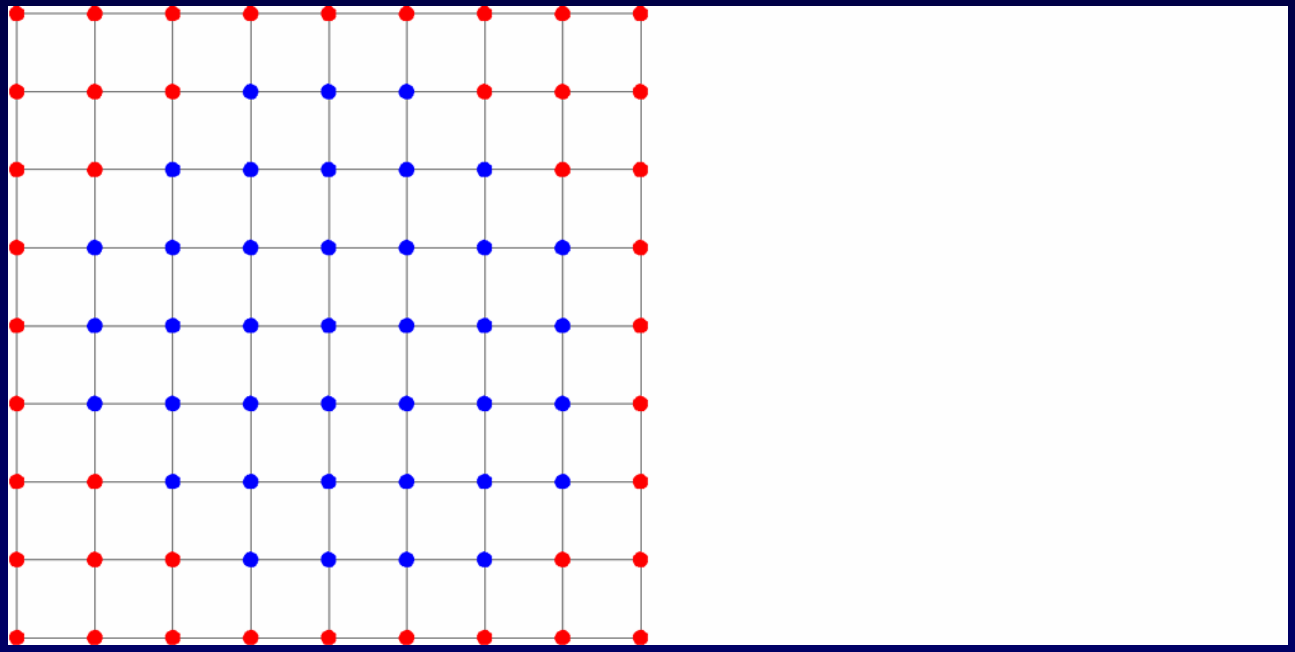

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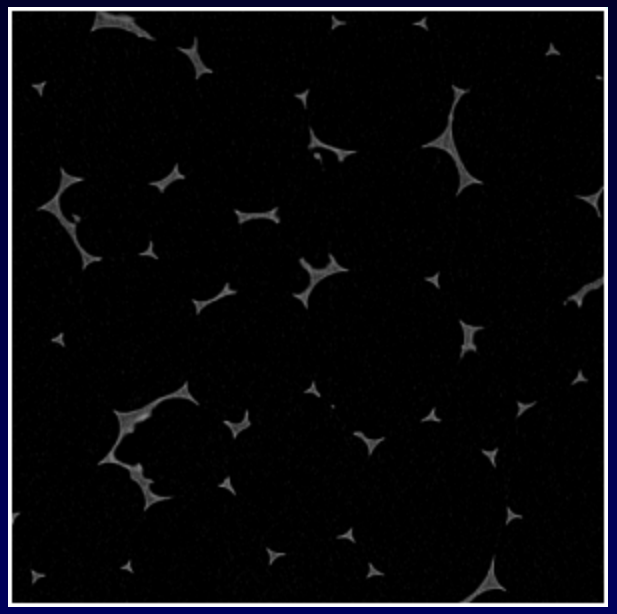

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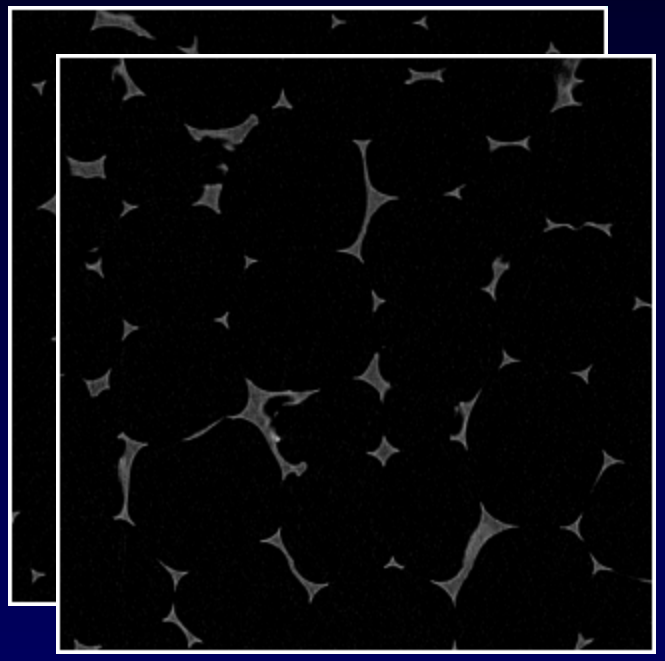

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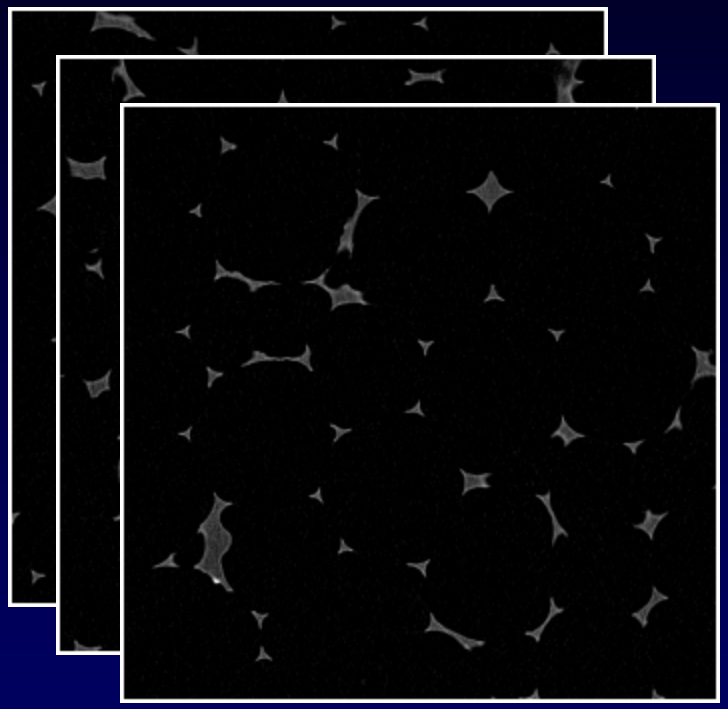

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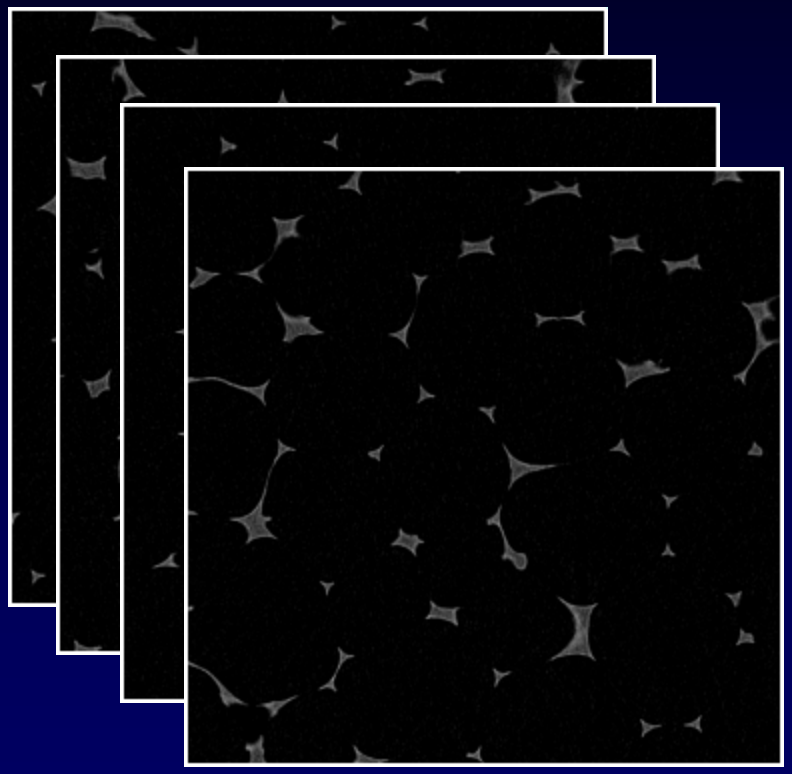

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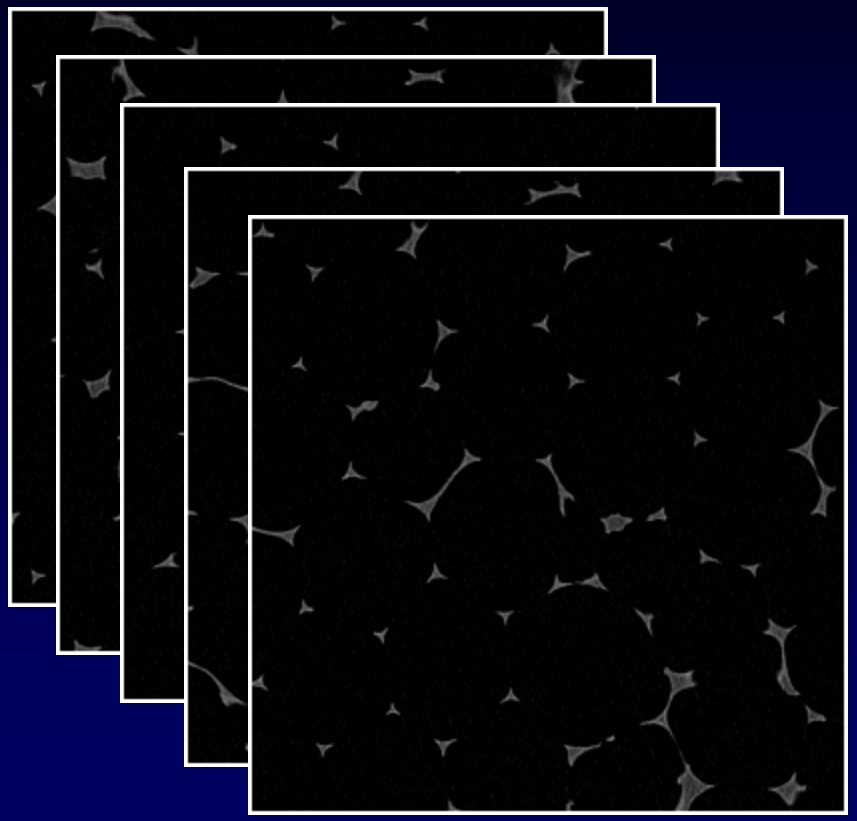

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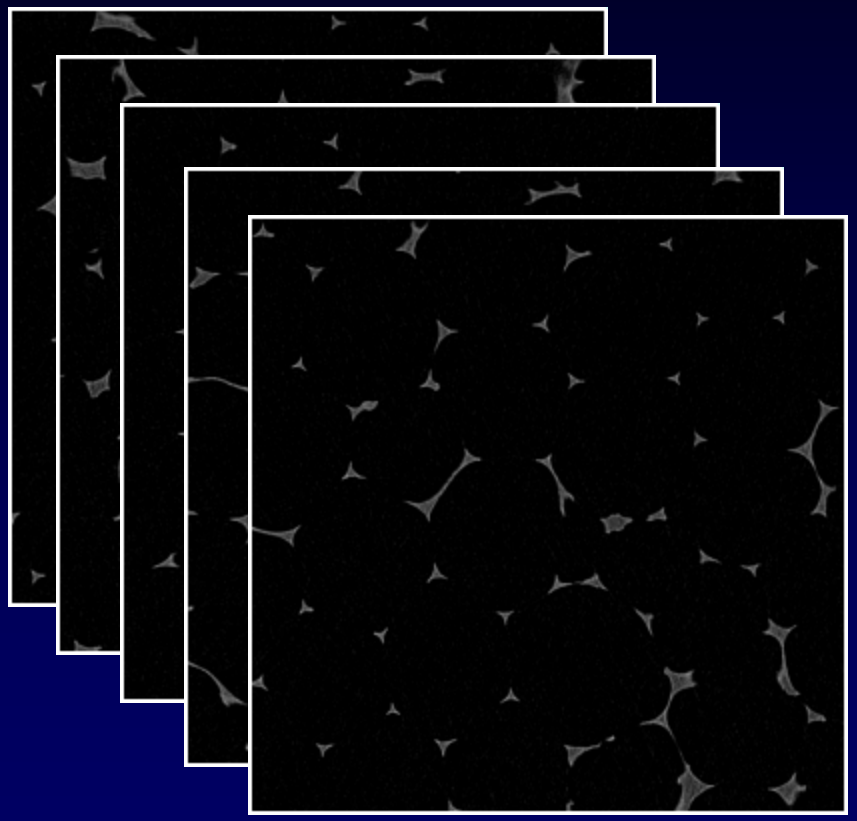

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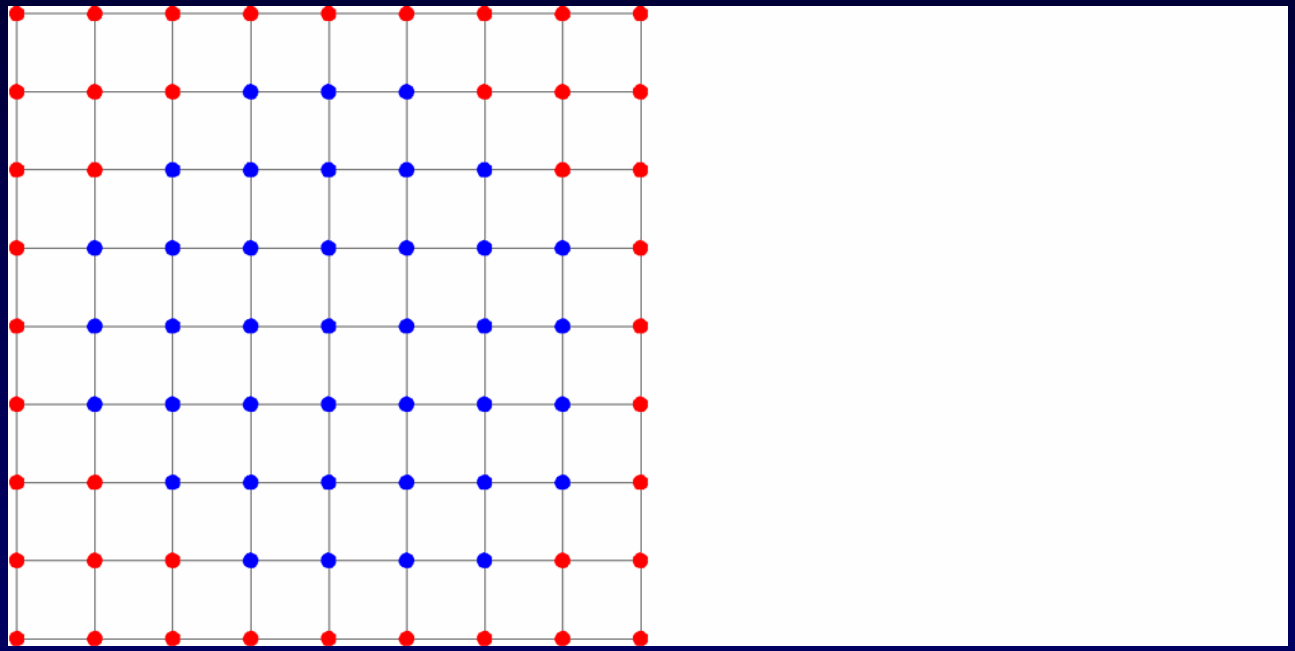

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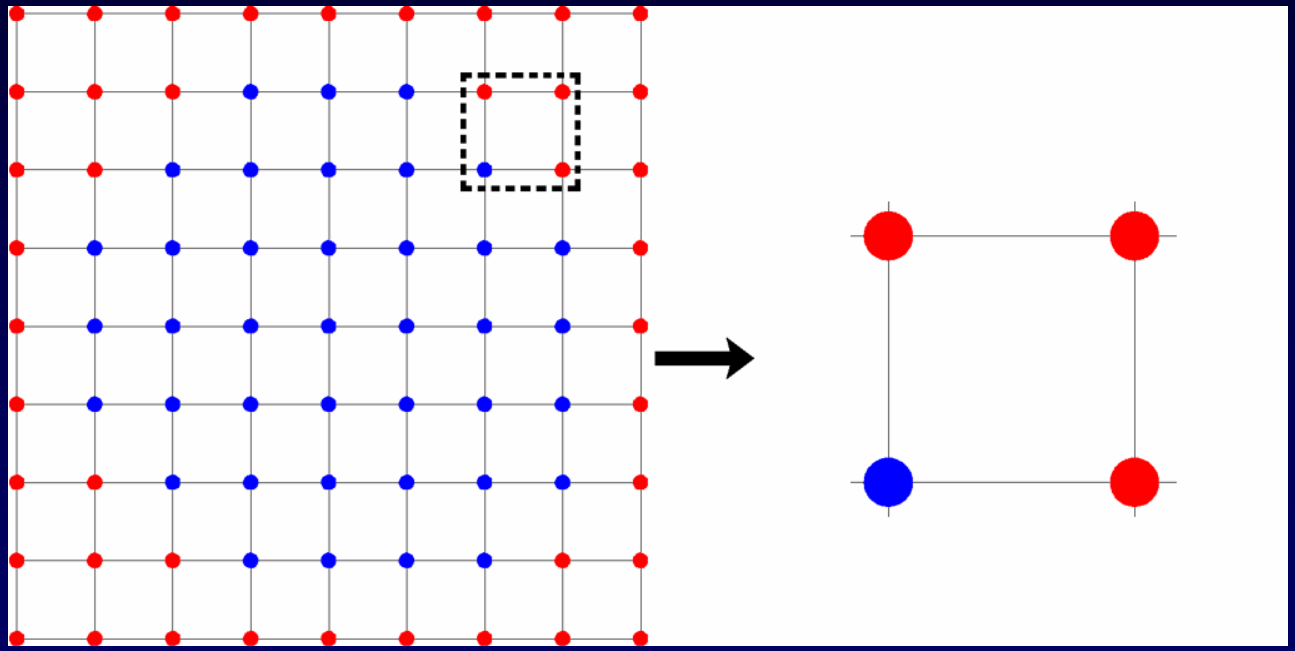

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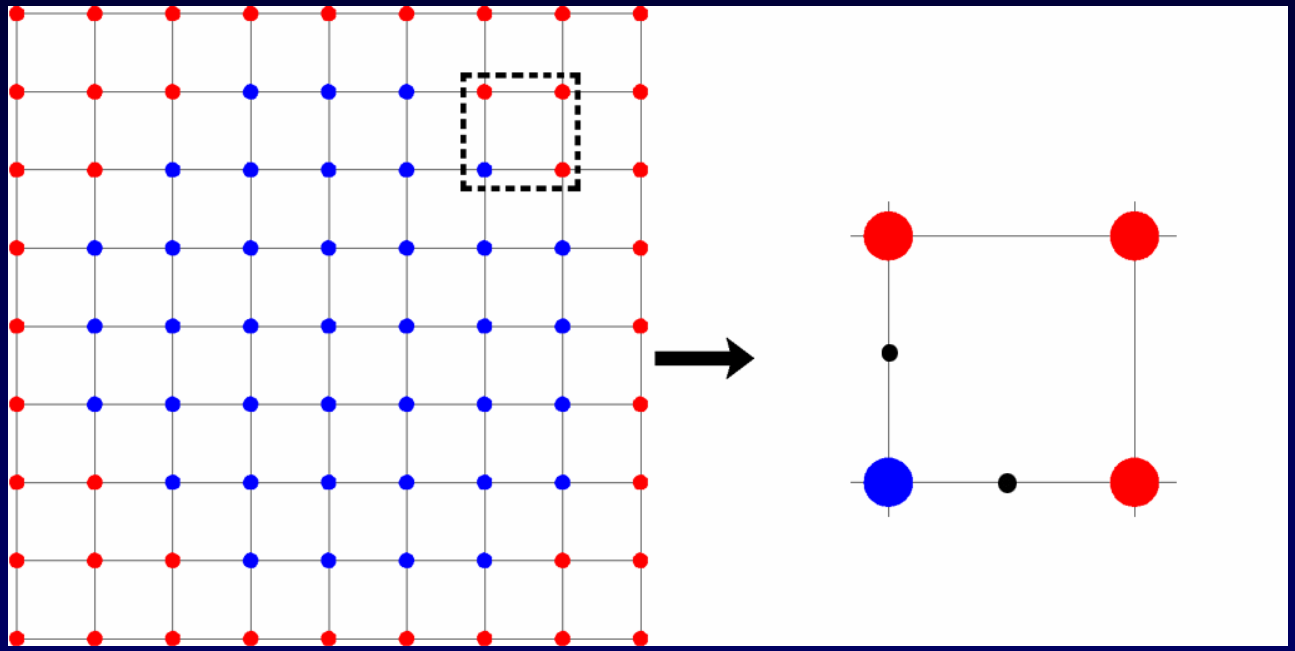

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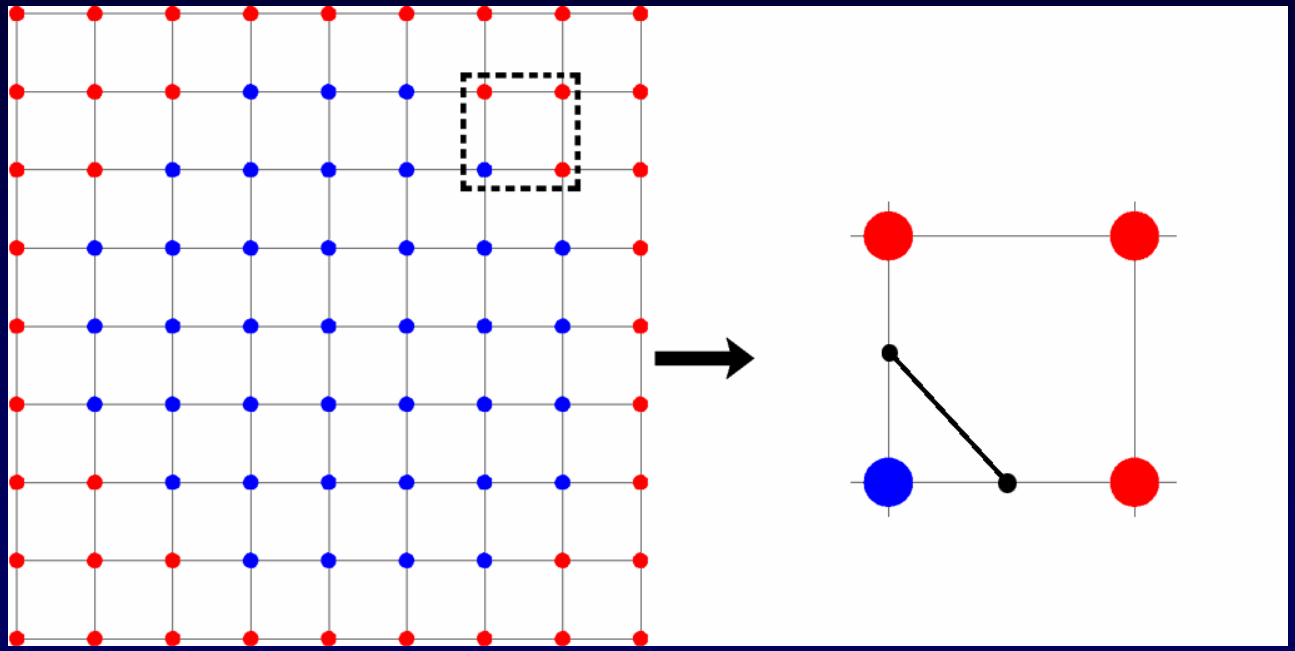

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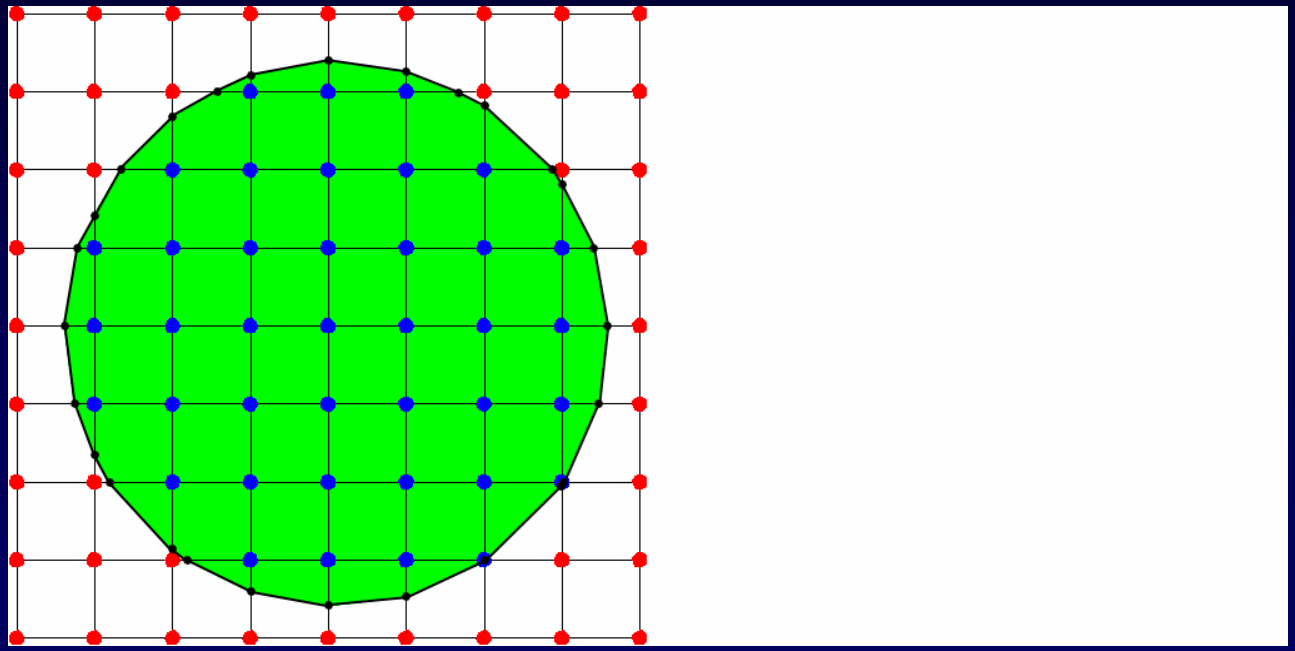

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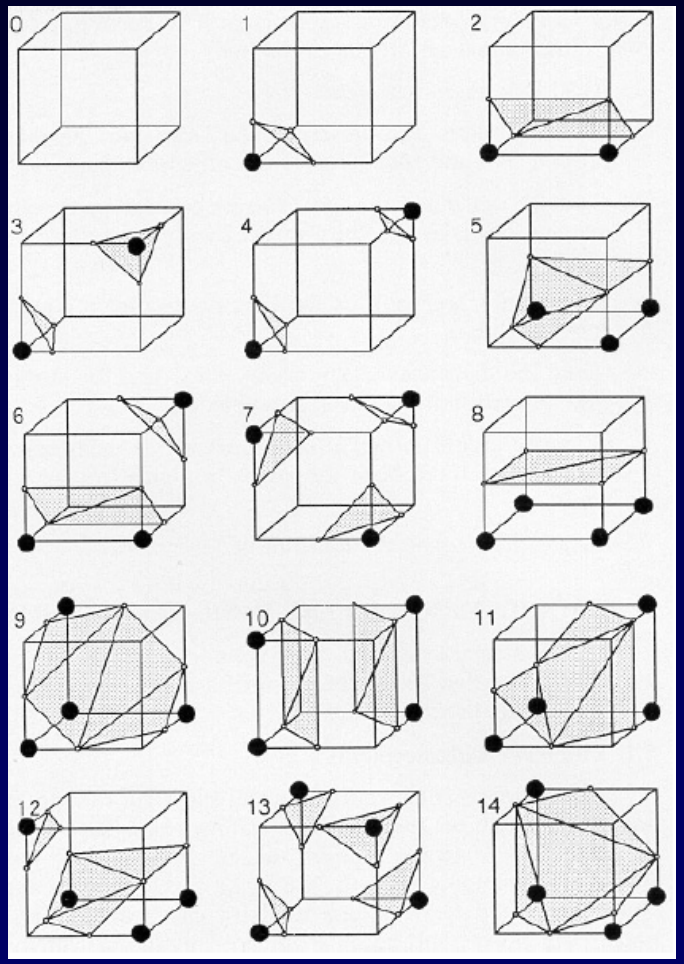


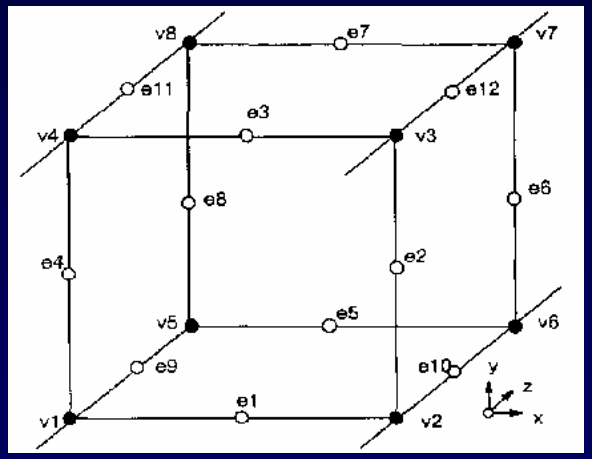

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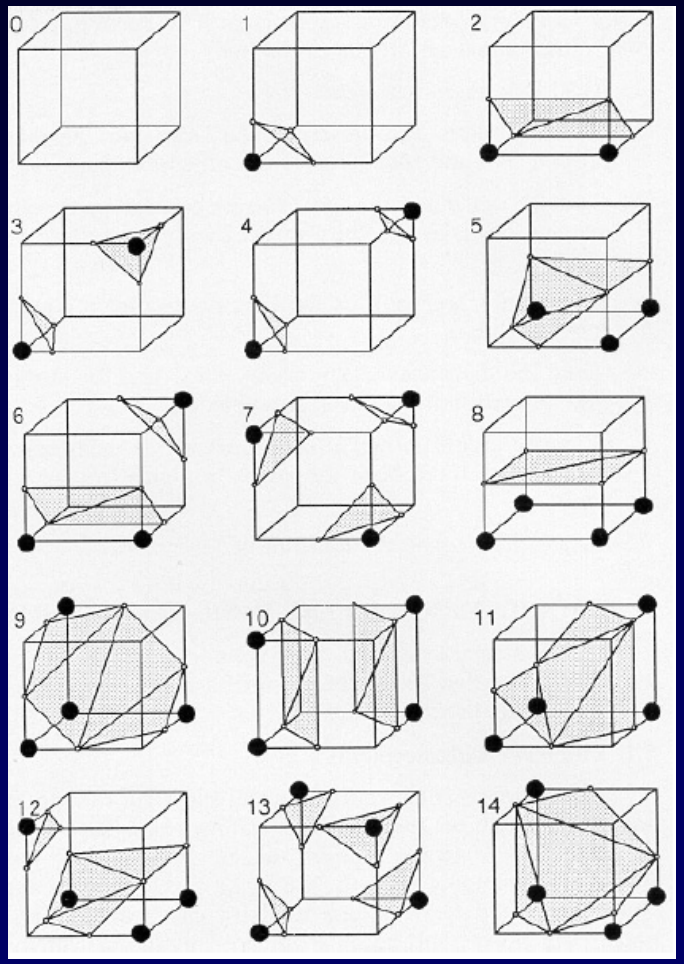


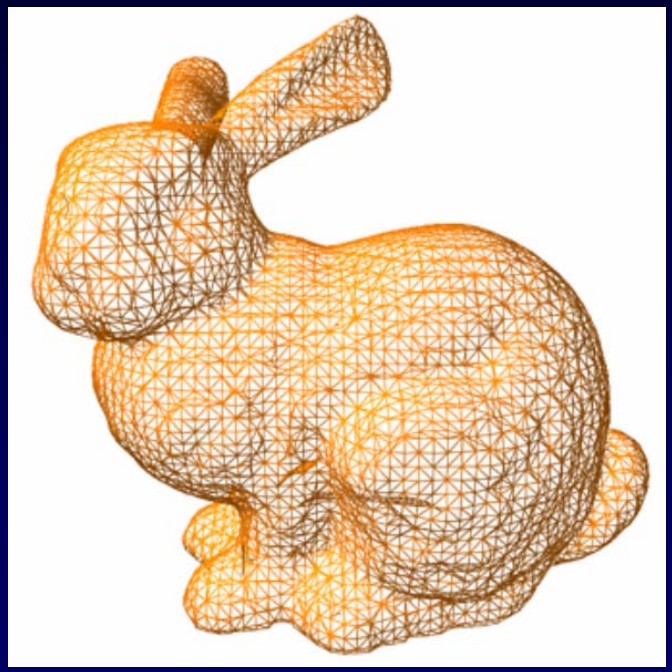

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