Line Labeling

“Waltz Line Labeling”
A polyhedral scene
A fully labeled image
(notice the few ambiguities)
Old symbolic concept used to identify and label elements of polyhedral shapes in an image.

Breaks polyhedral shapes into two sets of elements:
- Junctions
- Planes.
Junctions & Planes

➔ Types of junctions:
  ◆ T
  ◆ Arrow
  ◆ Y
  ◆ L

The labels associated with each line store information describing the relation between elements.

- General location
- Orientation and Interrelations
- Occlusion

Labels give depth, creating 3D perspective.

Types of line labels

➔ **Blade**
  - ( > ) or ( ▶ ) on a line. A single arrow. Only happens when convex and occluding other edge.

➔ **Convex**
  - ( + ) next to a line. An edge of an unoccluded plane face.

➔ **Concave**
  - ( - ) next to a line. An edge of an occluded face plane.
Labeled Polyhedral Shapes

Impossible Labels

What can you make of this image?

Implementation: Constraint Satisfaction

Concept Application

- In a line drawing or edge image, for each vertex:
  - Apply all physically possible labels
  - Eliminate more impossible labels by comparing neighboring labels

Constraint Satisfaction

- \{Variable Set, Domain Set, Constraint Set\}

Sources

- Ch. 9 “Representations of Three-Dimensional Structures”, section 9.5 “Understanding Line Drawings”
- Ch. 12 “Symbolic Constraints and Propagation”