1. Picture-Interpretation Problem
Given a picture composed of line segments, judge whether it represents a polyhedral scene.

2. Mathematical Method for Interpretation
2.1 Assumptions
Assumption 1. Objects are solid bounded by planar faces.
Assumption 2. The viewpoint is in general position.
Assumption 3. Each vertex is incident to exactly three faces.
Assumption 4. Visible edges only are drawn in the picture.
Assumption 5. The whole part of the object is drawn in the picture.

2.2 Construction of a Junction Dictionary
Classify the edges into three types: convex, concave, and silhouette, edges, which are represented by different labels.

Thus obtain the list of possible junctions. This is called the "junction dictionary", because it can be used for interpretation of pictures.

2.3 Picture Interpretation with the Junction Dictionary
Assign labels to edges according to the junction dictionary, and thus obtain a candidate of interpretation.

The junction dictionary is not perfect because the obtained interpretation is not necessarily correct.

2.4 Strict Judgment of the Correctness

Theorem 1. The picture represents a polyhedral scene if and only if $A_w = 0$ and $B_w > 0$ has solutions.

This theorem is too strict because the next picture is judged incorrect.

2.5 Robust and Flexible Judgment

The overstrictness comes from redundancy of the system equations.

Theorem 2. The system of equations is non-redundant if and only if the following inequality is hold for any subset with $|\mathcal{F}| \geq 2$:

$$\sum_{v \in \mathcal{V}} x_v + 3|\mathcal{F}| + |\mathcal{R}| + 4$$

where $\mathcal{V}$ represents the set of vertices, $\mathcal{F}$ the set of faces, and $\mathcal{R}$ the set of equations.

3. Realization of “Impossible Objects”

4. Invention of “Impossible Motions”