Semantics of Simple Arrow Diagrams
Yohei Kurata and Max J. Egenhofer
National Center for Geographic Information and Analysis & Department of Spatial Information Science and Engineering
University of Maine
{yohei, max}@spatial.maine.edu

Why Arrows?
Arrows are a major component of diagrams, which are used multi-purposely to facilitate the communication of spatial and temporal knowledge.

Research Goal
To develop a computational method for interpreting the meaning of arrow diagrams.

Approach
The appearance of the arrow symbol alone does not determine any meaning—the meaning is established when the arrow symbol originates from, traverses, or points to other elements in the diagram.

Ongoing Work
With the three component slots and the five types of components, we can distinguish 6^3 = 216 types of simple arrow diagrams.

We investigated what semantics each type of arrow diagrams may illustrate, by classifying the arrow-related semantics into four classes (property, annotation, conjunction, and action) and considering the structural requirements for illustrating each class of semantics.

We found that:
- 83 types of arrow diagrams are meaningless.
- 15+4+12+50 = 81 types lead to a unique interpretation.
- 4+4+44 = 52 types are still ambiguous

For the 52 types of ambiguous arrow diagrams, we are now trying to determine the most reliable interpretation, making use of various clues in diagrams, such as the intrinsic orientations of objects.