

Modeling Diagrammatic Reasoning: Route Planning on a Grid Based Map

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ABSTRACT:

The process of diagrammatic reasoning is of particular importance in the area of military mission planning. Maps are specific instances of diagrams and are used to provide current and projected information. Diagrams are known to provide geo-spatial information quickly and concisely with minimal human cognitive processing requirements. This has the effect of reducing the memory required during the planning process relative to text-heavy presentations of the same information. Diagrams are also often modified during the planning process to reflect potential situations and the resultant diagram is used to plan possible responses.

I am currently building a cognitive model of route planning utilizing grid based maps in the ACT-R (Adaptive Control of Thought - Rational) cognitive architecture. This architecture has been used to build models of a wide variety of cognitive processes. This model currently examines a complete grid for a location B and then plans a shortest route from a known location on the map to the location B.

The choice to model a grid-based map was based on the work of Chandrasekaran and Josephson at Ohio State University. In this work, diagrams are constructed from points, lines, and regions and the phenomena and relations that emerge from these geometric objects. The long term goal is to fully incorporate these objects in the cognitive model. As a result, the route planning process will incorporate information about passable/impassible regions and incomplete grid structures.

KEY WORDS: cognitive models, diagrammatic reasoning, ACT-R

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