TDD - A Comprehensive Model for Qualitative Spatial Similarity Assessment

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Abstract

Similarity plays a fundamental role in the human cognition process. It serves as a principle of categorization, inductive reasoning, and analogical inference. Spatial similarity assessment plays the same role in the retrieval, integration, and data mining of spatial information. In this paper, we introduce the basic components of a similarity assessment model. The model makes a contribution in the following aspects. First, it applies the order of priority topology → direction → distance into spatial similarity assessment. Second, instead of measuring the distance between stimuli, which neglects the effect of common features, we adopt Tversky's feature contrast model, which considers both commonality and difference in similarity assessment. Third, our model applies spatial alignment, which was considered as an assumption in previous research. Fourth, it relaxes the rule used in previous research, which considered identical the transformation costs of each edge belonging to a conceptual neighborhood network. In order to address this fourth point, we group the topological relationships and introduce the concepts of inter- and intra-group transformation costs. The inter-group transformation cost has a higher value than the intra-group transformation cost. We call the model TDD for Topology-Direction-Distance.