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Computational Implementation of a Model of Category-Theroretic Metaphor Comprehension

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Abstract

In this study, we developed a computational implementation for a model of metaphor comprehension based on the theory of indeterminate natural transformation (TINT) proposed by Fuyama et al. We simplified the algorithms implementing the model to be closer to the original theory and verified it through data fitting and simulations. For details, we proposed a method to replace the deterministic operation of existing model with a probabilistic (softmax) operation. The outputs of the algorithms are evaluated with three measures: data-fitting with experimental data, the size of the correspondence of the metaphor comprehension result, and the novelty of the comprehension (i.e. the correspondence of the associative structure of the source and target of the metaphor). The improved algorithm outperformed the existing one in all the three measures. We suggest that the metaphor comprehension process in humans is based on more probabilistic procedure.

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