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Unifying exemplar and prototype models of categorization

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Abstract

Prototype and exemplar models have each found support in the cognitive science literature on human concepts and categorization. The two model classes have complementary strengths. Prototype models can be more computationally efficient and interpretable whereas exemplar models can represent vastly more complex relationships. Rather than posit one or the other, some researchers have proposed people shift between prototype and exemplar representations, for example over the course of learning. Other researchers have offered models that combine features of prototype and exemplar models. Here, we propose new approaches to reconciling prototype and exemplar models. We demonstrate how tune-able modifications to the k-nearest neighbor (kNN) classifier combined with clustering techniques can capture human performance as documented in cognitive science studies where people learn small, artificial concept structures, and can also scale to large machine learning contexts. Our findings show the value of fluid and flexible approaches in unifying prototype and exemplar representations.