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Proceedings of the Annual Meeting of the Cognitive Science Society

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Journal

Proceedings of the Annual Meeting of the Cognitive Science Society, 44(44)

Authors

Upadhyay, Neha

Mittal, Kritika

Varma, Sashank

Publication Date

2022

Peer reviewed

Typicality Gradients in Computer Vision Models

Neha Upadhyay

Georgia Institute of Technology, Atlanta, Georgia, United States

Kritika Mittal

Georgia Institute of Technology, Atlanta, Georgia, United States

Sashank Varma

Georgia Tech, Atlanta, Georgia, United States

Abstract

Rosch (1975) proposed that some exemplars are more typical of a category than others. Typicality gradients have historically been estimated from data collected from human participants. Here, we investigated whether they can be estimated from a computer vision model, VGG19, guided by cognitive science models of concepts and categorization. Following prototype models, we estimated the similarity of each exemplar to the concept prototype computed in two ways (average across all exemplars, most typical exemplar). Following exemplar models, we computed the pairwise similarities between pairs of exemplars and used MDS to order them on a continuum. The prototype-average model achieved the highest rank-order correlation to human typicality ratings of exemplars of the bird category. Thus, computer vision models may have some promise for generating human-like typicality gradients. We are extending this work to utilize newer computer vision models such as ResNet, and to encompass a broader range of categories.