Deep Networks Predict Attentional Bias in Category Learning

Submission ID 3000194

Submission Type Poster

Topic Artificial Intelligence

Status Submitted

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SUBMISSION DETAILS

Presentation Type Either Poster or Oral Presentation

Presentation Abstract Summary Human category learning is known to be a function of both the complexity of the category rule and attentional bias. We compared the performance and success of a shallow single hidden layer backpropagation (BP) neural network and a deep learning neural network (DL) when modeling attentional bias in a category learning tasks in which both category structure (separable or integral) and attentional bias (filtration or condensation) were manipulated using 2D binary stimuli or high dimensional naturalistic stimuli. Our results show that while BP needs the similarity gradient of more naturalistic stimuli, DL can successfully model the attentional bias with either stimuli. Furthermore, BP and DL produce qualitatively different learning dynamics and representational properties, visible from the learning curves and the internal representations of hidden units. We conclude that it is the increased depth of the DL architecture that enables more human-like behavior in category learning.

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Keywords

Keywords
attentional bias
category learning
deep learning
learning theory