

Deep Neural Networks Trained on Ecologically Relevant Categories Better explain human IT

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Presentation Abstract Summary Deep neural network models (DNNs) reach human-like performance in the computationally complex task of visual categorization, and also exhibit representational similarities with the human visual system. DNNs therefore enable researchers to investigate the mechanisms underlying cortical selectivity and organization by altering the training setup of the deep networks. Here, we explore whether using an ecologically more relevant set of image categories, rather than the ImageNet set frequently used in the engineering literature, may lead to receptive field properties that more closely match the human visual system. To this end, we introduce a new training set that consists of the 578 most concrete and frequent basic-level categories in the English language. Training 8-layer convolutional neural networks (CNNs) on this eco-set and a similar sized engineering set revealed that the ecologically more relevant visual diet led to significantly improved similarities to response properties in human inferior temporal cortex (IT). Although engineering datasets are a rich, and easily accessible source of training data, matching the human and networks' input statistics promises to lead to a better understanding of cortical function.

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