

A Dichotomy of Visual Relations

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Presentation Abstract Summary Convolutional neural networks (CNNs) have achieved state-of-the-art performance in image classification (He et al., 2015). However, a growing body of work indicates that CNNs still struggle on visual rule-learning tasks (Fleuret et al. 2011, Gulcehre & Bengio, 2013, Ellis et al. 2015). Currently, our understanding of precisely which rule-based problems are hard or easy for CNNs is limited. Here, we conducted a systematic analysis of CNN performance on the 23 problems of the Synthetic Visual Reasoning Test (SVRT), while varying network hyperparameters. We find that one group of SVRT problems is easily solved by most networks, whereas another group is not solved at all. We propose that the soluble problems of this dichotomy rely only on spatial relations. Intractable problems, on other hand, require same-different judgments, in which image regions must be compared. We conclude by sketching a novel cognitive architecture designed to solve visual reasoning problems.

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