What Affects Learned Equivariance in Deep Image Recognition Models? Robert-Jan Bruintjes · Tomasz Motyka · Jan van Gemert

Research Question

Convolutional Neural Networks (CNNs) learn equivariant features, but how much?



Contributions

1. Method: measure of learned equivariance

2. Finding: learned equivariance in intermediate CNN layers correlates with val. accuracy;

3. Finding: data augmentation, reduced model capacity and convolution increase learned equivariance



Architectures





Figure 1: Proposed measure of equivariance in CNNs

Findings



Symmetries in objective \rightarrow same rotation equivariance







Network width \rightarrow less translation equivariance



Data augmentations \rightarrow more translation equivariance



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Figure 2: Comparing similarity measures in ResNet-44