EMPOWERING NETWORKS WITH SCALE AND ROTATION EQUIVARIANCE USING A SIMILARITY CONVOLUTION

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ABSTRACT

The translational equivariant nature of CNN is a reason for their great success in the field of computer vision. However, networks do not enjoy more general equivariance properties such as rotation or scaling. This limits the generalization performance of the network. In this paper, we devise a method that provides networks with equivariance with respect to translation, rotation, and scaling simultaneously. We define a convolution-like operation and ensure equivariance based on our proposed scalable Fourier-Argand representation. The method has similar efficiency as a traditional network, since it hardly introduces any additional learnable parameters and does not rely on group theory. We verified the quality of our approach in image classification task, demonstrating the robustness and the generalization ability to both scaled and rotated inputs.

REFERENCES