

Variational Networks: Connecting Variational Methods and Deep Learning

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Abstract: At the HSPC 2018 we would like to present our latest results on connecting variational models and deep learning in the minisymposium “Machine Learning for Parameter Identification, Mathematical Challenges in Theory and Applications” organized by Din Hao and Peter Maass. The original abstract of the corresponding GCPR paper is:

In this paper, we introduce *variational networks* (VNs) to investigate the connections between variational methods and today’s successful deep learning approaches. The VNs are based on the solid theoretical foundations of incremental proximal methods, which allows us to explore theoretical properties such as the limitations of convexity in the context of image reconstruction. Our findings on image denoising and non-blind image deblurring suggest that the solutions of convex variational models are not capable of describing all facets of natural images and are outperformed by non-convex models. However, we can improve the results for convex and non-convex models by using parametrized incremental proximal methods.

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