

## **Nonparametric Neighborhood Statistics for MRI Denoising**

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### ***Abstract***

This paper presents a novel method for denoising MR images that relies on an optimal estimation, combining a likelihood model with an adaptive image prior. The method models images as random fields and exploits the properties of independent Rician noise to learn the higher-order statistics of image neighborhoods from corrupted input data. It uses these statistics as priors within a Bayesian denoising framework. This paper presents an information-theoretic method for characterizing neighborhood structure using nonparametric density estimation. The formulation generalizes easily to simultaneous denoising of multimodal MRI, exploiting the relationships between modalities to further enhance performance. The method, relying on the information content of input data for noise estimation and setting important parameters, does not require significant parameter tuning. Qualitative and quantitative results on real, simulated, and multimodal data, including comparisons with other approaches, demonstrate the effectiveness of the method.