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A Nonlocal Means Algorithm for Poisson Denoising Based on Information Geometry

Authors : Dongxu Chen, Yipeng Li

Abstract : This paper presents an information geometry NonlocalMeans(NLM) algorithm for Poisson denoising. NLM estimates a noise-free pixel as a weighted average of image pixels, where each pixel is weighted according to the similarity between image patches in Euclidean space. In this work, every pixel is a Poisson distribution locally estimated by Maximum Likelihood (ML), all distributions consist of a statistical manifold. A NLM denoising algorithm is conducted on the statistical manifold where Fisher information matrix can be used for computing distribution geodesics referenced as the similarity between patches. This approach was demonstrated to be competitive with related state-of-the-art methods.

Keywords : image denoising, Poisson noise, information geometry, nonlocal-means
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