Modeling Image Prior and its Application on Image Denoising

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We build a Markov Random Field (MRF) for image priors. The energy function of the MRF is modeled as the summation of filter responses in each location. The filters are trained by Principal Component Analysis (PCA) from an image database. The coefficients of the MRF are estimated by maximum pseudo-likelihood method. Based on this model for image prior, we can take a Bayesian approach to recover noisy or damaged images. The posterior distribution is calculated according to the image prior and the observed image, and the desired solution is the image that maximizes the posterior distribution. This solution can be obtained numerically through gradient ascent on the logarithm of the posterior.

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