

ICA Based Neural Network for Image Denoising

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Abstract

The goal of this research is to eliminate the noise from color images of different formats by using multilayer feedforward neural network based on Independent Component Analysis (ICA), and the results are compared to those received by Independent Subspace Analysis (ISA) and Topographic Independent Component Analysis (TICA). We analyze the results of these three approaches by using different sets of parameters and different type and level of noise. Natural scenes are used for simulations by converting them to grayscale values between 0 and 255. A training set is generated by taking samples from the images. The mean and different whitening filters are implemented in order to sphere the training set. By prewhitening the original image in this way, we can ensure that the subsequent transformation to be learnt should approximate an orthonormal matrix rotation without scaling. The experimental results prove that ICA significantly reduces the noise by elimination of some small features, which are in the original image.