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Statistical Analysis of Natural Images after Applying ICA and ISA

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Abstract : Difficulties in analyzing real world images in classical image processing and machine vision framework have motivated researchers towards considering the biology-based vision. It is a common belief that mammalian visual cortex has been adapted to the statistics of the real world images through the evolution process. There are two well-known successful models of mammalian visual cortical cells: Independent Component Analysis (ICA) and Independent Subspace Analysis (ISA). In this paper, we statistically analyze the dependencies which remain in the components after applying these models to the natural images. Also, we investigate the response of feature detectors to gratings with various parameters in order to find optimal parameters of the feature detectors. Finally, the selectiveness of feature detectors to phase, in both models is considered.

Keywords : statistics, independent component analysis, independent subspace analysis, phase, natural images
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