

## Towards Prior Models for the Local Geometric Structures in Natural Images

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### Abstract

Recently, there has been a great deal of interest in the statistics of natural images and many investigations of these from both the biological and computational vision perspectives. Despite the many advances in sparse coding and multi-resolution analysis, we are still missing a description of the full probability distribution (as opposed to marginals) of small neighborhoods of pixels or filter responses.

In this talk, I will start by exploring the state space of 3-by-3 high-contrast patches from images of natural scenes. We will see that the distribution of natural data is extremely “sparse” with the majority of data points concentrated along a low-dimensional manifold that correspond to edge structures. Furthermore, I will show evidence from a scale-space study of natural images that the results generalize to general filter responses and larger scales.