Invariant Hierarchical Sparse Coding for Object Recognition

PhD Proposal Seminar by
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Abstract:
Sparse representation-based classifiers have shown outstanding accuracy and robustness on image classification tasks even with presence of intense noise and occlusion. However, in order to achieve a higher performance, it has recently been discovered that the sparse representation requires the training and test images to be meticulously aligned. In most cases, the misalignment can easily ruin the classification performance by creating a nonlinear subspace, which unfortunately cannot be handled by the sparse representation.

In this proposal, assuming that both training and test images are misaligned, we introduce a novel multi-layer sparse coding framework that is designed to efficiently perform image alignment and sparse recovery simultaneously and hierarchically. The goal of multi-layer sparse coding is to eliminate the misalignment on different scales. In each layer, every dictionary atom is registered according to the input image, i.e., the output of the previous layer. The sparse code is then recovered using the aligned dictionary. Preliminary results on several publicly available datasets verify the efficacy and robustness of the proposed algorithm for several misaligned datasets.

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