

A One-pass Resource-Allocating Codebook for Patch-based Visual Object Recognition

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Abstract

Frequencies of occurrence of low-level image features is the representation of choice in the design of state-of-the-art visual object recognition systems. A crucial step in this process is the construction of a codebook of visual features, which is usually done by cluster analysis of a large number of low-level image features detected as interest points. However, clustering is a process that retains regions of high density in a distribution and it follows that the resulting codebook need not have discriminant properties. Here we extend our recent work on constructing a one-pass discriminant codebook design procedure inspired by the resource allocating network model from the artificial neural networks literature. Unlike clustering, this approach retains data spread out more widely in the input space, thereby including rare low-level features in the codebook. It simultaneously achieves increased discrimination and a drastic reduction in the computational needs. We illustrate some properties of our method and compare it to a closely related approach.

Author Keywords

Codebook Construction, Object Recognition, Resource Allocating Codebook