
Neighborhood Matching For Image Retrieval

Abstract

In the last few years large-scale image retrieval has attracted a lot of attention from the multimedia community. Usual approaches addressing this task first generate an initial ranking of the reference images using fast approximations that do not take into consideration the spatial arrangement of local features in the image (e.g. the Bag-of-Words paradigm). The top positions of the rankings are then re-estimated with verification methods that deal with more complex information, such as the geometric layout of the image. This verification step allows pruning of many false positives at the expense of an increase in the computational complexity, which may prevent its application to large-scale retrieval problems. This paper describes a geometric method known as Neighborhood Matching (NM), which revisits the keypoint matching process by considering a neighborhood around each keypoint and improves the efficiency of a geometric verification step in the image search system. Multiple strategies are proposed and compared to incorporate NM into a large-scale image retrieval framework. A detailed analysis and comparison of these strategies and baseline methods have been investigated. The experiments show that the proposed method not only improves the computational efficiency, but also increases the retrieval performance and outperforms state-of-the-art methods in standard datasets, such as the Oxford 5k and 105k datasets, for which the spatial verification step has a significant impact on the system performance.

Index Terms—image retrieval, geometric verification, neighborhood matching, robust estimation.