Research on image retrieval method based on graph clustering method

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Abstract: This study proposes a novel image retrieval method based on graph clustering techniques to address the challenges of scalability and accuracy in large-scale image databases. Traditional content-based image retrieval systems often suffer from high computational costs and semantic gaps when processing extensive datasets. The proposed approach transforms the image dataset into a weighted graph, where nodes represent images and edges denote visual similarity. By applying spectral clustering algorithms, the graph is partitioned into cohesive clusters, effectively grouping visually and semantically related images. This clustering structure enables efficient retrieval by first identifying the most relevant cluster for a query image, then performing a refined search within that reduced subspace. Experimental evaluations on benchmark datasets demonstrate that the method significantly improves retrieval precision and recall while reducing search time compared to conventional methods. The results confirm that graph-based clustering provides a robust framework for organizing and querying large image collections, offering a practical solution for applications requiring rapid and accurate visual search.

Keywords: image retrieval, graph clustering, clustering method, content-based retrieval