Research on image retrieval method using incremental clustering with relevance feedback

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Abstract: This study proposes a novel image retrieval method that integrates incremental clustering with relevance feedback to enhance retrieval accuracy and adaptability. Traditional content-based image retrieval systems often suffer from the semantic gap and static database limitations. To address these issues, we develop a framework that dynamically organizes image databases through incremental clustering, allowing the system to update cluster structures without full re-computation as new images are added. Relevance feedback from users is employed to iteratively refine cluster centroids and similarity metrics based on user preferences. By combining user interaction with adaptive clustering, the system effectively learns semantic concepts and improves retrieval precision over successive query sessions. Experimental evaluations on benchmark datasets demonstrate that the proposed method outperforms conventional static clustering and non-adaptive feedback approaches in terms of both precision and recall. The results confirm that incremental clustering with relevance feedback provides a robust and scalable solution for interactive image retrieval, effectively bridging the gap between low-level features and high-level semantic understanding.

Keywords: incremental clustering, image retrieval, relevance feedback, machine learning