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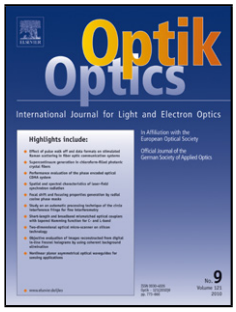

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Content Based Image Retrieval System Using Clustered Scale Invariant Feature Transforms

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Abstract.

The large amounts of image collections available from a variety of sources have posed increasing technical challenges to computer systems to store/transmit and index/manage the image data to make such collections easily accessible. To search and retrieve the expected images from the database a Content Based Image Retrieval (CBIR) system is highly demanded. CBIR extracts features of a query image and try to match them with extracted features from images in the database. This paper introduces two novel methods that can be used as image descriptors. The basis of the proposed methods is built upon Scale Invariant Feature Transform (SIFT) method. After extracting image features using SIFT, k-means clustering is applied on feature matrix extracted by SIFT, and then two new kinds of dimensionality reduction are applied to make SIFT features more efficient and realistic for image retrieval problem. Using the proposed strategies we cannot only take the advantage of SIFT features but also we can highly decrease the memory storage used by SIFT features. As well as in order to compare the images we do not need to run the time-consuming matching algorithm of SIFT. Finally, proposed methods are compared with two popular methods namely, color auto-correlogram and features extracted by wavelet transform. As a result, our proposed retrieval system is fast and accurate and it can efficiently manage large databases. Experimental results on two popular databases, Caltech 101 (with 9144 images) and Li database (with 2360) images, show the superiority and efficiency of the proposed methods.

Keywords. Content based image retrieval; Scale Invariant Feature Transform (SIFT); Cardinality Matrix of Cluster-Sets (CMCS); Resultant Vector of Clustered SIFT Features (RVCSF)

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