

# Content-based Image Retrieval in Digital Image Databases using Structure, Color and Texture

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## Abstract

Modern data systems—in areas ranging from surveillance to medical imaging—accrue and store massive numbers of images for future use. The accumulated images, however significant, are of little value if they cannot be quickly retrieved.

Efficient query systems are needed to quickly locate images with particular properties within large collections. “A picture is worth a 1,000 words,” says the old adage. However, retrieving images based on textual labels is time consuming and labor intensive since the images must be labeled in the first place. Content-based image retrieval systems analyze image features to identify image content. Color and texture are two of the features that have traditionally been used to approach this challenging problem.

At The University of Texas at Austin, we have found that structure, derived by perceptual grouping, is a valuable tool in our quest for more efficient content-based image retrieval. This presentation focuses on the use of structure, derived via perceptual grouping, for image classification and retrieval. Our use of structure does not require image segmentation. A hands-on comparison of results using color, texture and structure to retrieve images containing both natural and manmade objects will demonstrate that collectively structure, color and texture form an excellent feature set for image retrieval. Our system, available on the web, incorporates relevance feedback from the user to refine further the search. Future uses of our system in surveillance and video summarization will also be discussed.

**Keywords:** image retrieval, image databases