Query by Example: A histogram Based Color Image Indexing and Retrieval System

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Abstract

In today's multimedia rich society, searching efficiently through digital libraries containing large number of digital images and video sequences has become very crucial. This interest has been motivated by the need to efficiently manage image databases and efficiently run image retrieval queries to get the best results without having to manually annotate and index huge global databases. This leads to huge savings in time and money, especially in fields where a bulk of working databases are image files. Everyday, many people use the Internet for searching and browsing through different multimedia databases. To make such searching practical and successful, effective image indexing and searching techniques based on both image's semantics content (keywords) and compositional aspects (color, shape and texture) will be necessary. The two main approaches to retrieve images are by the exclusive use of keywords or the use of their primitive features. In the keyword approach, keyword indexing techniques can be used to capture an image's metadata, describing objects clearly identifiable by linguistic cues. These techniques assign keywords or classification codes to each image when it is first added to the collection and use these descriptors as retrieval keys at search time. While some metadata (e.g. image format) can be automatically derived from the image itself, the vast majority of them must be manually entered. Once the items in the collection are described by metadata, the type and actual content of the item itself becomes irrelevant for browsing and retrieval and only needed when the item itself has to be "shown" to the user. From this point of view, it is intuitively appealing and straightforward to use techniques such as database queries on structured metadata or text retrieval queries on metadata consisting of a textual description of the multimedia item. As digital media continues to get more popular, corporations and individuals gather an increasingly large number of digital images. As a collection grows to more than a few hundred images, manual annotation becomes impossible and the need for formalized indexing and retrieval system becomes crucial.

In this work, images are retrieved based on the characterization of their RGB and HSV color image histograms. Different similarity measures between the query and the database images are also used. The retrieval results are then analyzed to see if there are any semantic relationship between the query and the retrieved images. The image histograms used in this project are commonly used to describe images by their color distribution. However, image histograms have a drawback of not retaining information about object location, shape, and texture. This means that image retrieval is done with no such information contained in the descriptors. Given this limitation, this technique shows very good performance. Most of the retrieved images exhibit some discernable visual commonality.