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Abstract

CONTENT-BASED IMAGE RETRIEVAL USING COLOR QUANTIZATION, RECTANGULAR SEGMENTATION, AND RELEVANCE FEEDBACK

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With the rapid development of internet and multimedia technology, information retrieval becomes a major research area in computer science. Text was the main resource of the internet in the early years, but later images and videos becoming more widely spread. Traditionally, the retrieval of images is based on text-based method, where keywords are used as the index of images. However, using keywords to describe images not only heavily rely on labor, but also sensitive to people understands. Therefore, image indexed by its own contents such as color, texture, and shape is a hot research area, which known as content-based image retrieval (CBIR).

In this thesis, we present a new framework for effective content-based image retrieval. Color histogram is a widely used feature in the area of content-based image retrieval. One of the shortcomings of color histogram is that it is sensitive to the location of histogram bin boundaries. Therefore, a novel color histogram calculation technique based on color point coverage is proposed. On the other hand, color quantization approach of HSV color space is studied in this thesis. HSV color space is more perceptually uniform in conical form than cylindrical form. Thus, a novel color quantization approach in conical HSV color space is proposed. The results of image retrieval experiment shows that the proposed color quantization approach outperforms the traditional approach, especially with dark background images.

In the area of image segmentation, speed is more important than accuracy in CBIR. We proposed a new rectangular approximate image segmentation to solve the problem. We also develop a significance function to reflect the importance of different position in image, and improved the segmentation and retrieval performance. Finally, we present a similarity measure between images with multi-objects. The experimental evaluation of rectangular segmentation and the entire CBIR system proved that it is an efficient and robust model.

To further improve the retrieval performance and bridging the gap between visual content to human semantic understanding, the relevance feedback technique is used. The experiment results show that relevance feedback can greatly improved the retrieval rate based on human judgment.