Hybrid Content Based Image Retrieval: Performance improvement using Parallel Processing

Abstract:

Content-Based Image Retrieval (CBIR) is an image mining process which extracts images based on contents of the query image. CBIR is being used in several applications like medicine, digital libraries, biodiversity information systems, historical research, and crime prevention to name a few.

Generally, CBIR is implemented using either local features (texture, color, intensity, etc.) or global features (edges, points, contours, shape, etc.). Computation of local features for image retrieval gives high precision but low performance; while computation using global features gives high performance by sacrificing precision.

The proposed method uses hybrid technique; in which M-band wavelet will compute local features of the image and Prompt Edge Detection to extract edges for global features. 3-level M-band wavelet is proven to give high performance. Wavelet divides the image into N by N blocks and computation on each block is done separately- this involves high amount of computation time and resources. The proposed system will divide the computation among N processors thus reducing the processing time to t/N (where “t” is the processing time for a single processor). Prompt Edge Detection performs better than existing edge detection methods but has very complex computation and consumes a large amount of processor’s time which can be reduced by work division. The system also proposes use of parallel processing to decrease the retrieval time of the images. Gaussian Fuzzy method is used for accurate retrieval of images from database. Parallel computation on different datasets and on different images of the same dataset too will overcome high retrieval time taken by most of the present CBIR systems for image retrieval. Finally, to further improve the accuracy and performance, the system ranks images based on the previous retrieval history. This helps to get the most relevant image in very short time.

Parallel processing and image ranking would thus help for accurate, high precision, content based image retrieval system which will also give improvement in performance in various aspects.