

A Survey on Content Based Image Retrieval

Aniket Mirji¹, Danish Sudan², Rushabh Kagwade³, Savita Lohiya⁴U.G. Students of Department of Information Technology, SIES GST, Mumbai, Maharashtra, India^{1,2,3}Assistant Professor, Department of Information Technology, SIES GST, Mumbai, Maharashtra, India⁴

ABSTRACT: The content based image retrieval (CBIR) is one of the rising research areas of the digital image processing and searching. Most of the available image search tools, such as Google Images and Yahoo! Image search, are based on textual annotation i.e. metadata of images. In these tools, images are manually annotated with keywords and then retrieved using text-based search methods. The performances of these systems are not satisfactory. The goal of CBIR is to extract visual content of an image automatically like color, texture, or shape. Database images are indexed and clustered using k-means clustering algorithm. Finally, the visual features of the image to be searched are extracted and matched with the several clusters of images available in the database. The results show images similar to the input image

KEYWORDS: Image Processing, Database, Histogram, Clustering and Java.

I. INTRODUCTION

Image databases and collections can be enormous in size, containing hundreds, thousands or even millions of images. The conventional method of image retrieval is searching for a keyword that would match the descriptive keyword assigned to the image by a human categorizer. The problem involves entering an image as a query into a software application that is designed to employ CBIR techniques in extracting visual properties, and matching them. This is done to retrieve images in the database that are visually similar to the query image.

CBIR originates from fields such as pattern recognition and Image Processing. "Content-based" means that the search will analyze the actual contents of the image. The term 'content' in this context might refer to colors, shapes, textures, or any other information that can be derived from the image itself. The solution proposed is to extract the features of a query image and compare them to those of database images. Thus, using matching and comparison algorithms, the Histogram color, texture and features of one image are compared and matched to the corresponding features of another image. In the end, K-means clustering is performed one after another, so as to retrieve database images that are similar to the query.

II. RELATED WORK

Content Based Image Retrieval (CBIR) is an automatic process to search relevant images based on user input. The input could be sketches or example images. A typical CBIR process first extracts the image features and store them efficiently. Then it compares with images from the database and returns the results.

Feature extraction and similarity measure are very dependent on the features used. In each feature, there would be more than one representation. Among these representations, histogram is the most commonly used technique to describe features.

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Issue 3, March 2016

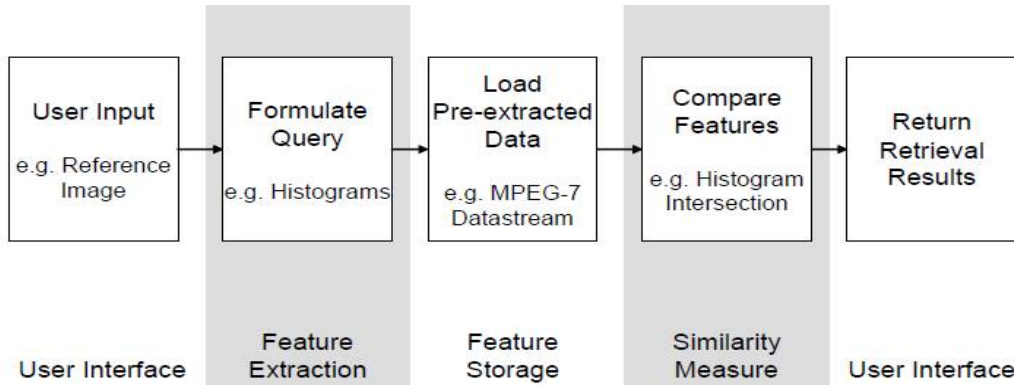


Fig 2.1 Flow of a typical CBIR process

Fig 2.1 describes the flow of a typical CBIR process although content based methods are efficient, they cannot always match user's expectation. Relevance Feedback (RF) techniques are used to adjust the query by user's feedback. RF is an interactive process to improve the retrieval accuracy by a few iterations. This can further improve accuracy of the system.

III. OBJECTIVES

- The aim of this project is to review Content-based image retrieval (CBIR), a technique for retrieving images on the basis of automatically-derived features such as color, texture. Our findings are based on a review of the relevant literature that have already been researched upon.
- The requirements of image users can vary considerably, it can be useful to characterize image queries into three levels of abstraction: primitive features such as color or shape, logical features such as the identity of objects shown and abstract attributes such as the significance of the scenes depicted.
- While CBIR systems currently operate effectively only at the lowest of these levels, most users demand higher levels of retrieval which is what we intend to achieve.
- Input design is achieved by creating user-friendly screens for the data entry to handle large volume of data. The goal of designing input is to make data entry easier and to be free from errors.
- The data entry screen is designed in such a way that all the data manipulation can be performed. It also provides record viewing facilities.
- When the data is entered it will check for its validity. Data can be entered with the help of screens. Thus the objective of input design is to create an input layout that is easy to follow.

IV. METHODOLOGY

The solution proposed is to extract the features of a query image and compare them to those of database images. Thus, using matching and comparison algorithms, the Histogram color, texture and features of one image are compared and matched to the corresponding features of another image. In the end, K-means clustering is performed one after another, so as to retrieve database images that are similar to the query.

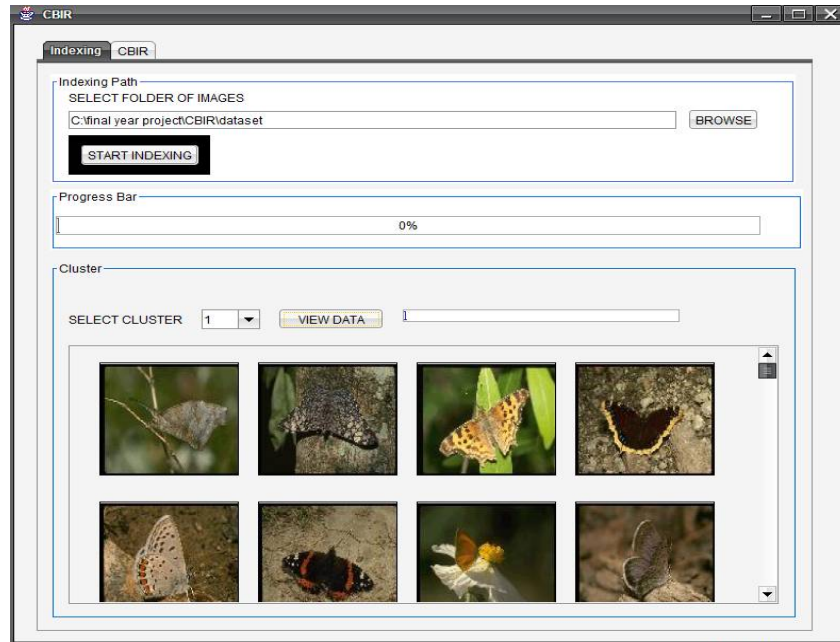


Fig 4.1 An Example of clustering of images in Content Based Image retrieval

Figure 4.1 Shows an example of content based image retrieval where a query image is given as input and results are the images that are matching in color, shape and texture.

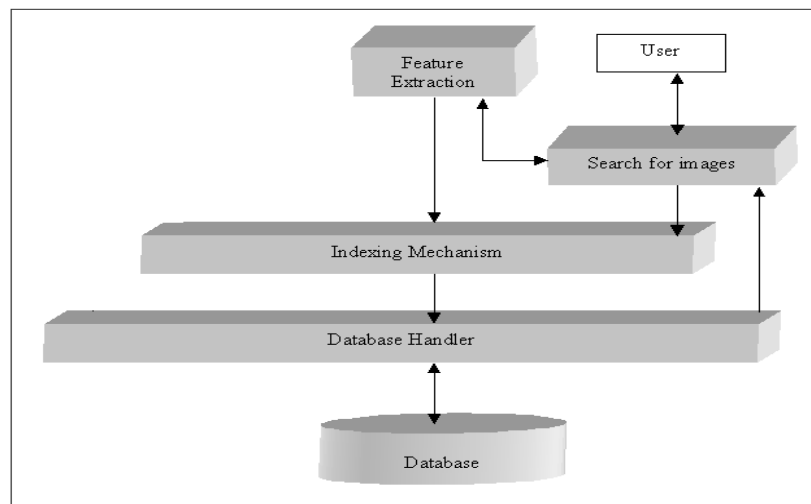


Figure 4.2 Content Based Image Retrieval architecture

Figure 4.2 shows the CBIR architecture using which the search operation takes place. The image to be searched by the user is placed in our application. The application extracts the visual features of that image and places it in a feature vector.

International Journal of Innovative Research in Science, Engineering and Technology

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Vol. 5, Issue 3, March 2016

In our database several images are indexed and clustered on the basis of similarity of their visual features using K-means clustering. The feature vector of image to be searched by the user is compared with the various clusters of images present in our database and displays the clusters of images ranked according to their similarity with the input image.

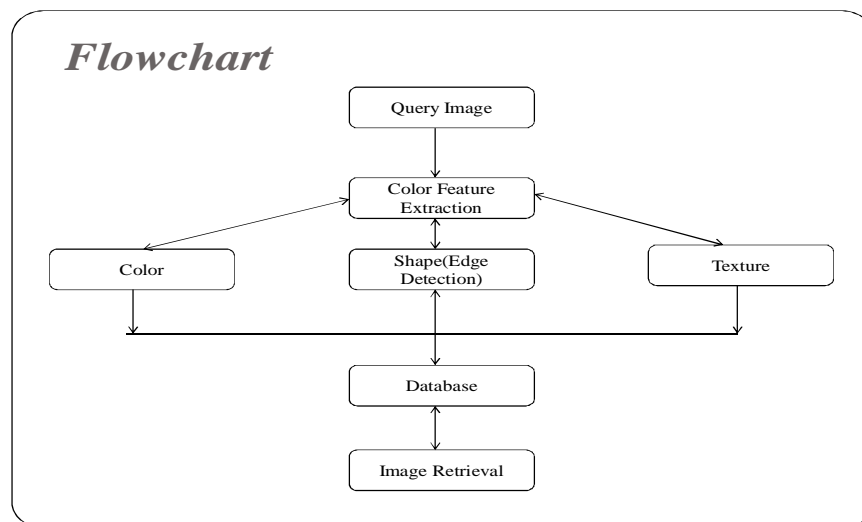


Figure 4.3 Flowchart of Content Based Image Retrieval

Figure 4.3 illustrates a solution model to the Content Based Image Retrieval workflow.

V. ADVANTAGES AND APPLICATIONS

Advantages:

1. Image retrieving based on content not by Meta data search.
2. Histogram calculation increases accuracy compared to conventional methods.
3. Selection of particular picture with the help of CBIR shows similar image.

Applications:

1. Image Search Engines
2. Security
 - Thumb Recognition
 - Face Recognition
3. Medical Diagnosis: Using CBIR in a medical database of medical images to aid diagnosis by identifying similar past cases.
4. Crime prevention: Automatic face recognition systems, used by police forces.

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Vol. 5, Issue 3, March 2016

VI. ACKNOWLEDGEMENTS

We express our deep gratitude to our project guide Mr. Savita Lohiya for providing timely assistance to our query and guidance that he gave owing to her experience in this field for past many years. We are grateful to our Head of Department Ms. Leena Ladage for extending her help directly and indirectly through various channels in our project work. We would also take this opportunity to thank our project coordinator Ms. Lakshmi Sudha. For her guidance in selecting this project and also for providing us all the details on proper presentation of this project. We would like to thank the people who have previously researched on this topic.

VII. CONCLUSION

We have implemented Content Based Image Retrieval to search images based on their visual properties i.e. color and texture. We have applied our algorithm on many images and found that it successfully searches for similar images.

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