Content based Image Retrieval System using Sketches and Colored Images with Clustering

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Abstract
The content based image retrieval (CBIR) is one of the most popular, rising research areas of the digital image processing. Most of the available image search tools, such as Google Images and Yahoo! Image search, are based on textual annotation of images. In these tools, images are manually annotated with keywords and then retrieved using text-based search methods. Therefore the performances of these systems are not satisfactory. The goal of CBIR is to extract visual content of an image automatically, like colour, texture, and shape. Our project aims to design and develop a CBIR system, which is based on sketch and coloured images. With the help of the existing methods, we will describe a possible solution of how to design and implement a CBIR system on the basis of colour, shape and texture as parameters, and also handle the informational gap between a sketch and a coloured image, making an opportunity for the efficient search hereby. It is constructed after special sequence of pre-processing steps so that the transformed full colour image and the input image can be compared. Overall, the results show that the sketch based and colour image based system allows users an intuitive access to search-tools. The CBIR technology can be used in several applications such as digital libraries, crime prevention, photo sharing sites, etc. Such a system has great value in apprehending suspects and indentifying victims in forensics and law enforcement.

Keywords: CBIR, colour, shape, texture.

1. Introduction
Content Based Image Retrieval (CBIR) is an automatic process to search relevant images based on user input. The input could be parameters, 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. 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. RF algorithms are dependent on feature representations.

2. Architecture Diagram

The Figure 1 shows the architecture of CBIR system. In this system query image is taken in the form of a sketch image or a coloured image. The feature vector consisting of colour, shape and texture is calculated for database and query images. After the process of matching the feature vectors of query image and database image, cluster of relevant images is then displayed as output. Sequential accessing of database image is done.

3. System Implementation and results

Working of the system with input and output images:
- In the system sketch as well as colored Input image is taken and relevant output is shown as follows.

3.1 Input given as colored image-
This is the view of working of CBIR system with input as a colored image and the relevant searches. Thus the search with highest rate of accuracy is seen on top. Accuracy is measured in terms of distance which is calculated using Euclidean algorithm. The pixels of input image are read and using RGB model colours of each pixel are extracted. Based on relevancy of images, clusters are formed for efficient retrieval.

3.2 Input given as a sketch:-
This is the view of working of CBIR system with input as a sketch image and the relevant searches. Thus the search with highest rate of accuracy is seen on top. Accuracy is measured in terms of distance which is calculated using Euclidean algorithm. For a sketch image feature extraction, edges are extracted. Texture of the image is also considered for evaluation of sketch image. Based on relevancy of images, clusters are formed for efficient retrieval.

3.3 PRECISION & RECALL GRAPH DIAGRAM:-

![Figure 4: Recall and Precision Graph](image)

These are the approximately estimated results for precision graph calculated from the formula as follows:-

\[
\text{recall} = \frac{\text{relevant hits}}{\text{expected hits}} \quad \text{precision} = \frac{\text{relevant hits}}{\text{all hits}}
\]

4. Conclusion

We are designing a system which will retrieve relevant images related to the query input image and based on the features such as texture, colour and sketch. The searching is done based on three types of parameters sketched image, colored image and both(sketch as well as colour). For further improving the accuracy user feedback can be used.

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References


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Sagar Ghan is pursuing the B.E. degree in Information Technology from Sinhgad Institute of Technology and Science (SITS). During 2013-2014, he studied various strategies of image processing and is undergoing research in the field of image processing using CBIR technique. He along with other authors have developed an efficient CBIR system.