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Working of CBIR System Using Relevance Feedback and Navigation Patterns

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ABSTRACT- Everyday a large collection of images are created in fields like medicine, entertainment, education, manufacturing etc. To search a particular image from this huge collection is a very tedious and time consuming task. Content Based image retrieval is a system by which various images are retrieved from a large database collection. The thought of relevance feedback (RF) is to involve the user in the retrieval process so as to improve the final result set. The goal of content-based image retrieval (CBIR) [1] is to retrieve images relevant to a query of a user, which is expressed by example. In CBIR, an image is described by automatically extracted low-level visual features, such as color, texture and shape. After a user has submitted one or more query images as examples of his/her preferences, a criterion based on this image description is used to rank the images of an image database according to their similarity with the examples of the query and, finally, the most similar are returned to the user as the retrieval results. Nevertheless, there is an intrinsic difficulty for low level image features to capture the human perception of image similarity. The reason for this is that the user is usually interested in the semantic content of the images. Unfortunately, the semantic content of an image is very difficult to describe using only low-level image features. This is the well-known semantic gap problem.

KEYWORD- CBIR System, Relevance Feedback, Low-level Features.

I. INTRODUCTION

With the fast growing use of world wide web, a huge amount of digital data is created every day.

This data is of multimedia type includes digital images, audio, video, graphics, text etc. to retrieve the needed/intended data from this huge stored databases we need powerful retrieval techniques are used. Keyword annotations were one of the old image retrieval techniques. In these techniques keywords are assigned to images manually. But suffers from problems like

- I. Manual efforts are more.
- II. Understanding of image contents varies from person to person.
- III. Keyword assignments differ from different indexers.

To overcome this difficulty, of keyword annotation content based- image retrieval systems has been planned. CBIR uses visual contents like color, texture, shape. History of image retrieval presents Traditional text-based image search engines. This traditional image search engines uses manual annotation of images and text-based retrieval methods. But these image retrieval systems used to face problems like large volumes of databases as well as valid only for one language. Again problems like human perception. So solution for such problems is CBIR.

II. RELEVANCE FEEDBACK

User may unable to express what exactly they want from system. Also user may not known what can information can be get from system. User can get a good conceptual idea when they saw a image. when results are produced user can indicate and mark the useful information. This concept of marking relevant images lead to the idea of relevance

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feedback. Its main concept is that a cbir system presents the user a set of search images and the user then somehow assesses their relevance to the search topic. This relevance information is then sent back to the cbir system to produce a new query or expand the original. Relevance feedback (RF) helps to improve the effectiveness of cbir systems. Relevance feedback method consists of three steps:

(a) cbir systems made initial search based on the query image provided by the user and gives back the output, output consist of a fixed number of images.

(b) user then marks the relevant images that are useful.

(c) finally, the system generates the final output based upon user's relevance judgments. This process terminates as user is satisfied with the output.

Relevance feedback (RF) makes participation of the user in the retrieval process so as to increase efficiency of CBIR system improve. In particular, the user selects the most similar images in an initial set of results. The basic RF procedure is:

- The user submits a query image.
- The system process the query image and produces an initial set of results.
- The user selects most similar image and mark it as relevant and other images as non relevant.
- The system computes a new result set based on the data provided by user.
- The system presents the updated result set.

What is CBIR?

CBIR i.e content based image retrieval system used to index and retrieve images from databases based on their visual content. Visual content is typically defined by a set of low level features extracted from an image that describe the color, texture and/or shape of the entire image. In CBIR system, visual features are extracted while the processing of a query image and perform search in the database for similar images [15]. A typical CBIR system maintains database of query image and the images in the database in the form of features the example image and images in the database as a collection of features, and ranks the relevance between the query image and any target image in proportion to a similarity measure, calculated from the features. The low level image features can be used to compute similarity between images [6].

III. WORKING OF CBIR PROCESS

In CBIR systems database of images are stored. Features are extracted from these images. User submits a query image to the system. Using the query image, system extracts features of the same kind. Features of the query image and those of images stored in database are compared using similarity measures like Euclidean distance. The top-n similar images are returns as output to user. Relevance feedback is a very effective tool for improving retrieval efficiency of CBIR systems. User can select the most appropriate/similar image from the output list of images generated by system. this image acts as query image and output is generated based on features of this image. This process to refine the query again and again is called relevance feedback.(The user indicates, through the UI, whether a returned image is relevant or not. After that the system has two ways to respond. The first way is to execute a query for every image indicated as relevant or irrelevant and merge the results, while the second is to create a single query after reweighing the features based on the user's feedback).

A number of images are stored in image databases. The retrieval process involves four basic steps as depicted in figure

- 1) Extract features as Feature space/vector.
- 2) Store feature vector in feature database.
- 3) When a query comes in either the form of query-by example or query-by-keywords, its feature space will be compared with those in the feature database one-by one.
- 4) And the similar images with the smallest feature distance will be retrieved.

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IV. OVERVIEW OF THE CBIR PROCESS

In typical cbir process, initially a set of images are stored into database. Features from those images are extracted. Performance of cbir system is based on two things data structure and algorithms used for indexing. User submits a query image, this query image explains user's information need. Cbir system analyses the query image and extracts features similar to the features stored into database. Next the features of query image are compared to the features of images stored into database using similarity measure. The system will return the top-n images to the user in decreasing order of similarity. A very important concept implemented in cbir systems is relevance feedback where user selects the most similar image, which acts as next input to the system. This process refines the query again and again.

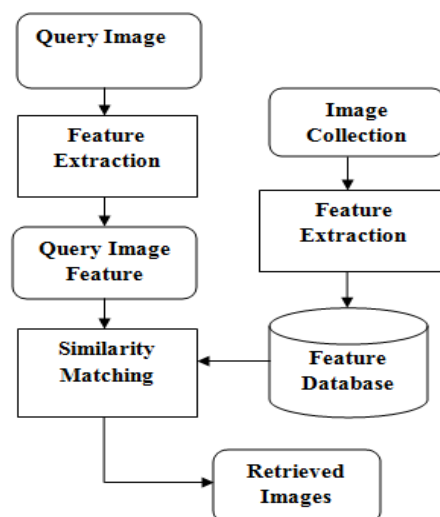


Fig.1 Working Of CBIR Process

Navigation- Pattern-based Relevance Feedback NPRF is used for getting high image retrieval. The user's browsing patterns are stored into a database usually called user query log. The log database describes what actually user wants from the system. Using different mining techniques navigation patterns are mined from log database. Using these navigation patterns relevant images is obtained. And helps to solve the problems of redundant browsing and exploration convergence. Number of iterations is reduced by incorporating NPRF with typical CBIR system. In cbir systems, user interface is query formulation where user submits an example image and result presentation part where relevant images are given as output.

V. EXISTING CBIR SYSTEM

QBIC developed by IBM allows users to create queries using visual image features. These features may be color percentage, color layout and texture in the target image positioned the output image. RF is not incorporated in QBIC so it becomes difficult for users to compose ideal queries in first iteration. QBIC suffers from local maximum traps. Queries in QBIC system may be

- 1) Query image
- 2) User drawn sketches or/and
- 3) May be color and texture patterns

For 3) choice user selects color or texture using sampler. The output images are presented in decreasing similarity order. The matching similarity score aside is given.

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PicHunter to reduce the load on users, PicHunter uses Bayesian-based RF technique. Bayesian-based RF predicts intended images. Pichunter's performance is evaluated by accuracy of the prediction algorithm and user's behavior.

selected by user next output is generated by the system. Existing CBIR system are explain to provide clear idea and working of CBIR systems. Most of this system are implemented using relevance feedback which makes the system more interactive.

MARS is single point movement technique as the refined query at each iteration contains of only of only one query point which is close to positive images and away from negative images. MARS uses combination of color, shape, texture features in MARS. Output images are display in sequence of decreasing similarity.

NeTra images are divided into regions of homogeneous color and this images are stored into databases. From this image regions, features like color, texture, shape and spatial location are extracted. In NeTra 2500 images are classified in 25 categories. each category contains 100 images. User can select the query image from database. In NeTra, specifying image example user can directly mention color and spatial location. Output image are linearly sequenced.

VisualSEEK images are automatically divided into region of equal dominant colors. For each segment, spatial and feature properties are stored for the later queries. In VisualSEEK the query is in the form of sketches of a number of regions, and dimensions them on the grid. Also selects a color for area. System outputs number of images as the best matches. User selects the example image from the output images. Here the result are presented in decreasing similarity order. For each retrieved image, the distance to the example image is indicated.

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