EFFICIENT RELEVANT FEEDBACK FOR MINING USER NAVIGATION PATTERS USING

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ABSTRACT

These a days, content-based image retrieval (CBIR) is the important of image retrieval systems. To be more suitable, relevance feedback techniques were changed into CBIR such that more the results can be obtained by taking user feedback into account. However, previous relevance feedback-based CBIR methods usually request a number of iterative feedbacks to produce refined search results, especially in a big image database. This is not practical and inefficient in real applications. In this paper, we propose a novel method, Navigation-Pattern-based Relevance Feedback (NPRF), to achieve the high efficiency and effectiveness of CBIR in coping with the large-scale image data. In terms of efficiency, the iterations of feedback are reduced substantially by using the navigation patterns discovered from the user query log. In terms of effectiveness, our proposed search algorithm NPRF Search makes use of the discovered navigation patterns and three kinds of query refinement strategies, Query Point Movement (QPM), Query Reweighting (QR), and Query Expansion (QEX), to converge the search space toward the user's intention effectively

Keyword *Query Point Movement (QPM), Query Reweighting (QR), and Query Expansion (QEX).*

1. INTRODUCTION

1.1 CBIR

Now these days, Multimedia contents are growing more and more and the need for multimedia retrieval is occurring more and more frequently in our daily life. Due to the more complexity of multimedia contents, image understanding is a difficult but interesting issue in this field. Extracting valuable knowledge from a large-scale multimedia repository, so-called multimedia mining, has been recently studied by some researchers. Typically, in the development of an image requisition system, semantic image retrieval relies heavily on the related captions, e.g., file-names, categories, annotated keywords, and other manual concept scripts. Badly, this kind of textual-based image retrieval always suffers from two problems: high-priced manual annotation and inappropriate automated annotation. On one hand, high-priced manual annotation cost is prohibitive in coping with a large-scale data set. On the other hand, inappropriate automated annotation yields the distorted results for semantic image retrieval. As a result, a number of powerful image retrieval algorithms have been proposed to deal with such problems over the past few years. Content-Based Image Retrieval (CBIR) is the mainstay of current image retrieval systems. In general, the purpose of CBIR is to present an image conceptually, with a set of low-level visual features such as color, texture, and shape. Despite the power of the search strategies, it is very difficult to optimize the retrieval quality of CBIR within only one query process. These conventional approaches for image retrieval are based on the computation of the similarity between the user's query and images via a query by example (QBE) system. The hidden problem is that the extracted visual features are too diverse to capture the concept of the user's query. To solve such problems, in the QBE system, the users can pick up some preferred images to refine the image explorations iteratively. The feedback procedure, called Relevance Feedback (RF), repeats until the user is satisfied with the retrieval results.
Although a number of RF studies have been made on interactive CBIR, they still incur some common problems, namely redundant browsing and exploration convergence. First, in terms of redundant browsing, most existing RF methods focus on how to earn the user's satisfaction in one query process. That is, existing methods refine the query again and again by analyzing the specific relevant images picked up by the users. Especially for the compound and

complex images, the users might go through a long series of feedbacks to obtain the desired images using current RF approaches. In fact, it is not practical in real applications like online image retrieval in a large-scale image database.

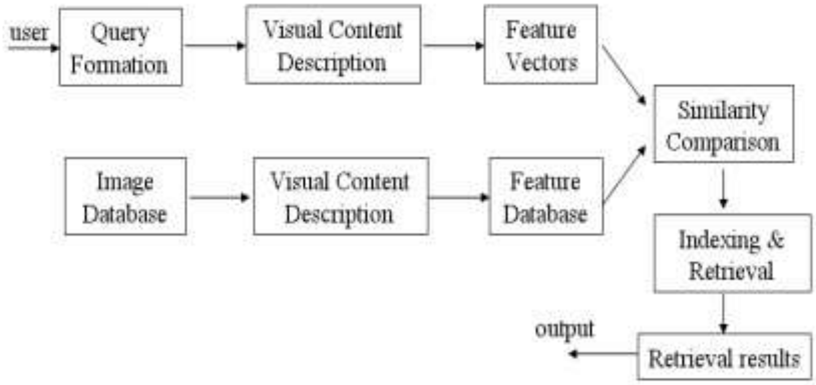

Fig.1.1: Diagram of Content-Based Image Retrieval System Without Relevance Feedback

2. RELEVANCE FEEDBACK

Human perception of image similarity is subjective, semantic, and task-dependent. Although content-based methods provide promising directions for image retrieval, generally, the retrieval results based on the similarities of pure visual features are not necessarily perceptually and semantically meaningful. In addition, each type of visual feature tends to capture only one aspect of image property and it is usually hard for a user to specify clearly how different aspects are combined. To address these problems, interactive *relevance feedback*, a technique in traditional text-based information retrieval systems, was introduced. With relevance feedback, it is possible to establish the link between high-level concepts and low-level features.

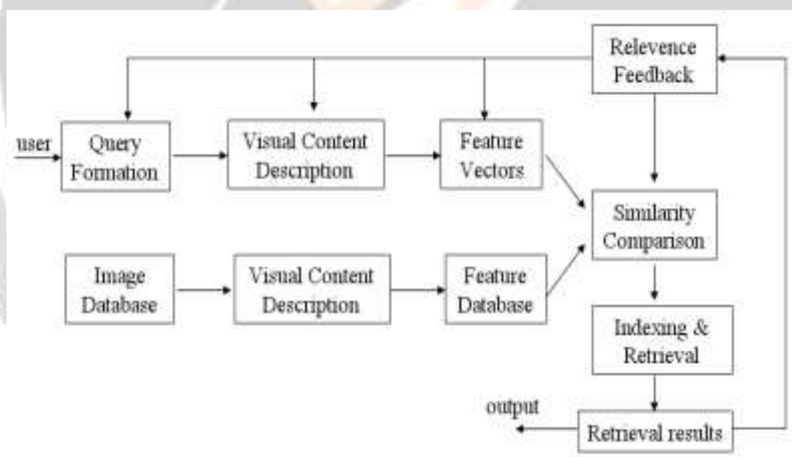

Fig.1.2: Diagram of Content-Based Image Retrieval System With Relevance Feedback

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3. APPLICATIONS OF CBIR

The military

Military applications of imaging technology are probably the best-developed, though least publicized. Recognition of enemy aircraft from radar screens, identification of targets from satellite photographs, and provision of guidance systems for cruise missiles are known examples – though these almost certainly represent only the tip of the iceberg. Many of the surveillance techniques used in crime prevention could also be relevant to the military field.

Intellectual property
Trademark image registration, where a new candidate mark is compared with existing marks to ensure that there is no risk of confusion, has long been recognized as a prime application area for CBIR. Copyright protection is also a potentially important application area. Enforcing image copyright when electronic versions of the images can easily be transmitted over the Internet in a variety of formats is an increasingly difficult task. There is a growing need for copyright owners to be able to seek out and identify unauthorized copies of images, particularly if they have been altered in some way.

Architectural and engineering design
Architectural and engineering design share a number of common features – the use of stylized 2- and 3-D models to represent design objects, the need to visualize designs for the benefit of non-technical clients, and the need to work within externally-imposed constraints, often financial. Such constraints mean that the designer needs to be aware of previous designs, particularly if these can be adapted to the problem at hand. Hence the ability to search design archives for previous examples which are in some way similar, or meet specified suitability criteria, can be valuable.

Fashion and interior design
Similarities can also be observed in the design process in other fields, including fashion and interior design. Here again, the designer has to work within externally-imposed constraints, such as choice of materials. The ability to search a collection of fabrics to find a particular combination of color or texture is increasingly being recognized as a useful aid to the design process.

Journalism and advertising
Both newspapers and stock shot agencies maintain archives of still photographs to illustrate articles or advertising copy. These archives can often be extremely large (running into millions of images), and dauntingly expensive to maintain if detailed keyword indexing is provided. Broadcasting corporations are faced with an even bigger problem, having to deal with millions of hours of archive video footage, which are almost impossible to annotate without some degree of automatic assistance. This application area is probably one of the prime users of CBIR technology at present – though not in the form originally envisaged.

Crime prevention
Law enforcement agencies typically maintain large archives of visual evidence, including past suspects' facial photographs (generally known as mug shots), fingerprints, tire treads and shoeprints. Whenever a serious crime is committed, they can compare evidence from the scene of the crime for its similarity to records in their archives. Strictly speaking, this is an example of *identity* rather than *similarity* matching, though since all such images vary naturally over time, the distinction is of little practical significance. Of more relevance is the distinction between systems designed for verifying the identity of a known individual (requiring matching against only a single stored record), and those capable of searching an entire database to find the closest matching records.

4.RESULT

4.1 Experimental Data

The experimental data came from the collection of the Corel image database and the web images. We prepared data set composed of different kinds of categories, as shown in Table 5.1.

Number of Categories	Category Set
05	**{ baseball, bus, eagle, horse and rose }**

TABLE 5.1 The Experimental Data Set

To analyze the effectiveness of our proposed approach, the criteria, namely *precision* is used to measure the related experimental evaluations. It is defined as:

$precision = \frac{|correct|}{|retrived|} * 100\%$, Where *correct* is the positive image set to the query image at feedback, *retrieved* is the resulting image set exploited by the proposed approach at each feedback. The criterion *precision* delivers the ability for hunting the desired images in user's mind

5. CONCLUSIONS

we have presented a new approach named NPRF by integrating the navigation pattern mining and a navigation-pattern-based search approach named NPRF Search. In summary, the main feature of NPRF is to efficiently optimize the retrieval quality of interactive CBIR. The proposed algorithm NPRF Search performs the navigation-pattern-based search to match the user's intention by merging three query refinement strategies. As a result, traditional problems such as visual diversity and exploration convergence are solved. Within a very short term of relevance feedback, the navigation patterns can assist the users in obtaining the global optimal results. The new search algorithm NPRF Search can bring out more accurate results than other well-known approaches. In the future, there are some remaining issues to investigate. First, in view of very large data sets, we will scale our proposed method by utilizing parallel and distributed computing techniques. Second, we will apply the NPRF approach to more kinds of applications on multimedia retrieval or multimedia recommendation.

6. REFERENCES

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