ISSN:0975-9646

B.Ramesh Kumar et al, / (IJCSIT) International Journal of Computer Science and Information Technologies, Vol. 4 (2) , 2013, 292 - 294

Innovative Context Free Approach for Image Retrieval

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Abstract— **Most current content-based image retrieval systems (CBIR) are still incapable of providing users with their desired results. The major difficulty lies in the gap between low-level image features and high-level image semantics, to address this issue we propose a new method that can remove few of the problems in the existing CBIR systems, by constructing a system using Context Free Approach for retrieving the images based on the tags associated with the image and also by taking into account the user feedback for effective retrieval of images.**

***Keywords*-CBIR, Tags, Retrieval, Context Free, Feed Back**

INTRODUCTION

A. Content Based Image Retrieval

Due to the rapidly growing amount of digital image data on the Internet and in digital libraries, there is a great need for large image database management and effective image retrieval tools. Content-based image retrieval (CBIR) is the set of techniques for searching for similar images from an image database using automatically extracted image features.

Tremendous research has been devoted to CBIR and a variety of solutions have been proposed within the past ten years. By and large, research activities in CBIR have progressed in three major directions: global features based, object/region-level features based, and relevance feedback. Initially, developed systems are usually based on the carefully selected global image features, such as color, texture or shapes, and prefixed similarity measure. They are easy to implement and perform well for images that are either simple or contain few semantic contents (for example, medical images and face images). However, for these systems, it is impossible to search for objects or regions of the image.

Therefore, the second group of systems is proposed on image segmentation. Contrasting the performance of these systems mainly relies on the results of segmentation. Therefore, they cannot generate extremely good performance since the image segmentation is still an open problem in computer vision so far.

The limited retrieval accuracy of image-centric retrieval systems is essentially due to the inherent gap between semantic concepts and low-level features. In order to reduce the gap, the interactive relevance feedback (RF) is introduced into CBIR. RF, originally developed for textural document retrieval, is a supervised learning algorithm used to improve the performance of information systems. Its basic idea is to incorporate human perception subjectivity into the query process and provide users with the opportunity to evaluate the retrieval results. The similarity measures are automatically refined on the basis of these relevance feedback evaluations. After RF for CBIR was first proposed by Rui *et al.*, this area of research has attracted much attention and become active in the CBIR community.

Recently, many researchers began to consider the RF as a learning or classification problem. That is, a user provides positive and/or negative examples, and the systems learn from such examples to refine the retrieval results or train a classifier by the labeled examples to separate all data into relevant and irrelevant groups.

Although RF can significantly improve the retrieval performance, its applicability still suffers from the following inherent drawbacks.

1) Incapability of capturing semantic:

Most RF techniques in CBIR absolutely copy ideas from textural information retrieval. They simply replace keywords with low-level features and then adopt the vector model for document retrieval to perform interactions. This strategy works well underlying the premise that the low-level features are as powerful in representing the semantic content of images, as keywords in representing textural information. Unfortunately, this requirement is often not satisfied. Therefore, it is difficult to capture high-level semantics of images when only low-level features are used in RF.

2)Scarcity and imbalance of feedback examples:

Very few users are willing to go through endless iterations of feedback with the hopes of getting the best results. Hence, the number of feedback examples labeled by users during a RF session is far smaller than the dimension of low-level features that characterize an image. Because of such small training data sizes, many classical learning algorithms cannot give exciting results. Furthermore, in the RF scenario, the number of labeled negative examples is usually greater than the number of labeled positive examples. As pointed out, the imbalance of training data always makes classification learning less reliable. Thus, the scarcity of feedback examples, especially positive examples, definitely limits the accuracy of RF.

3) Lack of the memory mechanism:

A disadvantage of the traditional RF is that the potentially obtained semantic knowledge in the feedback processes of one query session is not memorized to continuously improve the retrieval performance Even with the same query, a user will have to go through the same, often tedious, feedback process to get the same result, despite the fact the user has given the same query and feedbacks before. Hence, there is an urgent need of building a memory mechanism to accumulate and learn the semantic information provided by past user interactions.

To overcome the aforementioned difficulties, another school of thought generally called long-term learning, has become available in recent years. They memorize and accumulate users' preferences in the RF process. The historical retrieval experience will then be used to guide new users' queries. These long-term learning algorithms are mainly based on previous users' behaviors, which basically embody more semantic information than low-level features. They try to narrow that well-known gap by other persons' subjectivities because image content understanding is very difficult with the present state of the computer vision and image processing technology.

4) Negative examples:

The problem of how to treat negative examples may be central issues in when negative feedbacks are to be considered.

5) Global features versus query:

Most relevant feedback systems focus only on global features, which are not a better option, there is a lack of a algorithms that focus on the concatenated feature vector as the representation, and a hierarchical weighting scheme that automatically reveals the relative importance of different image blocks during user interactions.

Inorder to overcome the above drawbacks present in the context based image retrieval systems we propose a model that is built on the basis of Context free approach for retrieving images by taking user feedback into account.

PROPOSED SYSTEM

In this proposed system we attempt to exploit the human's perceptual capabilities and refine the image retrieval process, by bypassing image features, the performance improvement will not be restricted by the already defined capabilities of feature selection or object recognition. We name our approach "context –free" image retrieval (CFIR) because we are not analysing the image pixels.

In our system that we propose to build, consists of a database of images provide by the Flickr, associated with these images are the tags which we use for retrieving the images. We take the tags into account and create an inverted file structure of the tags in such a way that we get to know the number of images that are associated with the particular tags.

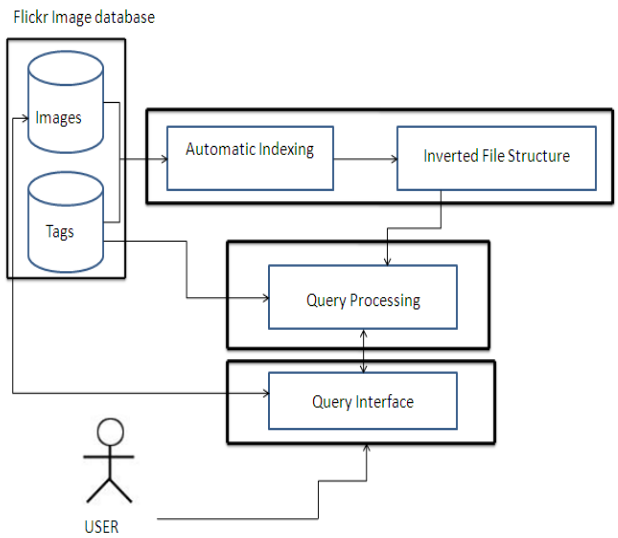

Figure 1: System model

Inverted file structure is the most common data structure used in both database management and information retrieval systems .Inverted file structures are composed of three basic files: the document file, the inversion lists and the dictionary.

Each text file that contains the tags associated with a particular image is given a numerical identifier i.e if the image name is 0.jpeg the tags for that image are present in the file 0.txt.It is that identifier that is stored in the inversion list. The way to locate the inversion list for a particular word or tag that is entered by the user of the system is via the Dictionary. The Dictionary is typically a sorted list of all unique words (processing tokens) in the system and a pointer to the location of its inversion list.

When a search is performed, that is when a user is looking for a image he enters the keywords of the image that he is looking for ,here keywords in the sense means the tags that are associated with the image ,we perform intersection of user entered keyword with the keywords present in the inversion list and the keyword in the query is located and the appropriate logic is applied between the inversion list and the images that are associated with the particular keyword entered by the user is retrieved from the database.

The user would be provided with an interface to search for images by using the keywords, once the images are displayed by using the using inversion list the user can go through the images and see whether the image that he is looking for is retrieved, if the user got the image he is looking for then there would be no refinement of the query entered by the user, if the user is not satisfied by the results then he would be given an option of providing feedback whether the particular image retrieved is relevant to the keyword entered by him.

Once the user provides the feedback to the system, we then apply automatic refinement of the user entered query by using clustering process and provide images to the user.

In this clustering process we use three main methods to refine the query entered by the user, we take into account the inverted file created using inverted file data structure, the inverted file contains words in alphabetical listing order using this inverted file ,we use tools such as KWOC, KWAC, or KWOC that can be useful in listing the words.

A Key Word Out of Context (KWOC) is another name for the concordance. Key Word In Context (KWIC) displays a possible term in its phrase context. It is structured to easily identify the location of the term or keyword under consideration in the sentence. Key Word And Context (KWAC) displays the keywords followed by their context.

Figure 2 below shows the various displays the various examples for KWIC, KWAC, and KWOC. Let's suppose we had the following title:

"Computer design contains memory chips"

KWOC

Term	**Frequency**	**Item ids**
Chips	**2**	**doc2, doc4**
Computer	**3**	**doc1, doc4, doc10**
Design	**1**	**doc4**
Memory	**3**	**doc3, doc4, doc8**

KWIC

Term	**Statements**
Chips/	**computer design has memory**
Computer	**design contains memory chips**
Design	**contains memory chips/ computer**
Memory	**chips/computer design contains**

KWAC

Chips	**computer design contains memory chips**
Computer	**design contains memory chips**
Design	**computer design contains memory chips**
Memory	**computer design contains memory chips**

Figure 2: Example of KWOC, KWIC and KWAC [11]

In the figure3, the character '/' is used in KWIC to indicate the end of the phrase. The KWIC and KWAC are useful determining the meaning of the homographs. The term "chips" could be wood chips or memory chips. In both the KWIC and KWAC displays the editor of the dictionary can read the sentence fragment associated with the term and determine its meaning. The KWOC does not provide any information that helps to resolve the ambiguity.

This process of refining the query will be automated by the system that we propose to build, thereby providing the images to the user that are related to the user entered query. Thus the system takes human perception capability into account and provides him the results; this system eliminates the need of the user to have prior knowledge about the image features.

CONCLUSION

We intend to build a system that is capable of refining the query entered by the user, there by providing efficient results to the user and eliminating the need of the user to have prior knowledge about the image contents.

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