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Survey on Content Based Image Retrieval with Relevance Feedback

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ABSTRACT: In Content Based Image Retrieval (CBIR), there is semantic gap between the low level features and high level concepts Therefore to confine semantic gap Relevance Feedback (RF) scheme have been designed.The CBIR has attracted increasingly attention in RS community particularly for its potential practical applications to RS to RS image management. In content-based image retrieval, Relevance Feedback (RF) is an interactive process, which builds a bridge to connect users with a search engine. Relevance Feedback is an important technique to improve the effectiveness of information retrieval systems. Active learning (AL) method reduces the annotation effort in RF that aims at finding the most informative images in the archive, when annotated and included in the training set. In this paper we study active learning method which evaluates the three criteria uncertainty, diversity and density.

KEYWORDS: Relevance Feedback (RF), Content Based Image Retrieval (CBIR), Active Learning (AL)

I. INTRODUCTION

With the rapid growth in digital media, necessity for large image database has raised. It comprises the major portion of the databases which makes the search engines to face difficulty in searching. Content based image retrieval is a method to retrieve the images from the large database based on the image content. CBIR takes an image as a query and identifies the matched images based on the visual similarity between the query image and gallery images. Various visual features, including colour, texture, and shape. In general CBIR system contains two modules: feature extraction module and retrieval module. In CBIR images are retrieved by using active learning method on the basis of uncertainty, diversity and density. The uncertainty and diversity goal is to finding most informative images from archive as well as training set whereas density criterion goal is to finding representative images from archive. Content-based image retrieval (CBIR), also known as query by image content and content-based visual information retrieval (CBVIR) is the application of computer vision techniques to the image retrieval problem, that is, the problem of searching for digital images in large databases.

Traditional RF methods in CBIR include the following two basic steps:

1) When retrieved images are returned to the user, some relevant and irrelevant images are labelled as positive and negative samples respectively and,

2) The retrieval system refines the retrieved results based on these labelled feedback samples.

These two steps are conducted iteratively until the user is satisfied with the presented result.

II. RELATED WORK

Image retrieval is a kind of technique information retrieval from large amount of database in the form of Image. The main motivation of Image Retrieval is 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 categoriser.[2] There are various kinds of Image Retrieval:

1. Text Based Approach: This approach is used to annotate the meaning of text into image form.

2. Content Based Approach: We provide image as a query and extract the features and match its similarity from database image.

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Content based approach is more effective and efficient than Text based approach because Impression is more by an image rather than thousands of words. CBIR (Content Based Image Retrieval) is also known as Query by image content. The working of general CBIR system as follows:

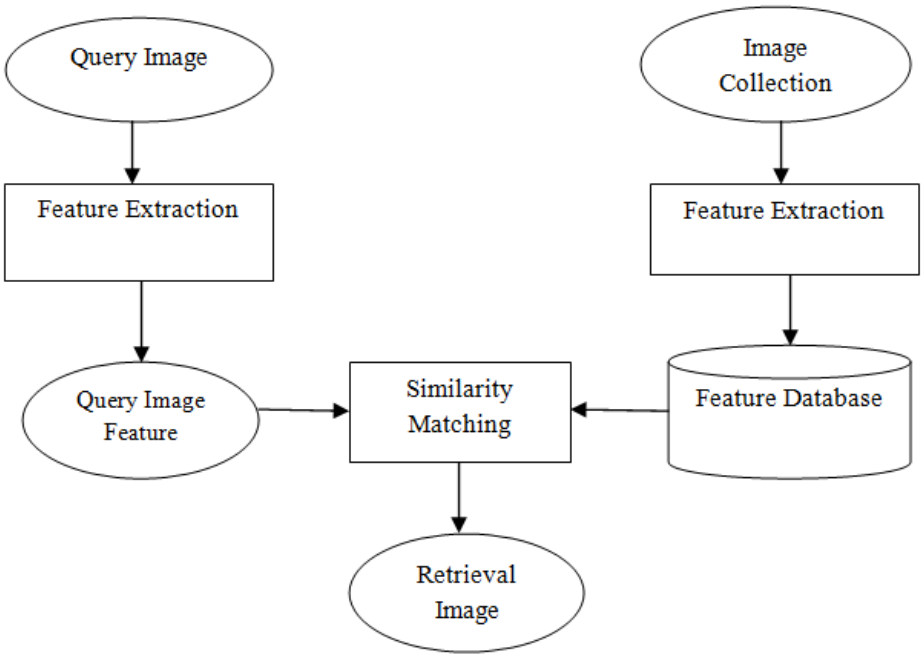

Fig. General Overview of CBIR System

The System architecture is divided into two phases. During first phase features are extracted from both Query image and Image collection. In second phase system comparing the features of query image and database image and retrieved similarity matching images to the user. To finding good similarity measures between images is a challenging task. Similarity measurement is the process of finding the similarity/difference between the database images and the query image using their features [6].

Existing conventional remote sensing image retrieval systems relay on Keywords/tags. The performance of tag matching based retrieval approaches highly depends on availability and quality of manual tags. In practice keywords/tags are expensive to obtain and ambiguous. Due to these drawbacks recent studies shows the content of RS data is more relevant than manual tag. [1]

A relevance feedback retrieval system has a number of design requirements that allow the system to function in an efficient online manner. After each iteration, when a set of images are retrieved, the system must require a reasonable amount of feedback. If the user needs to labour over providing feedback for numerous images after each and every iteration, they will tire soon and not be satisfied with the process. The system must produce acceptable results after only a few iterations. If large numbers of iterations are required, the user will also tire. Feature extraction should be completed in a short period of time to prevent user frustration. Also these low level features extracted and their semantic meanings may differ thus forming a gap known as the “Semantic Gap”. This problem is an important factor that affects the performance of RF in CBIR. A wide variety of RF algorithms have been developed in the recent years with an effort to reduce this semantic gap and thus improving the performance of CBIR systems.

III. SCOPE OF RESEARCH

1] CBIR [3]:

"Content-based" means that the search analyzes the contents of the image rather than the metadata such as keywords, tags, or descriptions associated with the image. The term "content" in this context might refer to colors,

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shapes, textures, or any other information that can be derived from the image itself. In content-based image retrieval (CBIR), the search may be initiated using a query as an example. The top rank similar images are then presented to the user. Then, the interactive process allows the user to refine his request as much as necessary in a relevance feedback loop. Many kinds of interaction between the user and the system have been proposed, but most of the time, user information consists of binary labels indicating whether or not the image belongs to the desired concept. The positive labels indicate relevant images for the current concept, and the negative labels irrelevant images.

2] Relevance Feedback (RF) [5]:

Relevance Feedback (RF) has gathered great momentum over the years as a promising, power full, and an advanced technique for CBIR. Many advancements and optimizations have been performed in CBIR using RF. Many RF methods have been developed in recent years:

1. One approach is that the weights of various features to adapt to the user's perception are adjusted.
2. Another approach is that the density of the positive feedback examples is estimated.
3. Support vector machine (SVM) has also been used as a classification method for RF.

These methods all have their own limitations, respectively:

1. The method in is only heuristic based.
2. The density estimation method loses information contained in negative samples.
3. Classification based method treats the positive and negative samples equally.

3] Active Learning [4]:

Active Learning (AL) that aims at finding the most informative images in the achieve that, when annotated and included in the set of relevant and irrelevant images (i.e. the training set), can significantly improve the retrieval performance. The main objective of Active Learning (AL) method are to achieve a training set of annotated relevant and irrelevant images with respect to the query image as small as possible within a low number of RF iterations, To retrieve the images similar to the query image with high accuracy.

IV. CONCLUSION

Active Learning method is an effective approach to reduce annotation effort in relevance feedback. Active learning method selects both informative and representative unlabeled images to be included in training set at each RF round by joint evaluation of uncertainty, diversity and density criteria. The uncertainty and diversity criteria aim at selecting the most informative images in the archive. Whereas density criterion goal is to choose images that are representative of underlying distribution of data in the archive. Our active learning method overcomes the limitations of previously presented AL method in CBIR problems, which are due to the following unbalanced training set, biased initial training set. The main objective of AL in CBIR is to optimize the search with minimum number of annotated images and thus with minimum cost in annotating images.

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BIOGRAPHY

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