International Journal of Research in Advent Technology, Vol.2, No.5, May 2014
E-ISSN: 2321-9637

A Comprehensive Review of Image Retrieval Based On Example Video Clip

P.Dhivya[1], D.Lakshmi[2],
PG Student of CSE[1], Associate Professor of CSE[2]
Adithya Institute of Technologye[1, 2]
pdhivyait@gmail.com[1], *lakshmi.lifefordivine@gmail.com*[2]

Abstract- In the recent years, with the usage of internet, there has been large amount of data resides on the web. Everyone is interested for accurate and fast retrieval search engines that retrieve images. This paper tries to present a comprehensive review and differentiate the various problems of image retrial techniques. This paper presents a survey of the most popular image retrieval techniques with their advantage and limitations. Content Based Image Retrieval is the latest technique for image retrieval. In order to make image retrieval more effective researcher are moving towards Video based image retrieval that is new direction of CBIR. Finally, based on existing technologies and the demand from real-world applications, a few promising future research directions are suggested.

Index Terms- Image Retrieval, Content Based Image Retrieval, Search Engine, Video Based Image Retrieval

1. INTRODUCTION

An image retrieval system is a computer system for browsing, searching and retrieving images from large database of digital images [1]. This area of research is very active research since the 1970s. The purpose of an image database is to store and retrieve an image or image sequences that are relevant or similar to a query image [2]. There are a variety of domains such as information retrieval, computer graphics, object retrieval, object recognition and matching, database management and user which have evolved separately but are interrelated and provide a valuable involvement to this research subject.

1.1 Image Retrieval Techniques

Due to increased development of multimedia information over internet and photographic technology the number of digital images is rapidly increasing. In multimedia world, research in information retrieval is one of the most important fields. So everyone is interested to get accurate and fast retrieval of images. For this purpose there are several image retrieval techniques, some of them are discussed below:

- Text Based Image Retrieval
- Content Based Image Retrieval

1.1.1. Text Based Image Retrieval

TBIR is currently used in almost all web image search engine. Google, yahoo image search engine are used this type of Techniques. As shown n Fig. 1 this approach use the text or keyword to retrieve the image that relevant to keyword

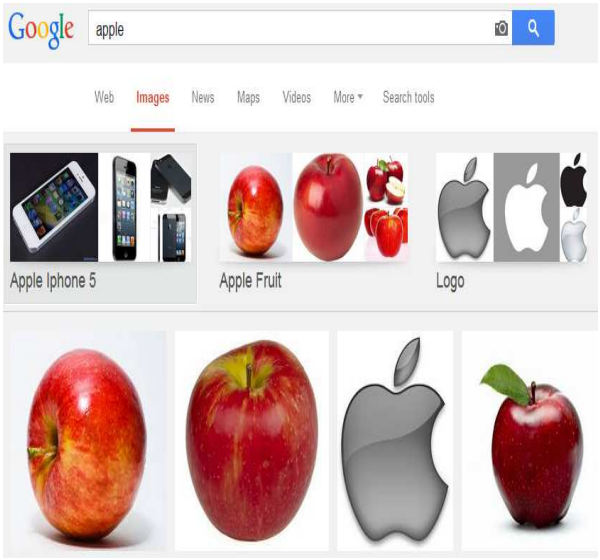

Fig 1 Illustration of the keyword-based image search scheme. In this scheme, the search query comprises one or multiple keywords specified by the user.

However, this method is fast and accurate but sometimes its retrieve the irrelevant result to the user. In this approach, the images are manually annotated by text description and the database management system is used for the image retrieval. The limitation over the text based search or keyword search is, the perspective of the textual description may differ from the perspective of the user. Large amount of man power also needed in manual image annotation.

1.1.2 Content Based Image Retrieval

Content-Based Image Retrieval (CBIR), which belongs to a research field of image analysis, also known as Query by Image Content (QBIC) and Content-Based Visual Information Retrieval (CBVIR). The key technologies image retrieval include: Image feature extraction, feature-based similarity calculation, semantically relevance feedback and image acquisition .It relates to machine vision, pattern recognition, database technology and information retrieval studies. Everyone is interested for accurate and fast retrieval. Maintaining the image database and retrieval of correct image from the database is challenging task. Such strategy is called Content-Based Image Retrieval (CBIR). CBIR has become advancing research area in image retrieval. CBIR [8] have been progressed in four major areas: Global image properties based, region-level features based, relevance feedback and semantic based.

Fig.2 Illustration of the example-based image search scheme. In this scheme, the query is an image, either specified y a URL or uploaded by users.

As shown in fig .2 this approach use the input query as image and retrieve the similar type of image based on the image content. Features are extracted from the images include color, texture, shape .Similarity of images are calculated based on the distance between these features.

There are three fundamental bases for content based Image retrieval, i.e. visual feature extraction, multidimensional indexing, and retrieval system design.

a. Feature extraction and indexing of image database
b. According to the chosen visual features, which from the perceptual feature space, for example color, shape, texture or any combination of above.
c. Feature extraction of query image.
d. Matching the query image to the most similar images in the database according to some image-image similarity measure. This forms the search part of CBIR systems.
e. User interface and feedback which governs the display of the outcomes, their ranking, the type of user interaction with possibility of refining the search through some automatic or manual preferences scheme etc

CBIR technique some time gives the irrelevant result. Because our query image may be blur or noisy image .It's difficult to retrieve the correct matching results. To overcome these difficulties this paper introduces the new method called Video Based Image Retrieval.

2. SURVEY OF IMAGE RETRIEVAL

Carlos E. Baz-Hormigos, and Fernando Díaz-de-María [5] presented a Probabilistic generative model that continuously tackles the problem of image retrieval and Region of Interest (ROI).Specifically, the proposed model takes into account several properties of the matching process between two objects in different images, namely: objects undergoing a geometric transformation, typical spatial location of the region of interest, and visual similarity. **T**hey consider the problem of large-scale query-by-example image retrieval. This problem has been traditionally tackled using the well-known Bag-of-Words (BOW) model, a robust and computationally affordable method. This model involves the generation of a visual vocabulary, which allows for associating each local descriptor of an image with one visual word through a quantization process. As a result, each image can be described as a histogram of word occurrences that is used to compute a similarity measure between every pair of images.

R. Fergus1 and A. Zisserman1 [2] present an approach that can learn an object category from just its name, by utilizing the raw output of image search engines available on the Internet. We develop a new model, TSI-pLSA, which extends pLSA (as applied to visual words) to include spatial information in a translation and scale invariant manner. This approach can handle the high intra-class variability and large proportion of unrelated images returned by search engines.

Lowe DG [5] paper presents a method for extracting distinctive invariant features from images that can be used to perform reliable matching between different views of an object or scene. The features are invariant to image scale and rotation, and are shown to provide robust matching across a a substantial range of affine distortion, change in 3D viewpoint, addition of noise, and change in illumination. This

paper also describes an approach to using these features for object recognition. For image matching and recognition, SIFT features are first extracted from a set of reference images and stored in a database. A new image is matched by individually comparing each feature from the new image to this previous database and finding candidate matching features based on Euclidean distance of their feature vectors. This paper will discuss fast nearest-neighbor algorithms that can perform this computation rapidly against large databases.

R. Fergus1 and A. Zisserman1 [1] present an approach that can learn an object category from just its name, by utilizing the raw output of image search engines available on the Internet. We develop a new model, TSI-pLSA, which extends pLSA (as applied to visual words) to include spatial information in a translation and scale invariant manner. This approach can handle the high intra-class variability and large proportion of unrelated images returned by search engines.

Lowe DG [6] paper presents a method for extracting distinctive invariant features from images that can be used to perform reliable matching between different views of an object or scene. The features are invariant to image scale and rotation, and are shown to provide robust matching across a substantial range of affine distortion, change in 3D viewpoint, addition of noise, and change in illumination. This paper also describes an approach to using these features for object recognition. For image matching and recognition, SIFT features are first extracted from a set of reference images and stored in a database. A new image is matched by individually comparing each feature from the new image to this previous database and finding candidate matching features based on Euclidean distance of their feature vectors. This paper will discuss fast nearest-neighbor algorithms that can perform this computation rapidly against large database.

METHOD	ADVANTAGE	LIMITATION	APLLICATION
Generative probabilistic model, ROI Segmentation	Robust method for estimating the actual geometric transformation undergone by the objects	Improves the reliability of detected true matches between any pair of images.	Image Retrieval
Dual-Tree Rotated Complex Wavelet Filter (DT-RCWF) and Dual-Tree-Complex Wavelet Transform (DT-CWT)	Retrieval Accuracy is more. Computation Complexity is 3.3 times lesser than Garbor wavelet based approach	keywords based method to retrieve a particular image becomes inefficient	Online application
Translation and Scale invariant pLSA (TSI-pLSA)	improve the quality of the image search by re-ranking the images	how to pick the most informative images	Image search engine
Scaling Invariant Feature Transform (SIFT)	Improve robust object identification	Extract only local features	Object Recognition,3D reconstruction
Video similarity model	Increase the retrieval performance	Adaptation problem	Video search engine

Table 1: Comparison between different image retrieval techniques

3. FUTURE DIRECTION

From the above review, we can see that many advances have been made in various research aspects, including visual feature extraction [7], multi-dimensional indexing etc. However, there are still many open research issues need to be solved before current image retrieval can be of practical use.

3.1 Similar to Human Judgments

To understand user required images, further to plug and play the query and stored images in such a way that reflects human identical judgments and information-seeking behavior.

3.2 Semantic Gap

As there are no such techniques available which properly deal with semantic gap and hence new image annotation techniques need to be developed. The researchers are moving to reduce the semantic gap in broad domains.

3.3 Human Perception of image content

The basic features that users look for in images include color, shape or texture .With the huge amount of information present over the internet, it needs to be

organized efficiently for effective browsing search and retrieval. The knowledge on how the systems interact with the visual information is required to further develop an understanding of Image Retrieval systems.

4. APPLICATIONS

The image retrieval technique [7] mainly used in several applications such as

- Fingerprint identification
- Biodiversity information system
- Digital libraries
- Crime prevention
- Medicine
- Historical research

5. CONCLUSION

The main purpose of this survey is to provide an overview of Text Based Image Retrieval and Content Based image Retrieval systems. Most image retrieval system use image and texture features to retrieve the images from the databases which is not a reliable method. The reliability of CBIR is further improved by a new method called video based image retrieval. The major tools surveyed include Histograms, Geometrical method, probabilistic and clustering have been reviewed and analyzed. Comparison between various images retrieval techniques have been presented with explaining the important parameters needed for any retrieval system which include: the segmentation process, features extraction, and the classification algorithm also summarize various future directions

REFERENCES

[1] Akgül, Ceyhun Burak, Daniel L. Rubin, Sandy Napel, Christopher F. Beaulieu, Hayit Greenspan, and Burak Acar. "Content-based image retrieval in radiology: current status and future directions." *Journal of Digital Imaging* 24, no. 2 (2011): 208-222.

[2] Fergus, Robert, Li Fei-Fei, Pietro Perona, and Andrew Zisserman. "Learning object categories from Google's image search." In *Computer Vision, 2005. ICCV 2005. Tenth IEEE International Conference on*, vol. 2, pp. 1816-1823. IEEE, 2005.

[3] González-Díaz, Iván, Carlos E. Baz-Hormigos, Moises Berdonces, and Fernando Diaz-de-Maria. "A generative model for concurrent image retrieval and ROI segmentation." In *Content-Based Multimedia Indexing (CBMI), 2012 10th International Workshop on*, pp. 1-6. IEEE, 2012.

[4] González-Díaz, Iván, Carlos E. Baz-Hormigos, Moises Berdonces, and Fernando Diaz-de-Maria. "A generative model for concurrent image retrieval and ROI segmentation." In *Content-Based Multimedia Indexing (CBMI), 2012 10th International Workshop on*, pp. 1-6, 2012.

[5] Ke, Yan, and Rahul Sukthankar. "PCA-SIFT: A more distinctive representation for local image descriptors." In *Computer Vision and Pattern Recognition, 2004. CVPR 2004. Proceedings of the 2004 IEEE Computer Society Conference on*, vol. 2, pp. II-506. IEEE, 2004.

[6] Kokare, Manesh, P. K. Biswas, and B. N. Chatterji. "Rotation-invariant texture image retrieval using rotated complex wavelet filters." *Systems, Man, and Cybernetics, Part B: Cybernetics, no.6, pp.1273-1282, 2006.*

[7] Prabhu, Jeyanthi, and Jawahar Senthil Kumar. "Wavelet Based Content Based Image Retrieval Using Color And Texture Feature Extraction By Gray Level Coocurence Matrix And Color Coocurence Matrix." *Journal of Computer Science* 10, no. 1, 2013.

[8] Rui, Yong, Thomas S. Huang, and Shih-Fu Chang. "Image retrieval: Current techniques, promising directions, and open issues." *Journal of visual communication and image representation* 10, no. 1 pp. 39-62, 1999.

[9] Smeulders, Arnold WM, Marcel Worring, Simone Santini, Amarnath Gupta, and Ramesh Jain. "Content-based image retrieval at the end of the early years." *Pattern Analysis and Machine Intelligence, IEEE Transactions on* 22, no. 12, pp: 1349-1380.

[10] Thomas M. Lehmann ; Berthold B. Wein ; Joerg Dahmen ; Joerg Bredno ; Frank Vogelsang, et al, "Content-based image retrieval in medical applications: a novel multistep approach", *Proc. SPIE* 3972, Storage and Retrieval for Media Databases 2000.

[11] Wilkins, Peter, Paul Ferguson, Alan F. Smeaton, and Cathal Gurrin. "Text based approaches for content-based image retrieval on large image collections." In *Integration of Knowledge, Semantics and Digital Media Technology, (EWIMT 2005).* pp. 281-288, 2005.

[12] Wu, Yi, Yueting Zhuang, and Yunhe Pan. "Content-based video similarity model." In *Proceedings of the eighth ACM international conference on Multimedia*, pp. 465-467. ACM, 2000.