IMAGE DATA EXTRACTING USING IMAGE FRAME COMPARISON TECHNIQUE

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Abstract: The advancement of database technology that incorporates multimedia data, are in need to efficiently handle the immensely growing amount of multimedia data The growing of digital medias (digital camera, digital video, digital TV, e-book, cell phones, etc.) gave rise to the revolution of very large multimedia databases, in which the need of efficient storage, organization and retrieval of multimedia contents came into question. The main focus of this paper is to analyze the image retrieval system and to overcome the limitations the existing system.

Keywords: Information Retrieval, Image pixel comparison, Pixel threshold value, Image frame value, Image mining, Image frame comparison.

1. INTRODUCTION

Information retrieval (IR) is the area of study concerned with searching for documents, for information within documents, and for metadata about documents, as well as that of searching structured storage, relational databases, and the World Wide Web. There is overlap in the usage of the terms data retrieval, document retrieval, information retrieval, and text retrieval, but each also has its own body of literature, theory, praxis, and technologies. IR is interdisciplinary, based on computer science, mathematics, library science, information science, information architecture, cognitive psychology, linguistics, and statistics. Content-based video analyzing and retrieval are important technologies, which have been an international research focus in recent ten years. It is needed urgently the advanced technologies for organizing, analyzing, representing, indexing, filtering, retrieving and mining the vast amount of videos to retrieve specific information based on video content effectively, and to provide better ways for entertainment and multimedia applications.

1.1 Image Retrieval

Image mining requires that images be retrieved according to some requirement specifications. The requirement specifications can be classified into three levels of increasing complexity [1]:

(a) Level 1 comprises image retrieval by primitive features such as color, texture, shape or the spatial location of image elements.

(b) Level 2 comprises image retrieval by derived or logical features like objects of a given type or individual objects or persons

(c) Level 3 comprises image retrieval by abstract attributes, involving a significant amount of high-level reasoning about the meaning or purpose of the objects or scenes depicted.

2. THE FOUNDATIONS OF DATA MINING

Data mining techniques are the result of a long process of research and product Development [1]. This evolution began when business data was first stored on computers, continued with improvements in data access, and more recently, generated technologies that allow users to navigate through their data in real time. Data mining takes this evolutionary process beyond retrospective data access and navigation to prospective and proactive information delivery. Data mining is ready for application in the business community because it is supported by three technologies that are now sufficiently mature:

- Massive data collection
- Powerful multiprocessor computers
- Data mining algorithms

Figure 1. Data Mining Preprocessing Steps

2.1 Research issues in image mining

By definition, image mining deals with the extraction of image patterns from a large collection of images. Clearly, image mining is different from low-level computer vision and image processing techniques because the focus of image mining is in extraction of patterns from *large* collection of images, whereas the focus of computer vision and image processing techniques is in understanding and/or extracting specific features from a *single* image. While there seems to be some overlaps between image mining and content-based retrieval (both are dealing with large collection of images), image mining goes beyond the problem of retrieving relevant images. In image mining, the goal is the discovery of image patterns that are significant in a given collection of images. Perhaps, the most common misconception of image mining is that image mining is nothing more than just applying existing data mining algorithms on images. This is certainly not true because there are important differences between relational databases versus image
Databases.

2.1.1 Absolute versus relative values.

In relational databases, the data values are semantically meaningful. For example, age is 35 is well understood. However, in image databases, the data values themselves may not be significant unless the context supports them. For example, a grey scale value of 46 could appear darker than a grey scale value of 87 if the surrounding context pixels values are all very bright.

2.1.2 Spatial information:

(Independent versus dependent position) another important difference between relational databases and image databases is that the implicit spatial information is critical for interpretation of image contents but there is no such requirement in relational databases. As a result, image miners try to overcome this problem by extracting position-independent features from images first before attempting to mine useful patterns from the images.

2.1.3 Unique versus multiple interpretations.

A third important difference deals with image characteristics of having multiple interpretations for the same visual patterns. The traditional data mining algorithm of associating a pattern to a class (interpretation) will not work well here. A new class of discovery algorithms is needed to cater to the special needs in mining useful patterns from images. In addition to the need for new discovery algorithms for mining patterns from image data, a number of other related research issues also need to be resolved.

3. CONTENT BASED IMAGE RETRIEVAL SYSTEM

Content-based image retrieval (CBIR), also known as query by image content (QBIC) and content-based visual information retrieval (CBVIR) is the application of computer vision to the image retrieval problem. This system is based upon a combination of higher-level and lower-level vision principles. Higher-level analysis uses perceptual organization, inference and grouping principles to extract semantic information describing the structural content of an image. Lower-level analysis uses image texture, shape and color histogram techniques. The image search is of two types such as target search and category search. The goal of target search is to retrieve known and specific image, such as registered logo, a historical photograph, or a particular painting. The goal of category search is to retrieve a given semantic class or genre of images or used to find relevant images that the user might not be aware ahead of time, such as scenery images or skyscrapers

Figure 2. Context based Retrieval

3.1Image-based applications

Due to computer capacity limitations, development of image-based computer applications followed text-based applications. Perhaps the first image-based computer applications were developed for weather forecasting, though other early applications included:

- Map generation and manipulation
- Visual analysis of experiment data - in chemistry, physics and statistics
- Visualization of mathematical functions
- CAD/CAM (computer aided design and manufacture) for ship building, quickly followed by architecture, landscaping, interior decorating, fashion, ...

As computer capacity has grown, image-based application areas have expanded to include:

- Satellite image analysis for monitoring weather, climate, agricultural quality, human activity, ...
- Analysis of medical images
- Navigation - for submarines, ships and aircraft
- Security - photo identity and finger prints

As broadband Internet capacity has become more generally available, art, cultural, and natural science museums have found new audiences for their, predominantly visual, exhibits image data.

3.2 Image Mining Algorithm Steps:

The algorithms needed to perform the mining of associations within the context of image. The four major image mining steps are as fallows:

1. Feature Extracting: Segment images into regions identifiable by region descriptors (blobs) ideally one blob represents one object.
2. Object identification and record creation: Compare objects in one image to objects in every other image. Label each object with an id. We call this step the preprocessing algorithm.
3. Create auxiliary images: Generate image with identified objects to interpret the association rules.
4. Apply data mining algorithm to produce object.

3.3 Image Indexes

Image databases can be and normally are indexed by at least the first 3 of the 4 main index types listed above, listed below in falling frequency:

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1. Atomic indexes, used for standard RDB attributes containing context (photographer/artist, owner,) or structural (encoding type, size,) metadata.

2. Term indexes, defined on terms selected from semantic metadata attributes such as title, caption, subject and description.

3. Structural feature indexes based on automatically extracted, low-level features such as color, texture, and shape, and

4.Semantic feature indexes based on recognition of objects - persons, events - and/or high-level semantic features such as "exam", "prayer",.

4. VIDEO DATA MINING

4.1 Video shot detection.

Video shot detection is the first step for video parsing, and the detected shot boundaries are the basic units for video feature extraction. In this study, we improved our previous work by using a multi-filtering architecture including the *pixel-level comparison*, *histogram comparison,* and *segmentation map*

4.2 Indexing Of Frame

For any data retrieval the indexing is treated as an important aspect. As mentioned earlier there are different types of systems that fetch work based on different algorithms and the retrieved image can be the same query image or a part of the query image or even objects in the image. Sometimes the query can be “retrieve ten most similar images to the given image” which can be called as the Nearest-neighbour. In the existing systems the performance is proportional to the database size. The efficiency of the system should depend on the number of similar images rather the total number of images in the database

4.2 Color histogram

The color histogram for an image is constructed by quantizing the colors within the image and counting the number of pixels of each color. More specifically, given a color space (e.g. YUV), an image can be projected onto three color channels (*Y*, *U*, and *V*). Therefore, an image can be divided into three color components, each of which can be regarded as a gray level image under a certain color channel. Then, the feature vector of an image can be derived from the histograms of its color components. To generate a histogram for a gray-level image, the bin number of the histogram, N, must be given beforehand; each pixel in the image is grouped into the bin whose center is the nearest to the value of the pixel. Then, the number of pixels in the bin gives the value of the bar in the histogram. Finally, a feature vector of an image can be constructed; the values of the bars in the histogram correspond to the coefficients in the feature vector

4.3 Experimental Results:

Table 1 Different Frame splitting time

Number Of Frames Spitted	Search Time
100	2 Seconds
1000	5 Seconds
10000	14 Seconds

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Figure 3. The model input frames of different types of test videos

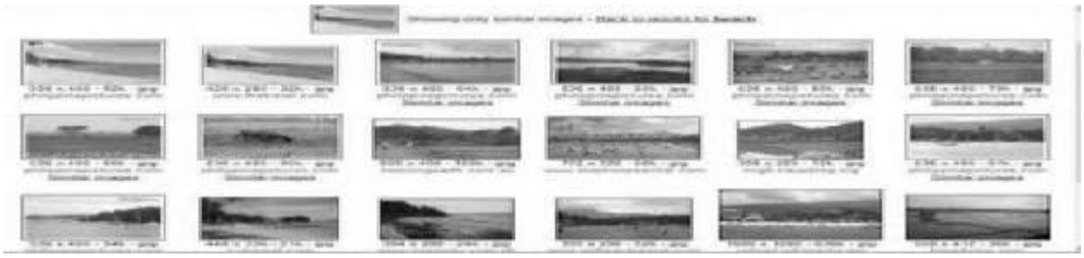

Figure 4. Example Content Based Image Retrieval

Figure 5. Cartoon Input Image Vs Ouput image extrcted.

Figure 6. Sports Input Image Vs Output image extracted.

Table 2. Input frame Vs Time taken

frmcnt	milliseconds	categor
25	789	Cricket
50	785	Cricket
75	780	Cricket
100	756	Cricket
152	705	Cricket
125	758	Cricket

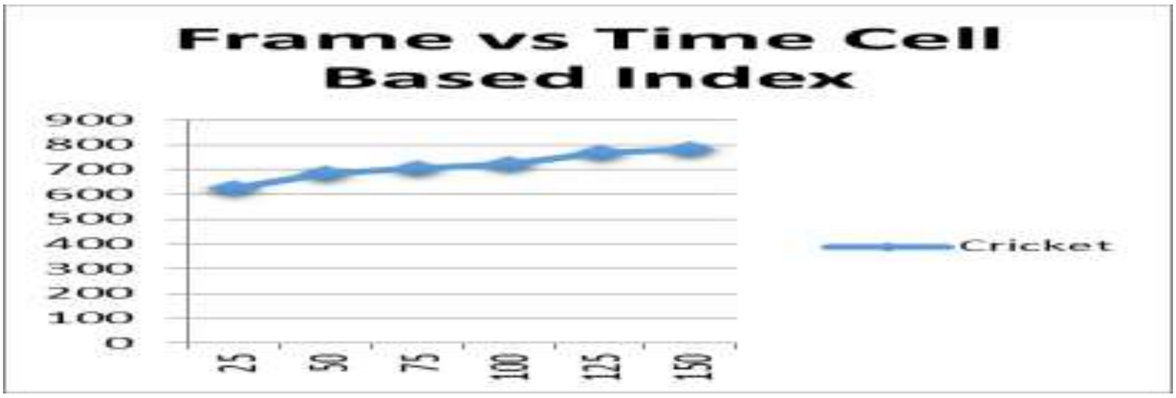

Figure 7. Performance graph of Sports video file

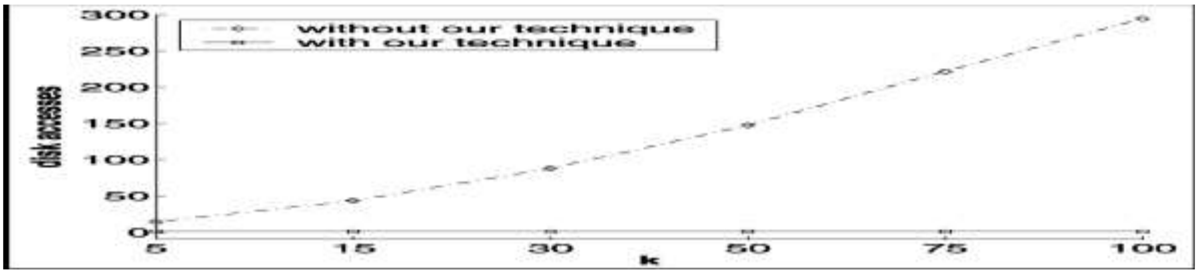

Figure 8. Sampling Query Comparison

5. CONCLUSION

Data mining describes a class of applications that look for hidden knowledge or patterns in large amounts of data. Most of data mining research has been dedicated to alpha-numeric databases, and relatively less work has been done for the multimedia data mining. The current status and the challenges of video data mining which is a very premature field of multimedia data mining, are discussed in this paper. The issues discussed should be dealt with in order to obtain valuable information from vast amounts of video data

6. REFERENCES:

[1] D.Saravanan, Dr.S.Srininvasan " Query Point Techniqeus for CBIR Systems ", In the Proc. Of Advances in Image Processing ,Mining Computing Technology", Pages 425-432,2010.

[2] D.Saravanan, Multimedia data Retrieval Data mining image pixel comparison technique", Lecture notes on Data Engineering and communications Technology 31,Aug 2019, Pages 483-489, ISBN 978-3-030-24642-6, Chapter 57

[3] Z. Barceló's, E. L. Flores; C. A. Z. Barceló's, S. F. Silva, M. A. Batista," A Multi-Dimensional Similarity Modeling and Relevance Feedback Approach for Content-Based Image Retrieval", Systems, Signals and Image Processing, 2009,Page 1-5.

[4] Sun Yen , Wang Zheng-xuan , Wang Dong-mei "An Image Retrieval Method Based on Relevance Feedback and Collaborative Filtering", 2010.

[5] D.Saravanan " Effective text data extraction using Hierarchical clustering technique" Int. Journal of Engg., and Advanced Technology(IJEAT),Feb 2019, Vol. 8, Issue 3-S, Pages 741-743(ISSN 2249 8658)June 2019

[6] Yihun Alemu, Jong-bin Koh, Muhammed Ikram, Dong-Kyoo Kim "Image Retrieval in Multimedia Databases: A survey", Fifth International Conference on Intelligent Information Hiding and Multimedia Signal Processing,2009

[7] D. Hilbert, "Uber die stetige Abbildung einer Linie auf ein Flachenstuck," Math. Annalen, 38-40. [10]I. Bartolini, P. Ciacci, and F. Waas, "Feedbackbypass: A New Approach to Interactive Similarity Query Processing," Proc. 27th Int'l Conf. Very Large Data Base (VLDB '01), pp. 201-210, 2001.

[8] R. Brunelli and O. Mich, "Image Retrieval by Examples," IEEE Trans. Multimedia, vol. 2, no. 3, pp. 164-171, 2000.

[9] D.Saravanan, "Information retrieval using image attribute possessions" Soft computing and signal processing , Advances in Intelligence systems and computing 898, Springer. DOI:10.1007/978-981-13-3393-4_77, Pages 759-767. March 2019.

[10] Fan, J.. Luo, H. "'Emantic Video Classification by Integrating Flexible MixtLre Model witlh Adaptive EM Algorithm",ACMSIGMM, 2003, pp.9-16.

.

[11] T. Gevers and A. Smeulders, "Content-Based Image Retrieval: An Overview," G. Medioni and S.B. Kang, eds., Prentice Hall, 2004.

[12] MAGE MINING: ISSUES, FRAMEWORKS AND TECHNIQUES i Zhang Wynne Hsu Mong Li Lee Department of Computer Science, School of Computing National University of Singapore Singapore, 117543

[13] J. Zhang, W. Hsu and M. L. Lee. An Informationdriven Framework for Image Mining, in Proceedings of 12th International Conference on Database and Expert Systems Applications (DEXA), Munich, Germany, September 2001.

[14] Zhang Qi-dong, Wu Jian-hua, Gao Li-qun. Medical image retrieval based on non subsampled Contourlet transform and Zernike moments [J]. Chinese Journal of Scientific Instrument, 2009, 30(6): 1275-1280.

[15] Y Lu , C Hu, X Zhu et al1 A unified semantics and feature based image retrieval technique using relevance feedback1 In : Proc of the 8th ACM Int'l. Multimedia Conf. Los Angeles: ACM Press, 2001.

[16] D.Saravanan," Efficient Video indexing and retrieval using hierarchical clustering techniques", Advances in Intelligence systems and computing, Volume 712, Pages 1-8, ISBN:978-981-10-8227-6, Nov-2018

[17] A. Vailaya, M. Figueiredo, A. K. Jain, and H.J. Zhang, Image Classification for Content-Based Indexing , IEEE Transactions on Image Processing, vol. 10, no. 1, pp 117-130, January, 2001.

[18] D.Saravanan, Dr. Vaithyasubramaniyan, Dr. Dennis joseph "Effective Utilization of image information using Data mining technique" , Intelligent systems reference library 172, Volume 172, Pages 207-215, ISBN 978-3-030-32643-2, Nov 2019.