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Matrix Based Indexing Technique for Video Data

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ABSTRACT

Due to increasing the usage of media, the utilization of video play central role as it supports various applications. Video is the particular media which contains complex collection of objects like audio, motion, text, color and picture. Due to the rapid growth of this information video indexing process is mandatory for fast and effective retrieval. Many current indexing techniques fails to extract the needed image from the stored data set, based on the users query. Urgent attention in the field of video indexing and image retrieval is the need of the hour. Here a new matrix based indexing technique for image retrieval has been proposed. The proposed method provide better result, experimental results prove this.

Keywords: Image Mining, Video Data Base, Video Data Retrieval, Video Data Indexing and Image Retrieval

1. INTRODUCTION

Data Mining is a process of knowledge evaluation from large data sets. It is a very challenging field of research in the recent years. Extraction of knowledge is a critical issue for the researchers. Many data mining tools currently fail to extract the needed information from the collection of data set; it requires extra steps for extracting and analyzing the data. Extraction video is a particular media which contains motion, sound, image, text and color information. Among these, extracting the needed information is a challenge. The amount of usage of the image has been increasing day by day due to various factors. They are not only used for expressing knowledge and information but also for the purpose of analyzing. For the purpose of effective retrieval video dates are indexed. In **Fig. 1-6** it shows for different search engines are used, in the output we clearly identify that none of the indexing technique is same (Saravanan and Srinivasan, 2010).

Video Content is always huge by itself with abundant information. Extracting explicit semantic information has been extensively investigated such as object detection, structure analysis and event detection. However, little work has been devoted on the problem of discovering global or inexplicit information from the huge video stream. The video is a particular media embedding visual, motion, audio and textual information. The indexing process must be automated in order to build a dictionary of images region.

1.1. Image Retrieval

Due to the technology improvement image is the essential tool to communicating the information in the form of displaying the detailed text message it is the alternative tool. Image capturing is easier but retrieve the relevant image it is necessary for indexing. Retrieval is the process retrieve the image based on the user query. The query may be text or image based on the input query system returned the specified image (output). Various factors are considered based on the application .To Retrieve the image from the stored data based is the current active research area, retrieve the image depends on various factors. Important factors are:

- Color
- Texture
- Shape

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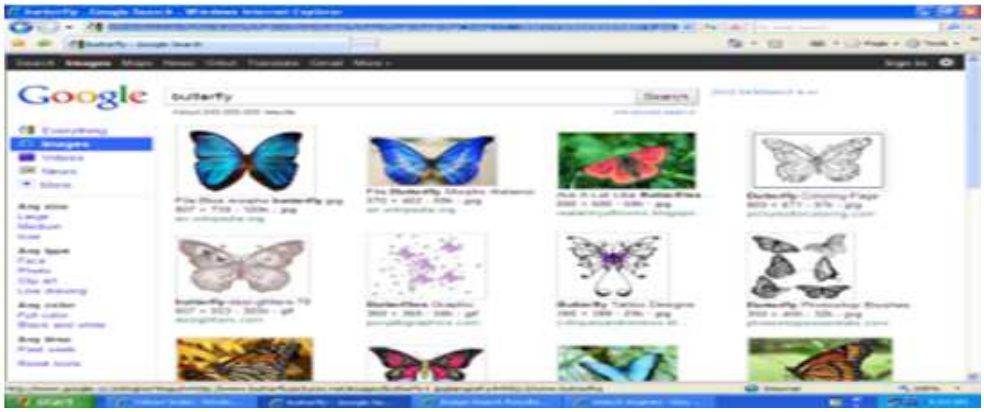

Fig. 1. Searching image using Google search

Fig. 2. Searching image using yahoo search

Fig. 3. Searching of image using Meta Search com

Fig. 4. Searching of image using dog pile image search option

Fig. 5. Searching of image using bing image search option

Fig. 6. Searching of image using ixquick image search engine

1.2. Color

Color plays a center role in image processing. The distance between the pixels, pixel properties are measured with help of color value. Colors are varying based on brightness, hue. Differentiate the image, image indexing are based on the distribution of color in the image.

1.3. Texture

The second factor for image retrieval is text based images. It is difficult to represent, identification of texture in the image based on gray level variation present in the image.

1.4. Shape

It is the common factor to identify the image. It not refers the size of the image but refers the region of the image. It plays important role in image processing like image segmentation and edge detection.

1.5. Image Processing Functions

1.5.1. Image Pre-Processing

In the image pre-processing which input is image taken from camera it is either video file or digital image. In video file, images are segmented as frames, that contains lot of impurities (such as noise) it is eliminated during the preprocessing steps. Finally we get the needed image based on the user's requirement

1.6. Feature Extraction

Here image feature is set based on the users relevant of information. Many data analysis software are used for this purpose like MAT LAB, Numpy.

1.7. Training of Images

After extracting the image features like texture and matrix conversion the pixel values are trained in the database by labeling the features of the images. The matrix conversion is done by giving intensity at each point x, y and RGB values are found [A matrix will be formed having M rows and N columns. Then the images are labeled in the database. So, it can be retrieved from the database easily. These labeling is done by the features of the image. Now, the image is stored in the database.

1.8. Retrieval of Image

In the final phase we get the image based on the users query. Various techniques are used to retrieve the relevant image.

1.9. These Results are Extracted by the Following Process

Step1: First, the image is given as the input to the from the camera.
Step2: Initially, this image is a raw image where it contains noise.
Step3: Then, the Features like Texture, Color and Shape are extracted by the RGB values
Step4: These features values and database values are matched. If it matched there will be fast retrieval of the image is done. The content of the image is also retrieved.

1.10. Color Histogram

A histogram is nothing but a graph that represents all the colors and the level of their occurrence in an image irrespective of the type of the image (Saravanan and Srinivasan, 2010). Few basic properties about an image can be obtained from using a Histogram **Fig. 6**. It can be used to set a threshold for screening the images. The shape and the concentration of the colors in the histogram will be the same for similar objects even though they are of different colors. In general any image contains useful and unwanted information (Saravanan and Srinivasan, 2011a). The system has to differentiate between the both the basic concept behind the histogram generation is simple. Each pixel in the image is scanned and the respective color or intensity value is obtained for the pixel:

$$iColor = (16 * p1[0]) + p1[1] * 4 + p1[2]$$

Then a graph is generated with total number of pixels against the pixel intensity. An array variable is chosen to store the different intensities and the counter increases for each repeated intensity counting the total number of occurrences of that particular color or intensity (Kumar and Saravanan, 2013; Saravanan and Srinivasan, 2010):

$$iHistoArr [iColor] = iHistoArr [iColor] +1$$

1.11. Image Indexing

Indexing is the process to improve the performance and speed of given query. Indexing which plays a very vital role for image retrieval. Without indexing the process take time, that reduce the performance of system computing. Different methodology is adopted for image.

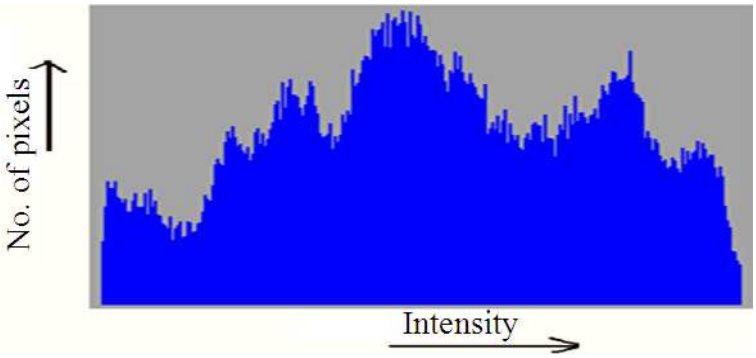

Fig. 7. Histogram

S no	Video name	Input frame	Histogram Val for matrix1	Histogram val for matrix2	No of output frame	Search time (Milli sec)	o/p frame
1	Cartoon 150 frames		336053, 335680, 736754	856311, 637202, 898637	5 to 33 from 150 frames	236	
2	Sports (Cricket)		722432, 000282, 923434	790904, 996289, 177775	4 to 25 From 152 frames	250	
3	Debate		605029, 603210 717768	678793, 613279, 750639	5 to 28 from 150 frames	265	
4	News		520569, 725504, 371481	891969, 653697, 255410	4 to 49 files from 150 frames	180	
5	Songs		748581, 644358, 445556	647636, 614854, 035176	5 to 33 files from 150 frames	265	

Fig. 8. Result of proposed matrix based indexing

Video Image Retrieval Using Data Mining Techniques (Saravanan and Srinivasan, 2012), Wicket Fall Concept Mining From Cricket Video Using A-Priori Algorithm (Mahesh *et al*., 2011), Re-ranking by local Re-scoring for video indexing and Retrieval (Safadi and Quenot, 2011) are used to index and retrieve the relevant image. To create an effective indexing avoids using multiple dimensions.

In case of using multiple dimensions the indexing technique is inefficient. In proposed methodology the matrix based indexing technique is consider. In this technique input frame is divided into rows and columns with help the matrix cell calculate the histogram value, it is used to retrieve the query image. Compare with other indexing technique it provides better results, experiments also verified this it shown in the **Fig. 7-12**.

1.12. Experimental Setup and Result

Five sets of Video files are taken (Cartoon, Sports (Cricket), Debate, News, Songs shown in **Fig. 8**).

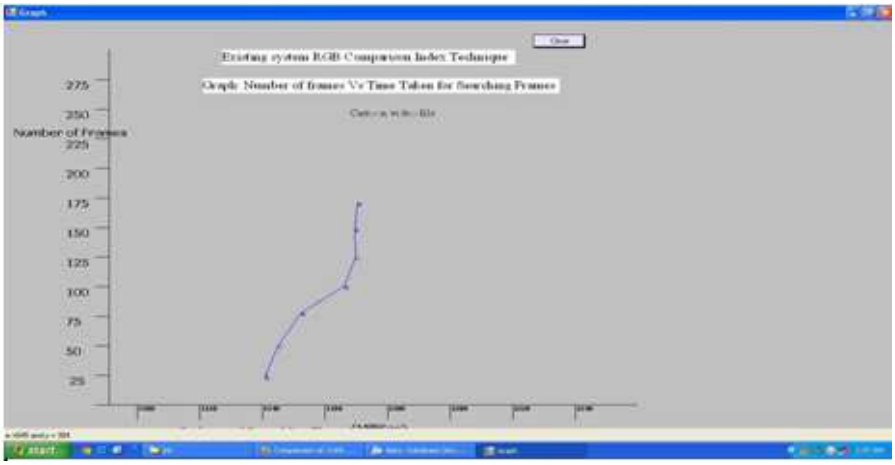

Fig. 9. RGB Comparison indexing technique (cartoon video file)

Fig. 10. Grid based indexing technique (cartoon video file)

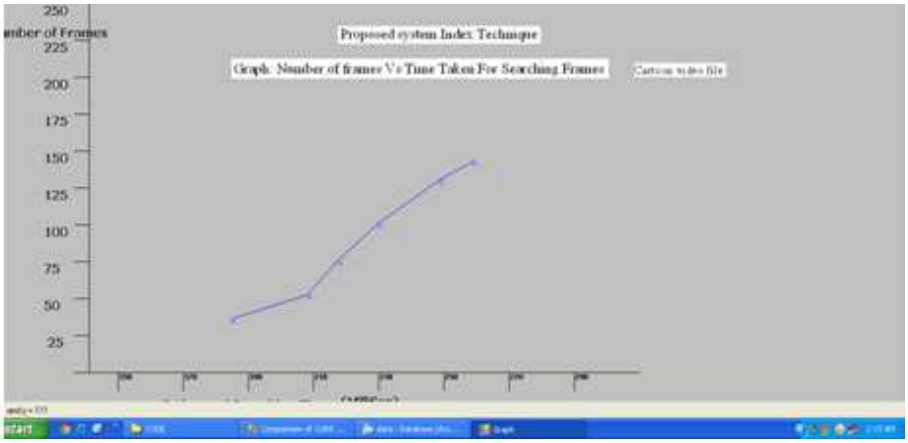

Fig. 11. Proposed matrix based indexing (cartoon video file)

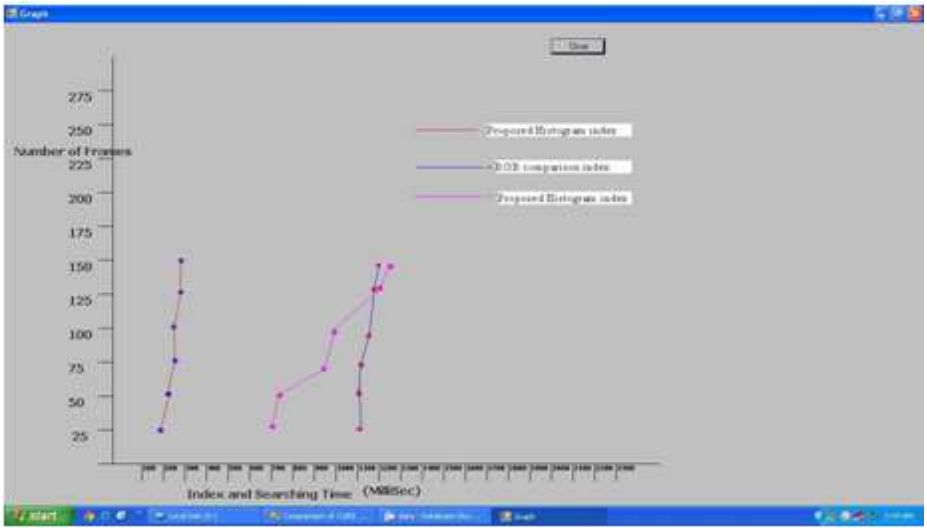

Fig. 12. Comparison of three indexing technique for cartoon vide file

After segmenting the image, Grey value represents the value of the difference between the two adjacent image grey values. By assuming a threshold for the grey value the duplicate images are found out (Saravanan and Srinivasan, 2011b). Using file handling method the duplicate files are eliminated. After eliminated duplication the grouping frames are taking as input for proposed matrix based indexing technique. In each frame the histogram value is calculated in the g the following manner. This value is stored for retrieval of user input query:

For i = 0 to matrix1 height
For j = 0 to matrix1 Width
Histoval 1 = histoval 1 +histo (i,j)
Loop
Loop
For i = 0 to matrix2 height
For j = 0 to matrix2 Width
Histoval 2 = histoval 2+histo (i,j)
Loop
Loop

1.13. Threshold

Matrix 1threshold val 1 = Histoval of matrix 1 of input frame + (matrix size/2)
Matrix 1threshold val 2 = Histoval of matrix 1 of input frame - (matrix size/2)

Matrix 2threshold val 1 = Histoval of matrix 2 of input frame + (matrix size/2)
Matrix 2threshold val 2 = Histoval of matrix 2 of input frame-(matrix size/2)

This is done by two set of process one far client side for training the input frame and other one for compare the given input to the trained data set the number of output and time take for retrieve the output are noted (tab 1)

1.14. Comparison

If (Histoval of matrix 1 of Database value >=Matrix 1threshold val 1) and
(Histoval of matrix 1 of Database value <= Matrix 1threshold val 2)

And

If (Histoval of matrix 2 of Database value >=Matrix 2threshold val 1) and
(Histoval of matrix 2 of Database value <= Matrix 2threshold val 2)

1.15. Frames Selected

Time for index and relevant frames are noted

1.16. Training Phase Algorithm

- Select Frame
- Find pixel values of frame
- Select 2 matrixes diagonally with pixel values as dynamic as per the original height and width of the frame
- Read the matrix1 and matrix2 pixel values and convert to histogram format and store it in database

- Find the input parameters like frame no, frame name, pathname, matrix value1, matrix value2, index time are stored as trained inputs in the database
- Select next frame, continue with step2

1.17. Frame Retrieval or Recognition Phase

- Select Input frame
- Find pixel values of frame
- Select 2 matrixes diagonally with pixel values as dynamic as per the original height and width of the frame
- Read the matrix1 and matrix2 pixel values and convert to histogram format and store it in database
- Find the input parameters like frame no, frame name, pathname, matrix value1, matrix value2, index time
- Compare the parameters with the existing database. But the comparison is based on the setting the threshold
- Matrix1 histo val (threshold) = matrix 1 histoval (input frame)+(Total pix val of matrix1/2)
- Matrix2 histo val (Threshold) = matrix 2 histoval (input frame)+(Total pix val of matrix2/2)
- Frames that are related to those threshold values are the output frames

1.18. Video Applications

Here some of the major domains where the video files are frequently utilized are listed

1.19. News Videos

This type of video files proved to be news to the audience. The news Producer and reporters use the video for reproducing the information based on the need. It also offers to retrieve a particular event based on request by the audience.

1.20. Entertainment Videos

These types of video files provide entertainment to the viewers. Additionally it provides information on analysis to the viewers for their favorite movie, actor and scene.

1.21. Educational Videos

It provides knowledge to the end user in their research and various experiments. From this they get information related to their studies.

1.22. Animated Videos

It offers knowledge to the end user in the filed of real time applications such as explosive type experiments, causes of experiments, medical functions in human body and medical treatment.

1.23. Sports Videos

It enables the player to learn the knowledge in their respective games and also analyze their performance.

1.24. Lecture Video

Today it provides lot of knowledge in the filed education. Online teaching, Online experiments, demo and lecture are conducted the help of video.

2. CONCLUSION

Data mining is the process of extracting knowledge efficiently and effectively e from hidden data set. If Most of the data mining work is devoted to extract text or numerical information alone, very less work is done for image retrieval. Image mining is a branch of data mining. Storing of image content in the data base is easy, but it is very difficult to extract the needed information. So the image information in the image data base are effectively organized. Due to the increasing need of image data it should be indexed, to build the dictionary of image region. This study has proposed a new matrix based indexing technique for efficient image retrieval the proposed system is compared with other two existing systems Experiment result show that the proposed system is effective.

3. ACKNOWLEDGEMENT

Working Presently as Sr. Lecturer in Dept of MCA, Sathyabama University Chennai and Tamilnadu, He has 14 Years of Teaching Experience in Engineering College. Area of interest is Data Mining, Image Processing; DBMS. He has guided 15 M. Phil Research in various platforms.

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